

**THE GOVERNING BOARD OF THE
ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION
INVITATION FOR BID 36033**

The Governing Board of the St. Johns River Water Management District (the “District”), requests that interested parties respond to the solicitation below by 2:00 p.m., September 30, 2020. Further information is available through DemandStar at *Demandstar.com* [(800) 711-1712], Vendor Registry at *Vendorregistry.com*, or the District’s website at *sjrwmd.com*. Solicitation packages may be obtained from DemandStar, Vendor Registry, or the District by calling or emailing Gerald Cahalane, Associate Procurement Specialist, at 386-326-3034 or Gcahalane@sjrwmd.com. Responses will be opened in the Procurement Conference Room, Administration Building, Palatka Headquarters, 4049 Reid Street, Palatka, Florida 32177-2571.

*Pursuant to the State of Florida Office of the Governor, Executive Order 20-52 (Emergency Management – COVID-19 Public Health Emergency) and the St. Johns River Water Management District Order 2020-05 (SJRWMD F.O.R. No. 2020-10) (Emergency Authorization For Continuity of Operations, Procurement, and Certain Other Measures Made Necessary By COVID-19), public meetings that are a part of District solicitations will be conducted by electronic means (webinar or telephone) during the terms of these orders. These meetings include, but are not limited to, solicitation openings, meetings for evaluation committees, presentations, negotiations, and pre-bid/pre-proposal meetings. **For this solicitation, interested respondents may participate in these meetings via teleconference by calling toll-free at 1-888-585-9008 or 657-220-3242 and entering the conference room number 864-005-056#.***

The objective of this project is to provide a pump system to move water from the Duda central portion of the Lake Apopka North Shore (LANS) to the east side of the LANS. The project consists of the construction of a transfer pumping station, an earthen berm with controlled culverts across lake level canal, and a controlled culvert from the lake level canal to the east side of the LANS.

The engineer's construction estimate for the first term of the project is \$1,340,000.00.

Special accommodations for disabilities may be requested through Gerald Cahalane, Associate Procurement Specialist, at 386-326-3034 or by calling (800) 955-8771 (TTY), at least five business days before the date needed.

A Non-Mandatory Pre-Bid Conference is scheduled for **September 8, 2020, at 1:30 p.m.** This will be held via teleconference. The purpose of the pre-bid conference is to clarify requirements of this solicitation. **Site access will be at the exit of the Apopka Wildlife Drive on the LANS, on the morning of September 8, 2020, from 10:00AM to 11:00AM.**

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INSTRUCTIONS TO RESPONDENTS

1. DEFINITIONS

The definitions of capitalized terms used in this solicitation that are not otherwise defined herein can be found in the sample contract document (the “Agreement”) that is at the end of these instructions. The Agreement includes these Instructions to Respondents, any addenda published by the District, the bid provided by Respondent (the “Bid”), and all required certifications and affidavits.

2. CONTRACT ADMINISTRATION

All inquiries related to this solicitation may only be directed to the Procurement Specialist:

Gerald Cahalane, Associate Procurement Specialist
 Phone: 386-326-3034
 Fax: 386-329-4546
 Email: Gcahalane@sjrwmd.com

Between the release of this solicitation and the posting of the notice of intended decision, Respondents to this solicitation or persons acting on their behalf may not contact any employee or officer of the District concerning any aspect of this solicitation, except the procurement employee listed above. Violation of this provision is grounds for rejecting a response.

3. WHERE TO DELIVER BID

The Bid must be submitted in a sealed envelope to:

Gerald Cahalane, Associate Procurement Specialist
 Attn: Office of Financial Services
 St. Johns River Water Management District
 4049 Reid St, Palatka, FL 32177-2571

Respondents must clearly label the Bid envelope with **large bold, and/or colored lettering (place label on inner envelope if double sealed)** as follows:

SEALED BID — DO NOT OPEN
 Respondent’s Name: _____
 Invitation for Bid: 36033
 Opening Time: 2:00 p.m.
 Opening Date: September 30, 2020

Please note that the United States Postal Service does not deliver regular mail or express mail to the above address. The District’s experience is that Federal Express and United Parcel Service will.

4. OPENING OF BIDS

Respondents or their authorized agents are invited to attend the opening of the Bids at the following time and place:

2:00 p.m., September 30, 2020
Please see special instructions on page 1 regarding necessary teleconferencing information due to COVID-19.

The Florida Public Records Act, §119.071(1)(b), Fla. Stat., exempts sealed Bids from inspection and copying until such time as the District provides notice of an intended decision pursuant to §120.57(3)(a), Fla. Stat., or until 30 days after opening of bids, proposals, submittals, or final replies, whichever is earlier. This exemption is not waived by the public opening of the Bids.

Unless otherwise exempt, Respondent's Bid is a public record subject to disclosure upon expiration of the above exemption period. If any information submitted with the Bid is a trade secret as defined in §812.081, Fla. Stat., and exempt from disclosure pursuant to §815.04, Fla. Stat., Respondent must clearly identify any such material as "CONFIDENTIAL TRADE SECRET" in its Bid and explain the basis for such exemption. The District reserves the right, in its sole judgment and discretion, to reject a Bid for excessive or unwarranted assertion of trade secret confidentiality and return the Bid to Respondent.

5. PREPARATION AND ORGANIZATION OF BID DOCUMENTS

Respondent must submit its Bid in "digital" format. Instructions for submitting are provided below.

1. Respondents must submit the following fully executed documents on reproduced copies of the attached forms provided in FORMS:
 - a. Bid Form
 - b. Cost Schedule
 - c. Certificate as to Corporation
 - d. Affidavit as to Non-collusion and Certification of Material Conformance with Specifications
 - e. Qualifications (General, Similar Projects, Client References, Subcontractors, and other required qualification forms)
 - f. Drug-Free Workplace Form (not required unless there is a tie bid)
 - g. Bid bond form
2. Respondents must submit the original bid package in the form and manner specified herein. All blank spaces on the bid documents must be typewritten or legibly printed in ink. Respondent must specify the cost for any one complete bid item or the entire work described in the Agreement (the "Work") in figures as indicated by the spaces provided. In the event you decline to submit a bid, the District would appreciate submittal of the "No Response Form" provided at the end of the "FORMS" section to describe the reason for not submitting a bid.
3. Respondent must follow all procedures for digital submission or the Respondent's Bid may be determined as "non-responsive" and rejected.
4. Unless directed otherwise, all information required by the solicitation, including the forms and questionnaires listed under "A" above must be completed (typed or hand written) and included in the submission in electronic format (forms must be completed and converted/scanned to PDF format (Adobe).
5. The file-naming conventions for the bid shall include:
 - h. Bid: IFB # Respondent's name (abbreviated) Due Date
(Example: IFB 12345 ABC Company 01-15-16)
6. All digitally submitted files shall be saved to a single CD or pin/thumb/jump drive. The CD or pin/thumb/jump drive MUST be placed in a sealed envelope pursuant to the instructions under Item 3 for sealed Bid – DO NOT SUBMIT YOUR BID BY EMAIL — THIS WILL RESULT IN THE BID BEING REJECTED AS NON-RESPONSIVE.
7. Please do NOT password protect your files. The District recommends that Respondents confirm their Submittal will open correctly on a non-company owned computer. Any electronic submittal received by the District that does not open on a District-owned computer is subject to rejection as a defective response.

All of the forms and questionnaires in the Invitation for Bids package are available upon request in Microsoft® Word to aid the Respondent in submitting its Bid.

If you need assistance or have any questions about the format, please call or email Gerald Cahalane at 386-326-3034 or Gcahalane@sjrwmd.com.

6. INQUIRIES AND ADDENDA

District staff are not authorized to orally interpret the meaning of the specifications or other Agreement documents, or correct any apparent ambiguity, inconsistency, or error therein. In order to be binding upon the District, the interpretation or correction must be given by the Procurement Specialist and must be in writing. The Procurement Specialist may orally explain the District's procedures and assist Respondents in referring to any applicable provision in the Invitation for Bids documents, but the Respondent is ultimately responsible for submitting the Bid in the appropriate form and in accordance with written procedures.

Every request for a written interpretation or correction must be received at least nine days prior to opening of Bids in order to be considered. Requests may be submitted by fax at 386-329-4546 or by email at Gcahalane@sjrwmd.com. Interpretations, corrections, and supplemental instructions will be communicated by written addenda to this solicitation posted by DemandStar and Vendor Registry to all prospective Respondents (at the respective addresses furnished for such purposes) no later than five days before the opening of Bids.

Submission of a Bid constitutes acknowledgment of receipt of all addenda. Bids will be construed as though all addenda had been received. Failure of the Respondent to receive any addenda does not relieve Respondent from any and all obligations under the Bid, as submitted. All addenda become part of the Agreement.

7. ENGINEER'S ESTIMATE

The engineer's construction estimate for the project is \$1,340,000.00. The above amount is an estimate only and does not limit the District in awarding the Agreement. Respondents are cautioned to not make any assumptions from the engineer's construction estimate about the total funds available for the Work. The District retains the right to adjust the estimate in awarding the Agreement. The District also reserves the right to reject all Bids if subsequent negotiations with qualified Respondents result in costs over the engineer's construction estimate. In addition, the District reserves the right to increase, decrease, or delete any class, item, or part of the Work in order to reduce costs for any reason. The District may discuss alternatives for reducing the cost of the Work with Respondents and make such modifications as it determines to be in its best interest.

8. MINIMUM QUALIFICATIONS

Respondent must use the "Qualification" forms (General, Similar Projects, and Client References) provided in these documents to document the minimum qualifications listed below. Failure to include these forms with the Bid may be considered non-responsive.

- a. Respondent must have a state of Florida licensed General Contractor or Underground Utility and Excavation Contractor (provide copy of license with submittal).
- b. Respondent (or a combination of the firm, individual, or project manager assigned to the work) must have successfully completed at least three construction projects of a similar scope and each qualifying project must include the following type of work: pump station construction or rehabilitation within the five years immediately preceding the date for receipt of Bids.
- c. Respondent (or a combination of the firm, individual, or project manager assigned to the work) must have successfully completed at least three projects of a similar nature (Two projects must have had a project value of at least \$250,000 and one project shall be \$500,000 or greater. Each project value

shall be all associated with the pump station work. No more than one (1) project may be from the District. Should a District project be included, do not request a reference from the District, as the close out documents for that work and the project manager's evaluation will be utilized. Each of the three projects submitted shall also be utilized as a reference (use the SIMILAR PROJECTS FORM). (Add additional sheets for optional additional completed projects.) within the five years immediately preceding the date for receipt of Bids. Each project must have had a project value of at least \$250,000.00.

- d. Respondent must have no less than five years of experience on projects of the nature specified above.
- e. Respondent must provide three client references. Up to two of the client references may be from the similar projects listed in response to subparagraph (a), above. No more than one of the references may be from completed District projects. If a District project is cited, do not request a letter from District staff.

Irrespective of the minimum qualifications stated above, the District may make such investigations as it deems necessary to determine the ability of the Respondent to perform the Work. The District reserves the right to reject any Bid if the evidence submitted by such Respondent and/or the District's independent investigation of such Respondent fails to satisfy the District that such Respondent is properly qualified to carry out the obligations of the Agreement and complete the Work in a manner acceptable to the District within the time period specified.

9. **BID GUARANTY**

Each Bid must be accompanied by a Bid guaranty in the form of a Bid bond or cashier's check, payable to the District, for five percent of the "Total Bid Cost" indicated on the Bid. Cash will not be accepted. The Bid bond must be written through a licensed Florida agency with a company licensed to do business in the State of Florida and meeting the requirements of the Agreement. The guarantee must provide that the Bid will remain firm for 60 days after the designated date and hour of the Bid opening; that if the Bid is accepted, Respondent must enter into a contract with the District in accordance with the Agreement; and that Respondent will provide any required performance and payment bonds and certificates of insurance.

If Respondent withdraws its Bid after receiving notice of acceptance thereof, Respondent will be liable to the District for the full amount of the guaranty as representing the District's damages on account of Respondent's default.

Within ten days after the Bid opening, the Bid guaranty will be refunded to all respondents, except the three lowest responsive and responsible Respondents. The remaining Bid guarantees will be refunded within 30 days after the District and the Successful Respondent have executed the Agreement and all other necessary documents.

Attorneys-in-fact who sign Bid bonds and performance and payment bonds must file with such bonds a certified copy of their power of attorney to sign such bonds. All bonds must be countersigned by a Florida resident agent of the surety, with proof of agency attached.

10. **SUBCONTRACTS**

Respondent must identify all portions of the Work Respondent intends to perform through subcontractors for each portion of the Work exceeding ten percent of the Work on the attached "Proposed Subcontractors" form. Respondent must submit with its Bid a list of all known subcontractors who will participate in more than ten percent of the Work. The prime contractor shall provide a minimum of 50% of the labor. Acceptance of the Bid does not constitute approval of the subcontractors identified with the Bid.

11. SIGNATURE AND CERTIFICATION REQUIREMENTS

An individual submitting a Bid must sign his/her name therein and state his/her address and the name and address of every other person interested in the Bid as principal. If a firm or partnership submits the Bid, state the name and address of each member of the firm or partnership. If a corporation submits the Bid, an authorized officer or agent must sign the Bid, subscribing the name of the corporation with his or her own name and affixing the corporate seal. Such officer or agent must also provide the name of the state under which the corporation is chartered, and the names and business addresses of the President, Secretary, and Treasurer. Corporations chartered in states other than Florida must submit evidence of registration with the Florida Secretary of State for doing business in the State of Florida. Respondent must certify that all persons or entities having an interest as principal in the Bid or in substantial performance of the Work have been identified in the Bid forms.

12. DISQUALIFICATION OF RESPONDENTS

Any of the following causes will be considered as sufficient grounds for disqualification of a Respondent and rejection of the Bid:

- a. Contacting a District employee or officer other than the procurement employee named in this solicitation about any aspect of this solicitation before the notice of intended decision is posted.
- b. Submission of more than one Bid for the same subject matter by an individual, firm, partnership, or corporation under the same or different names;
- c. Evidence of collusion among Respondents;
- d. Submission of materially false information with the Bid;
- e. Information gained through checking of references or other sources which indicates that Respondent may not successfully perform the Work;
- f. Incomplete contractual commitment(s) to other persons or entities, which, in the sole judgment of the District, may hinder or prevent the prompt completion of the Work if awarded to Respondent;
- g. Respondent is failing to adequately perform on any existing contract with the District;
- h. Respondent has defaulted on a previous contract with the District;
- i. The evidence submitted by Respondent, or the District's investigation of Respondent, fails to satisfy the District that Respondent is properly qualified to carry out the obligations of the Agreement in a manner acceptable to the District and within the time period specified;
- j. Any other cause that is sufficient to raise doubt regarding the ability of a Respondent to perform the Work in a manner that meets the District's objectives for the Work.

13. REJECTION OF BID

Bids must be delivered to the specified location and received before the Bid opening in order to be considered. Untimely Bids will be returned to the Respondent unopened. Bids will be considered irregular and may be rejected if they show material omissions, alterations of form, additions not called for, conditions, limitations, or other material irregularities. The District may consider incomplete any Bid not prepared and submitted in accordance with the provisions specified herein, and reserves the right to waive any minor deviations or irregularities in an otherwise valid Bid.

The District reserves the right to reject any and all Bids and cancel this request for qualifications when it determines, in its sole judgment and discretion, that it is not in its best interest to award the agreement.

14. WITHDRAWAL OF BIDS

Respondent may withdraw its Bid if it submits such a written request to the District prior to the designated date and hour of opening of Bids. Respondent may be permitted to withdraw its Bid no later

than 72 hours after the Bid opening for good cause, as determined by the District in its sole judgment and discretion.

15. AWARDING THE AGREEMENT

- a. The Agreement will be awarded to the lowest responsive, responsible Respondent, being the Respondent with the lowest Total Bid Cost who demonstrates, in accordance with the requirements of the bid documents, a verifiable history of the skill, ability, integrity, and reliability necessary for the faithful performance of the Agreement (the "Successful Respondent"). The Agreement may be modified based on the District's acceptance of any alternatives listed in the bid that the District deems in its best interest.
- b. Section 286.0113, Fla. Stat., exempts from being open to the public, any portion of a meeting at which: (1) a negotiation with a Respondent is conducted pursuant to a competitive solicitation; (2) a Respondent makes an oral presentation as part of a competitive solicitation; (3) a Respondent answers questions as part of a competitive solicitation; or (4) negotiation strategies are discussed. Also, recordings of, and any records presented at, the exempt meeting are exempt from §119.07(1) and §24(a), Art. I of the State Constitution (Public Records) until such time as the District provides notice of an intended decision or until 30 days after opening the bids, proposals, submittals, or final replies, whichever occurs earlier. A complete recording shall be made of any portion of an exempt meeting. No portion of the exempt meeting may be held off the record.
- c. Pursuant to §286.0113 Fla. Stat., if the District rejects all bids and concurrently provides notice of its intent to reissue the competitive solicitation, any recordings or records presented at any exempt meeting relating to the solicitation shall remain exempt from §119.07(1) and §24(a), Art. I of the State Constitution (Public Records) until such time as the District provides notice of an intended decision concerning the reissued competitive solicitation or until the District withdraws the reissued competitive solicitation. A recording and any records presented at an exempt meeting are not exempt for longer than 12 months after the initial District notice rejecting all bids.
- d. If two or more bids are equal in all respects, the Agreement will be awarded as follows: (1) to the Respondent that certifies compliance with §287.087, Fla. Stat., via the Drug-Free Workplace Form; (2) to a Respondent university in the State University System pursuant to §373.63, Fla. Stat.; (3) to a Respondent whose bid contains commodities manufactured, grown, or produced within the State of Florida pursuant to §287.082 Fla. Stat.; or (4) by lot.
- e. For 60 days after the designated date and hour of the opening of bids, the Respondent will not be permitted to increase its bid cost.
- f. The District reserves the right to award the Agreement to the next lowest available bidder in the event the Successful Respondent fails to enter into the Agreement, or the Agreement with said Respondent is terminated within 90 days of the effective date.
- g. All Respondents will be notified of the District's intent to award or decision to award the Agreement. For the purpose of filing a bid protest under §120.57(3), Fla. Stat., the time period will commence as provided in "NOTICES AND SERVICES THEREOF."

16. EXECUTION OF AGREEMENT

Submittal of a Bid binds the Successful Respondent to perform the Work upon acceptance of the Bid and execution of the Agreement by the District.

Unless all Bids are rejected, a contract substantially in the form included in these documents will be provided to the Successful Respondent, who must execute and return the Agreement to the District within ten days of the date of receipt, along with the following:

- a. A performance and payment bond
- b. A completed Internal Revenue Service Form W-9

- c. Satisfactory evidence of all required insurance coverage
- d. Proof satisfactory to the District of the authority of the person or persons executing the Agreement on behalf of Respondent
- e. All other information and documentation required by the Agreement

The District will not execute the Agreement until the above documents have been executed and delivered to the District. The Agreement will not be binding until executed by the District. A copy of the fully executed Agreement will be delivered to the Successful Respondent. The District reserves the right to cancel award of the Agreement without liability at any time before the Agreement has been fully executed by all parties and delivered to the Successful Respondent.

Failure upon the part of the Successful Respondent to execute the Agreement or timely submit the required evidence of insurance coverage, or any other matter required by the Agreement, will be just cause, if the District so elects, for the recommended award to be annulled. In such event, the District will be entitled to the full amount of the guaranty, not as a penalty, but in liquidation of and compensation for damages sustained.

17. EXAMINATION OF AGREEMENT DOCUMENTS AND WORK AREA

Respondent is solely responsible for being fully informed of the conditions under which the Work is to be performed in relation to existing conditions. Respondent is responsible for carefully examining the general area of the Work, the requirements of the drawings and other contract documents related to the Work, the time in which the Work must be completed, and any other details of the Work. Respondent must satisfy itself from its own personal knowledge and experience or professional advice as to the character of the Work, the conditions and materials to be encountered, the character, quality, and quantities of the Work, and any other conditions affecting the Work, including surrounding land.

Failure to satisfy the obligations of this paragraph will not relieve a Successful Respondent of its obligation to furnish all material, equipment, and labor necessary to perform the Agreement and to complete the Work for the consideration set forth in its Bid. Any such failure will not be sufficient cause to submit a claim for additional compensation.

No verbal agreement or conversation with any District officer, agent or employee, either before or after the execution of the Agreement, will affect or modify any of its terms.

18. DIVERSITY

The District is committed to the opportunity for diversity in the award and performance of all procurement activities. The District encourages its Prime Respondents to make a good faith effort to ensure that women and minority-owned business enterprises (W/MBE) are given the opportunity for maximum participation as second and lower tier participants. The District will assist Respondents by sharing information on W/MBEs to encourage their participation.

19. FLORIDA SALES TAX

The District is exempt from payment of State of Florida sales tax pursuant to §212.08(6), Fla. Stat. Any tangible personal property that is the subject of this Invitation for Bids is intended to remain tangible personal property and not become part of a public work owned by the District.

20. PUBLIC ENTITY CRIMES/DISCRIMINATORY VENDORS

In accordance with §287.133 and §287.134, Fla. Stat., a person or affiliate who has been placed on the convicted or discriminatory vendor lists following a conviction for a public entity crime or placement on the discriminatory vendor list may not submit a bid, proposal, or reply on a contract to provide any goods or services to a public entity; may not submit a bid, proposal, or reply on a contract with a public entity for the construction or repair of a public building or public work; may not submit bids, proposals, or

replies 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 any public entity; and may not transact business with any public entity in excess of the threshold amount provided in §287.017 for CATEGORY TWO (\$35,000) for a period of 36 months following the date of being placed on the convicted or discriminatory vendor lists.

21. USE BY OTHER FLORIDA GOVERNMENTAL ENTITIES

Respondent may provide services to other State of Florida governmental entities pursuant to the terms and conditions of the Agreement. These governmental entities include other water management districts, state of Florida agencies (including members of the state university system and community college system), counties, school boards, municipalities, special districts, and other local public agencies or authorities. References to the St. Johns River Water Management District in the Agreement will be replaced with the purchasing entity and the District will not be a party to any other governmental entity's agreement to purchase. Nor will the District be responsible for payment for any goods or services delivered or performed for any other governmental entity that utilizes Respondent pursuant to this paragraph.

22. NOTICES AND SERVICES THEREOF

The District will publish notice of specifications and criteria, including addenda, intended agency decisions, or other matters pertinent to this solicitation on Onvia DemandStar at *DemandStar.com* and Vendor Registry at *vendorregistry.com*. Onvia DemandStar and Vendor Registry may also be accessed through the District's web site at *sjrwm.com*. In addition, the District will post notices of intended agency decisions at the District's headquarters, 4049 Reid Street, Palatka, Florida, Administration Building, Procurement Bulletin Board, on the date the publication is posted on Onvia DemandStar.

Notices that are posted on Onvia DemandStar and Vendor Registry are deemed received at 8:00 a.m. on the next business day following the date posted. Notices that are posted at the District's Procurement Bulletin Board are deemed received at 8:00 a.m. on the next business day following the date of posting. Notices will be posted for a minimum of 72 hours following the time at which they are deemed received. The time period for filing a Notice of Protest pursuant to §120.57(3), Fla. Stat., and Rule 28-110.003, Fla. Admin. Code, commences at the time notices are deemed received.

As a courtesy to Respondents, the District may send copies of the notices of intended agency decisions via email or facsimile to Respondent. These courtesy communications neither constitute official notice nor vary the times of receipt set forth above.

23. PROTEST PROCEDURES

Pursuant to §120.57(3), Fla. Stat., and Rule 28-110.003, Fla. Admin. Code, any person adversely affected by the procurement methodology described herein, or the specifications or criteria, including addenda, must file a Notice of Protest within 72 hours after receipt of the solicitation documents or addenda.

Pursuant to §120.57(3), Fla. Stat., and Rule 28-110.003, Fla. Admin. Code, any person adversely affected by a District decision or intended decision to award a contract, or to reject all bids, proposals, or qualifications, must file a Notice of Protest within 72 hours after receipt of the decision or intended decision. Pursuant to §120.57(3), Fla. Stat., and Rule 28-110.004, Fla. Admin. Code, the protester must also file with the District Clerk a Formal Written Protest within ten days after the date the Notice of Protest is filed with the District. The Formal Written Protest must state with particularity the facts and law upon which the protest is based. Pursuant to §287.042(2)(c), Fla. Stat., any person who files an action protesting the decision or intended decision must post with the District Clerk at the time of filing the formal written protest a bond, cashier's check, or money order made payable to the St. Johns River Water Management District in an amount equal to one percent (1%) of the estimated contract amount.

No additional time will be added for mailing. All filings must comply with Rule 28-106.104, Fla. Admin. Code, and must be addressed to and received by the District Clerk at the District Headquarters in Palatka, Florida within the prescribed time periods. The District will not accept as filed any electronically transmitted facsimile pleadings, petitions, Notice of Protest or other documents. Failure to file a protest within the time prescribed in §120.57(3), Fla. Stat., or failure to post the bond or other security required by law within the time allowed for filing a bond will constitute a waiver of proceedings under chapter 120, Fla. Stat. Mediation under §120.573, Fla. Stat., is not available.

FORMS
BID FORM

Include this form in the response

RESPONDENT:

The undersigned, as Respondent, hereby declares and certifies that the only person(s) or entities interested in this bid as principal(s), or as persons or entities who are not principal(s) of the Respondent but are substantially involved in performance of the Work, is or are named herein, and that no person other than herein mentioned has any interest in this bid or in the Agreement to be entered into; that this bid is made without connection with any other person, company, or parties making a bid; and that this bid is in all respects fair and in good faith without collusion or fraud.

Respondent represents to the District that, except as may be disclosed in an addendum hereto, no officer, employee or agent of the District has any interest, either directly or indirectly, in the business of Respondent to be conducted under the Agreement, and that no such person shall have any such interest at any time during the term of the Agreement, should it be awarded to Respondent.

Respondent further declares that it has examined the Agreement and informed itself fully in regard to all conditions pertaining to this solicitation; it has examined the specifications for the Work and any other Agreement documents relative thereto; it has read all of the addenda furnished prior to the bid opening, as acknowledged below; and has otherwise satisfied itself that it is fully informed relative to the Work to be performed.

Respondent agrees that if its bid is accepted, Respondent shall contract with the District in the form of the attached Agreement, and shall furnish everything necessary to complete the Work in accordance with the time for completion specified in the Agreement, and shall furnish the required evidence of the specified insurance.

Acknowledgment is hereby made of the following addenda (identified by number) received:

Addendum No.	Date	Addendum No.	Date
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Respondent (firm name) _____
Date

Address

Email address

Signature _____
Telephone number

Typed name and title _____
Fax number

COST SCHEDULE

Include this form in the response

Bid to be opened at 2:00 p.m., September 30, 2020

To: ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

In accordance with the advertisement requesting bids for the Lake Apopka North Shore Interconnect Pump Station, subject to the terms and conditions of the Agreement, the undersigned proposes to perform the Work for the price contained in the following schedule (fill in all blanks).

If said bid exceeds the estimated amount previously provided, the District expressly reserves the right to increase, decrease, or delete any class, item, or part of the Work, as may be determined by the District.

Respondents are reminded to refer to “PREPARATION AND ORGANIZATION OF BID DOCUMENTS” for information to be included with the bid package.

The bid will be awarded to the lowest responsive and responsible Respondent for the Total Bid Cost.

Respondent’s Name: _____				
IFB 36033 COST SCHEDULE LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION				
DESCRIPTION AND ASSUMPTIONS	ESTIMATED QUANTITY	UNIT	UNIT PRICE	TOTAL AMOUNT
MOBILIZATION	1	LS	\$	\$
GENERAL CONDITIONS	1	LS	\$	\$
ANGLED LINESHAFT AXIAL FLOW PUMPS	1	LS	\$	\$
CANAL TRANSFER PUMP STATION	1	LS	\$	\$
EARTHEN BERM, CULVERTS AND SLIDE GATES	1	LS	\$	\$
CULVERT AND SLIDE GATE	1	LS	\$	\$
DEMOBILIZATION AND CLEANUP	1	LS	\$	\$
SUPPLEMENTAL WORK ALLOWANCE			\$ 64,000	\$ 64,000
TOTAL BID COST			\$	

Cost schedule continued on the next page.

Pursuant to §287.084(2) Fla. Stat., a vendor whose principal place of business is outside the State of Florida must accompany any written bid, proposal, or reply documents with a written opinion of an attorney at law licensed to practice law in that foreign state, as to the preferences, if any or none, granted by the law of that state to its own business entities whose principal places of business are in that foreign state in the letting of any or all public contracts.

I HEREBY ACKNOWLEDGE, as Respondent's authorized representative, that I have fully read and understand all terms and conditions as set forth in this bid and upon award of such bid, shall fully comply with such terms and conditions.

Date

Respondent (firm name)

Address

E-mail address

Signature

Telephone number

Typed name and title

Fax number

PROPOSED SUBCONTRACTORS

Include this form in the response

Respondent must identify all portions of the Work Respondent intends to perform through subcontractors.

- 1. Name and address of subcontractor: _____

Description of work: _____

Estimated value of Work: _____

- 2. Name and address of subcontractor: _____

Description of work: _____

Estimated value of Work: _____

- 3. Name and address of subcontractor: _____

Description of work: _____

Estimated value of Work: _____

- 4. Name and address of subcontractor: _____

Description of work: _____

Estimated value of Work: _____

- 5. Name and address of subcontractor: _____

Description of work: _____

Estimated value of Work: _____

- 6. Name and address of subcontractor: _____

Description of work: _____

Estimated value of Work: _____

CERTIFICATE AS TO CORPORATION

Include this form in the response

The below Corporation is organized under the laws of the State of _____; is authorized by law to respond to this Invitation for Bids and perform all work and furnish materials and equipment required under the Agreement, and is authorized to do business in the state of Florida.

Corporation name: _____

Address: _____

Registration No.: _____

Registered Agent: _____

By: _____

(Official title)

(Affix corporate seal)

Attest: _____

(Secretary)

The full names and business or residence addresses of persons or firms interested in the foregoing bid as principals or officers of Respondent are as follows (specifically include the President, Secretary, and Treasurer and state the corporate office held of all other individuals listed):

Identify any parent, subsidiary, or sister corporations involving the same or substantially the same officers and directors that will or may be involved in performance of the Project, and provide the same information requested above on a photocopy of this form.

If applicable, attach a copy of a certificate to do business in the state of Florida, or a copy of the application that has been accepted by the state of Florida to do business in the state of Florida, for the Respondent and/or all out-of-state corporations that are listed pursuant to this form.

AFFIDAVIT AS TO NON-COLLUSION AND CERTIFICATION OF MATERIAL CONFORMANCE WITH SPECIFICATIONS

Include this form in the response

STATE OF _____

COUNTY OF _____

I, the undersigned, _____ being first duly sworn, depose and say that:

1. I am the owner or duly authorized officer, representative, or agent of:

_____ the Respondent that has submitted the attached bid.

2. The attached bid is genuine. It is not a collusive or sham bid.

3. I am fully informed respecting the preparation and contents of, and knowledgeable of all pertinent circumstances respecting the attached bid.

4. Neither Respondent nor any of its officers, partners, owners, agents, representatives, employees, or parties in interest, including this affiant, has in any way colluded, conspired, connived, or agreed, directly or indirectly, with any other Respondent, firm, or person to submit a collusive or sham bid in connection with the Agreement for which the attached bid has been submitted, or to refrain from bidding in connection with such Agreement, or has in any manner, directly or indirectly, sought by agreement, collusion, communication, or conference with any other Respondent, firm, or person to fix the price or prices in the attached bid of any other Respondent, or to fix any overhead, profit, or cost element of the bid prices or the bid price of any other Respondent, or to secure through collusion, conspiracy, connivance, or unlawful agreement any advantage against the District or any other person interested in the proposed Agreement.

5. The price(s) quoted in the attached bid are fair and proper and are not tainted by any collusion, conspiracy, connivance, or unlawful agreement on the part of the Respondent or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

6. No official or other officer or employee of the District, whose salary or compensation is payable in whole or in part by the District, is directly or indirectly interested in this bid, or in the supplies, materials, equipment, work, or labor to which it relates, or in any of the profits therefrom.

7. Any materials and equipment proposed to be supplied in fulfillment of the Agreement to be awarded conform in all respects to the specifications thereof. Further, the proposed materials and equipment will perform the intended function in a manner acceptable and suitable for the intended purposes of the District.

Signature: _____

Title: _____

Subscribed and sworn to before me this _____ day of _____, 20 ____.

Notary Public, state of _____ at Large

My commission expires:

(SEAL)

QUALIFICATIONS — GENERAL

Include this form in the response

As part of the bid, Respondent shall complete the following so that the District can determine Respondent’s ability, experience, and facilities for performing the Work.

Name of Respondent: _____

Respondent’s tax identification No.: _____

Year company was organized/formed: _____

Number of years Respondent has been engaged in business under the present firm or trade name: _____

Total number of years Respondent has experience in similar projects for pump station construction (please reference Minimum Qualifications section of this bid packet for additional information) INSTRUCTIONS TO RESPONDENTS: _____

Has Respondent previously been engaged in the same or similar business under another firm or trade name? If so, please describe each such instance.

Has Respondent ever been adjudicated bankrupt, initiated bankruptcy, or been the subject of bankruptcy proceedings on behalf of the current entity submitting this bid or a prior entity that Respondent substantially operated or controlled? If yes, please describe the nature and result of those proceedings and the entity involved.

Describe the background/experience of the person or persons who will be primarily responsible for directing the Work that will be performed pursuant to this bid. This inquiry is intended to encompass the project manager and/or superintendent who will be engaged on a daily basis in directing performance of the Work.

QUALIFICATIONS — SIMILAR PROJECTS

Include this form in the response

Respondent (or a combination of the firm, individual, or project manager assigned to the work) must have successfully completed at least one similar projects within the five years immediately preceding the date set for receipt of the response, as described in the INSTRUCTIONS TO RESPONDENTS. Each project shall have had a project value of at least \$250,000.00. (Add additional sheet for optional additional completed projects.)

Completed Project 1:

Agency/company: _____

Current contact person at agency/company: _____

Telephone: _____ Fax: _____ Email: _____

Address of agency/company: _____

Name of project: _____

Description: _____

Project value: _____ Start date: _____ Completion date: _____
(month/year) (month/year)

Name(s) of assigned personnel:

Project manager: _____

Others: _____

Completed Project 2:

Agency/company: _____

Current contact person at agency/company: _____

Telephone: _____ Fax: _____ Email: _____

Address of agency/company: _____

Name of project: _____

Description: _____

Project value: _____ Start date: _____ Completion date: _____
(month/year) (month/year)

Name(s) of assigned personnel:

Project manager: _____

Others: _____

QUALIFICATIONS — CLIENT REFERENCE

Include this form in the response

Respondent shall provide three client references, which may include the similar projects listed above. No more than one reference shall be from the District. (For similar projects listed above, simply state “Similar Project No. ___.”)

Client Reference 1:

Agency/company: _____

Current contact person at agency/company: _____

Telephone: _____ Fax: _____ E-mail: _____

Agency/Company Address: _____

Name of project: _____

Description: _____

Project value: _____ Project manager: _____

Client Reference 2:

Agency/company: _____

Current contact person at agency/company: _____

Telephone: _____ Fax: _____ E-mail: _____

Agency/Company Address: _____

Name of project: _____

Description: _____

Project value: _____ Project manager: _____

Client Reference 3:

Agency/company: _____

Current contact person at agency/company: _____

Telephone: _____ Fax: _____ E-mail: _____

Agency/Company Address: _____

Name of project: _____

Description: _____

Project value: _____ Project manager: _____

DRUG-FREE WORKPLACE FORM

This form required only in the event of a tie response

The Respondent, (business name) _____, in accordance with §287.087, Fla. Stat., hereby certifies that Respondent does the following:

1. Informs employees about the dangers of drug abuse in the workplace, the business’s policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations
2. Publishes a statement notifying employees that
 - a. the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against its employees for violations of such prohibition.
 - b. as a condition of working on the contractual services that are the subject of this solicitation, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of chapter 893, Fla. Stat., or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five days after such conviction.
3. Gives each employee engaged in providing the contractual services that are the subject of this solicitation a copy of the statement specified in paragraph 2, above.
4. Imposes a sanction on, or require the satisfactory participation in a drug abuse assistance or rehabilitation program if such is available in the employee’s community, by any employee convicted of a violation listed in sub-paragraph 2.b., above.
5. Makes a good faith effort to continue to maintain a drug-free workplace through implementation of §287.087, Fla. Stat.

As the person authorized to sign this statement, I certify that this firm complies fully with the above requirements.

By: _____

Title: _____

Date: _____/

BID BOND FORM

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
STATE OF FLORIDA

KNOW ALL MEN BY THESE PRESENTS that _____, whose address is: _____, (“Principal”), and _____, whose address is _____, (“Surety”), are held and firmly bound unto the St. Johns River Water Management District, whose address is 4049 Reid Street, Palatka, Florida 32177 (the “District”), in the Penal Sum of _____ dollars (\$ _____) lawful money of the United States, for the payment of which we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas Principal has submitted the accompanying bid for Bid 36033, Lake Apopka North Shore Interconnect Pump Station , which is scheduled to be opened on September 30, 2020.

NOW, THEREFORE, if Principal shall not withdraw this bid within 60 days after date of bid opening and shall within ten days after the prescribed forms are presented to him for signature, enter into a written contract with the District, in accordance with the bid as accepted, and shall give such bond or bonds as may be specified in the contract documents, with good and sufficient sureties, as may be required, for the faithful performance and proper fulfillment of the contract and give such bonds within the time specified; and, if Principal shall pay the District the difference between the amount specified in bid and the amount for which the District may procure the required work supplies, if the latter amount be in excess of the former, then the above obligations shall be void, and of no effect, otherwise to retain in full force and effect.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way diminished, impaired, or affected by any extension of the time within which the District may accept such Bid, and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the parties have executed this statement under their several seals this _____ day of _____, 20____, the name and corporate seal of each corporate party being affixed below and this statement being signed by his representative, pursuant to authority of its governing body.

Signed, sealed and delivered in the presence of:

PRINCIPAL

(Official Title)

By: _____
(typed name) (SEAL)

SURETY

(Official Title)

By: _____
(typed name) (SEAL)

NOTE: If Principal and Surety are corporations, the respective corporate seals should be affixed and attached. Attach a certified copy of Power-of-Authority appointing individual Attorney-in-Fact for execution of bid bond on behalf of Surety.

PERFORMANCE AND PAYMENT BOND

Bond Number _____
Surety Number _____

St Johns River Water Management District Contract Number 36033

BY THIS BOND, we, _____, whose address is _____,
_____, Phone _____, (“Principal”), and _____,
_____ whose address is _____,
Phone _____, a corporation organized under the laws of the state of _____ and licensed
to do business in the state of Florida (“Surety”), bind ourselves and our heirs, personal representatives,
successors, and assigns, jointly and severally, unto the St. Johns River Water Management District (the
“District”), whose address is 4049 Reid Street, Palatka, Florida 32177-2571, Phone (386) 329 4500, for the use
and benefit of claimants, as defined in §255.05(1), Fla. Stat., in the amount of Total Contract Amount,
\$ _____, for the payment of which sum will and truly be made.

THE CONDITION OF THIS BOND is that if Principal:

1. Performs the work described in these contract documents, which are incorporated into this bond by reference, at the times and in the manner prescribed in the contract; and
2. Promptly makes payment to all claimants supplying Principal with labor, materials, or supplies, used directly or indirectly by Principal in the prosecution of the Work described in the contract, and
3. Pays the District all losses and damages, expenses, costs, and attorney’s fees, including appellate proceedings, that the District sustains because of a default by Principal under the contract; and
4. Performs the guarantee of all work and materials furnished under the contract for the time specified in the contract, then this bond is void; otherwise it remains in full force.

Any action instituted by a claimant under this bond for payment must be in accordance with the notice and time limitation provisions in §255.05(2) and (10), Fla. Stat.

Any changes in or under the contract documents (which include the plans and specifications) and compliance or noncompliance with any formalities connected with the contract documents or the changes do not affect Surety’s obligation under this bond, and Surety hereby waives notice of any such changes. Further, Principal and Surety acknowledge that the Penal Sum of this bond shall increase or decrease in accordance with approved changes or other modifications to the contract documents.

IN WITNESS WHEREOF, Principal and Surety have executed this instrument under their several seals on this _____ day of _____, 20____, the name and corporate seal of each corporate party being hereto affixed and this Bond fully signed by each party’s undersigned representative, pursuant to authority of its governing body.

Signed, sealed and delivered in the presence of:

Principal _____

By: _____

(Official title)

(Typed name)

(SEAL)

Surety _____

By: _____

(Official title)

(Typed name)

(SEAL)

(Countersignature by Florida Registered Agent)

NOTE: If Principal and Surety are corporations, the respective corporate seals should be affixed and attached. Attach a certified copy of power of attorney appointing individual attorney-in-fact for execution of Payment Bond on behalf of Surety.

NO RESPONSE FORM
ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
INVITATION FOR BIDS 36033

Your reasons for not responding to this Invitation for Bids are valuable to the St. Johns River Water Management District’s procurement process. Please complete this form and return it to the Office of Financial Services no later than the date set for receipt of bids. Thank you for your cooperation.

Please check (as applicable):

- Specifications too “general” (explain below)
- Insufficient time to respond to the solicitation
- Do not provide this type of work for this project
- Schedule would not permit us to perform
- Unable to meet solicitation specifications
- Specifications unclear (explain below)
- Disagree with solicitation or Agreement terms and conditions (explain below)
- Other (specify below)

Remarks: _____

DATE _____

RESPONDENT (FIRM NAME) _____

ADDRESS _____

E-MAIL ADDRESS _____

SIGNATURE

TYPED NAME AND TITLE

TELEPHONE NUMBER

FAX NUMBER

**AGREEMENT BETWEEN THE
ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
AND _____ FOR
LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION**

THIS AGREEMENT is entered into by and between the GOVERNING BOARD of the ST. JOHNS RIVER WATER MANAGEMENT DISTRICT (the "District"), whose address is 4049 Reid Street, Palatka, Florida 32177-2571, and _____ ("Contractor"), whose address is _____. All references to the parties hereto include the parties, their officers, employees, agents, successors, and assigns.

In consideration of the payments hereinafter specified, Contractor agrees to furnish and deliver all materials and perform all labor required for 36033, Lake Apopka North Shore Interconnect Pump Station (the "Work"). In accordance with IFB 36033, Contractor shall complete the Work in conformity with this Agreement, which consists of and incorporates all of the following documents: (1) advertisement for bids, proposals, or qualifications; (2) Instructions to Respondents; (3) addenda; certifications, and affidavits; (4) bid, proposal, or qualifications submittals; (5) Agreement, including the Statement of Work, and any Special Conditions or other attachments. If any provision in the body of this Agreement conflicts with any attachment hereto, the body of this Agreement shall prevail. This Agreement, including attachments, shall take precedence over all solicitation documents (items 1 – 4). The parties hereby agree to the following terms and conditions.

1. TERM

- (a) The term of this Agreement shall be from the Effective Date to the Completion Date. Time is of the essence for each and every aspect of this Agreement. Where additional time is allowed to complete the Work, the new time limit shall also be of the essence. All provisions of this Agreement that by their nature extend beyond the Completion Date survive termination or expiration hereof.
- (b) **Completion Date.** The Completion Date of this Agreement is _____, unless extended by mutual written agreement of the parties. The Work shall be completed for use no later than said date. Contractor shall not commence work until the receipt of a written Notice to Proceed.
 - a. Commencement of Work. Contractor shall commence the Work on November 20, 2020. This date shall be known as the "Commencement Date." Contractor shall prosecute the Work regularly, diligently, and uninterruptedly so as to complete the Work ready for use in accordance with the Statement of Work and the time for completion stated therein. Contractor shall not commence the Work until any required submittals are received and approved.

2. LIQUIDATED DAMAGES

- (a) If Contractor neglects, fails, or refuses to satisfactorily complete the Work by the Completion Date, Contractor shall, as a part of the consideration for this Agreement, pay the District the amount stipulated herein, not as a penalty, but as liquidated damages for such breach, for each day Contractor is in default thereafter. This amount is fixed and agreed upon between the parties due to the impracticability and extreme difficulty of ascertaining the actual damages the District would sustain in such event. The amount of liquidated damages shall be one half of one percent (.5%) of the total contract amount per day. Liquidated damages shall be deducted from payments as they become due and may be deducted from the retainage due upon completion. They constitute an agreed-upon liquidated sum solely for consequential damages attributable to delay and are not a substitute for any other consequential damages incurred by the District, such as the

cost of finding a replacement Contractor for completion of the Work if this Agreement is terminated by the District for non-performance.

- (b) Contractor shall not be charged with liquidated damages or any excess cost when the District determines that Contractor's reasons for the time extension are acceptable in accordance with **FORCE MAJEURE; DELAYS; EXTENSION OF COMPLETION DATE**. A written extension of the Completion Date constitutes a waiver of liquidated damages to the new Completion Date unless expressly provided therein to the contrary.

3. DELIVERABLES

- (a) The Work is specified in the Statement of Work, Attachment A. Contractor shall deliver all products and deliverables as stated therein. Contractor is responsible for the professional quality, technical accuracy, and timely completion of the Work. Both workmanship and materials shall be of good quality. Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of materials provided. Unless otherwise specifically provided for herein, Contractor shall provide and pay for all materials, labor, and other facilities and equipment necessary for performance of the Work. The District's Project Manager shall make a final acceptance inspection of the deliverables when completed and finished in all respects.
- (b) If not otherwise addressed in the Statement of Work, upon written request, Contractor shall submit written progress reports to the District's Project Manager at the frequency requested in the form approved by the Project Manager at no additional cost to the District. The progress report shall provide an updated progress schedule, taking into account all delays and approved changes in the Work. Failure to provide a progress report will be cause to withhold payment.

4. **OWNERSHIP OF DELIVERABLES.** All deliverables, including Work not accepted by the District, are District property when Contractor has received compensation therefor, in whole or in part. Any District source documents or other District or non-District documents, specifications, materials, reports, or accompanying data developed, secured, or used in the performance of the Work, excluding proprietary materials, as outlined in a Statement of Work, are District property and shall be safeguarded and provided to the District upon request. District plans and specifications shall not be used on other work and, with the exception of the original plans and specifications, shall be returned to the District upon request. This obligation shall survive termination or expiration of this Agreement.

5. FUNDING OF AGREEMENT

- (a) For satisfactory performance of the Work, the District agrees to pay Contractor \$ _____ (the "Total Compensation").

6. PAYMENT OF INVOICES

- (a) Contractor shall submit itemized invoices on a monthly basis by one of the following two methods: (1) by email to acctpay@sjrwmd.com (preferred) or (2) by mail to the St. Johns River Water Management District, Finance Director, 4049 Reid Street, Palatka, Florida 32177-2571. Each invoice shall be submitted in detail sufficient for proper pre-audit and post-audit review. If necessary for audit purposes, Contractor shall provide additional supporting information as required to document invoices.
- (b) **End of District Fiscal Year Reporting.** The District's fiscal year ends on September 30. Irrespective of the invoicing frequency, the District is required to account for all encumbered funds at that time. When authorized under the Agreement, submittal of an invoice as of September 30 satisfies this requirement. The invoice shall be submitted no later than October 30. If the Agreement does not authorize submittal of an invoice as of September 30, Contractor shall

submit, prior to October 30, a description of the additional Work completed between the last invoice and September 30, and an estimate of the additional amount due as of September 30 for such Work. If there have been no prior invoices, Contractor shall submit a description of the Work completed on the project through September 30 and a statement estimating the dollar value of that Work as of September 30.

- (c) **Final Invoice.** The final invoice must be submitted no later than 20 business days after the Completion Date; provided, however, that when the Completion Date corresponds with the end of the District's fiscal year (September 30), the final invoice must be submitted no later than 30 days after the Completion Date. **Final invoices that are submitted after the requisite date shall be subject to a penalty of ten percent of the invoice. This penalty may be waived by the District, in its sole judgment and discretion, upon a showing of special circumstances that prevent the timely submittal of the final invoice. Contractor must request approval for delayed submittal of the final invoice not later than ten days prior to the due date and state the basis for the delay.**
- (d) All invoices shall include the following information: (1) District contract number; (2) Contractor's name and address (include remit address, if necessary); (3) Contractor's invoice number and date of invoice; (4) District Project Manager; (5) Contractor's Project Manager; (6) supporting documentation as to cost and/or project completion (as per the cost schedule and other requirements of the Statement of Work; (7) Progress Report (if required); (8) Diversity Report (if otherwise required herein). Invoices that do not correspond with this paragraph shall be returned without action, stating the basis for rejection. Payments shall be made within 20 business days of receipt of the invoice. Disputes regarding invoice sufficiency are resolved pursuant to the dispute resolution procedure of this Agreement.
- (e) **Travel expenses.** If the cost schedule for this Agreement includes a line item for travel expenses, travel expenses shall be drawn from the project budget and are not otherwise compensable. If travel expenses are not included in the cost schedule, they are a cost of providing the service that is borne by Contractor and are only compensable when specifically approved by the District as an authorized District traveler. In such instance, travel expenses must be submitted on District or State of Florida travel forms and shall be paid pursuant to District Administrative Directive 2000-02.
- (f) **Payments.** Absent exceptional circumstances, Contractor is required to sign up and receive payment(s) electronically from the District via Automated Clearing House (ACH) payment.
- (g) **Payments withheld.** The District may withhold or, on account of subsequently discovered evidence, nullify, in whole or in part, any payment to such an extent as may be necessary to protect the District from loss as a result of: (1) defective Work not remedied; (2) failure of Contractor to make payments when due to subcontractors or suppliers for materials or labor; (3) failure to maintain adequate progress in the Work; (4) damage to another contractor; or (5) any other material breach of this Agreement. Amounts withheld shall not be considered due and shall not be paid until the ground(s) for withholding payment have been remedied.
- (h) **Retainage.** The District shall pay Contractor 95% of each approved invoice and retain five percent as retainage, to be paid upon completion of the Work. Contractor may present the District with a payment request for part or all of the retainage as provided by §218.735(7)(e), Fla. Stat.
7. **PAYMENT AND RELEASE.** Upon satisfactory completion of the Work, the District will provide Contractor a written statement accepting all deliverables. Contractor's acceptance of final payment shall constitute a release in full of all Contractor claims against the District arising from the performance of this Agreement, with the exception of any pending claims for additional compensation that have been documented and filed as required by this Agreement.

8. **INDEMNIFICATION.** Contractor shall indemnify and hold harmless, release, and forever discharge the District, its public officers, employees, agents, representatives, successors, and assigns, from any and all liabilities, damages, losses, and costs, including, but not limited to, reasonable attorney’s fees, arising from or caused by the Contractor, its employees or subcontractors, in the performance of the Work. Contractor shall further indemnify the District for all costs and penalties the District incurs related to any failure to offer Patient Protection and Affordable Care Act compliant health care coverage to Contractor-employees performing under this contract.

9. **INSURANCE.** Contractor shall acquire and maintain all insurance required by Attachment B, Insurance Requirements, and shall not commence Work until it has provided Certificates of Insurance to the District as per Attachment B. Receipt of Certificates of Insurance indicating less coverage than required does not constitute a waiver of the Insurance Requirements. Contractor waives its right of recovery against the District to the extent permitted by its insurance policies. Contractor’s insurance shall be considered primary, and District insurance shall be considered excess, as may be applicable to Contractor’s obligation to provide insurance.

10. **FUNDING CONTINGENCY.** This Agreement is at all times contingent upon funding availability, which may include a single source or multiple sources, including, but not limited to: (1) ad valorem tax revenues appropriated by the District's Governing Board; (2) annual appropriations by the Florida Legislature, or (3) appropriations from other agencies or funding sources. Agreements that extend for a period of more than one Fiscal Year are subject to annual appropriation of funds in the sole discretion and judgment of the District's Governing Board for each succeeding Fiscal Year. Should the Work not be funded, in whole or in part, in the current Fiscal Year or succeeding Fiscal Years, the District shall so notify Contractor and this Agreement shall be deemed terminated for convenience five days after receipt of such notice, or within such additional time as the District may allow. For the purpose of this Agreement, “Fiscal Year” is defined as the period beginning on October 1 and ending on September 30.

11. PROJECT MANAGEMENT PERSONNEL

- (a) The Project Managers listed below shall be responsible for overall coordination and management of the Work. Either party may change its Project Manager upon three business days’ prior written notice to the other party. Written notice of change of address shall be provided within five business days. All notices shall be in writing to the Project Managers at the addresses below and shall be sent by one of the following methods: (1) hand delivery; (2) U.S. certified mail; (3) national overnight courier; (4) email or, (5) fax. Notices via certified mail are deemed delivered upon receipt. Notices via overnight courier are deemed delivered one business day after having been deposited with the courier. Notices via email or fax are deemed delivered on the date transmitted and received.

DISTRICT

Bob Naleway, Project Manager
 St. Johns River Water Management District
 4049 Reid Street
 Palatka, FL 32177-2571
 Phone: 386-312-2366
 Email: rnaleway@sjrwmd.com

CONTRACTOR

TBD, Project Manager
 TBD
 TBD
 TBD
 Phone: TBD
 Email: TBD

- (b) The District’s Project Manager shall have sole responsibility for transmitting instructions, receiving information, and communicating District policies and decisions regarding all matters pertinent to performance of the Work.

- (c) Contractor shall provide efficient supervision of the Work, using its best skill and attention. Contractor shall keep, on the worksite during its progress, a competent superintendent that is satisfactory to the District. The superintendent shall not be changed except with the District's consent, unless the superintendent proves to be unsatisfactory to Contractor and/or ceases to be in its employ. The superintendent shall represent Contractor in the absence of Contractor's Project Manager. All directions given to him shall be as binding as if given to Contractor. If the District produces documented evidence and informs the Contractor that any person on the job is incompetent, disorderly, or is working contrary to the Agreement or the District's instructions, that person shall thereupon be immediately dismissed from the project and shall not be given employment on any work connected with this Agreement. The District may request Contractor replace its Project Manager if said manager fails to carry the Work forward in a competent manner, follow instructions or specifications, or for other reasonable cause.
- (d) Contractor shall maintain an adequate and competent professional staff. Contractor's employees, subcontractors, or agents shall be properly trained to meet or exceed any specified licensing, training and/or certification applicable to their profession. Upon request, Contractor shall furnish proof thereof.

12. SCHEDULING AND WORK PLANNING; PROGRESS REPORTING

- (a) **Pre-work Conference.** Within ten days after execution of this Agreement, Contractor shall schedule a pre-work conference with the District's Project Manager to discuss scheduling and other matters. Contractor shall provide a work plan for the District's approval not less than five days prior to the pre-work conference. The District shall have ten days to review the work plan. Not less than five days prior to the pre-work conference, Contractor shall provide the District a list of each subcontract exceeding ten percent of the Total Compensation. The list shall include: (1) name, address, contract, phone number and email address of subcontractor, (2) description of subcontract work, and (3) estimated value of work.
- (b) **Progress Reports.** Contractor shall provide to the District the project schedule and update/status reports as provided in the Statement of Work. Reports will provide detail on progress of the Work and outline any potential issues affecting completion or the overall schedule. Reports may be submitted in any form agreed to by District's Project Manager and Contractor, and may include emails, memos, and letters.
- (c) **Critical Path Management.** The District may require Contractor to provide a Critical Path Management (CPM) network for the Work, which shall be provided within 15 days of request or when the work plan is submitted, whichever occurs last. Contractor shall utilize Microsoft Project 2000 software for the CPM, with a separate line for each major section of work or operation. The CPM shall show: (1) the first workday of each week; (2) the complete sequence of construction by activity, identifying the Work in separate stages and other logically grouped activities; (3) the early and late start and the early and late finish, and (4) the submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by the District. The District shall have ten days to review the work plan. If deemed necessary by the District, Contractor shall revise and resubmit the CPM. Contractor shall submit an updated CPM schedule with each invoice, identifying any changes since the previous submission and indicating the estimated percentage of completion for each item of the Work. The District owns all float.
- (d) **Daily Reporting.** The District may require Contractor to provide a daily report regarding the progress of the Work. The need for a daily report shall be determined at the pre-work conference. If required, a form shall be completed for each day any Work is performed until the project is accepted by the District. Completed forms shall be submitted to the District's Project Manager or other authorized representative by 9:00 a.m. of the following day.

- (e) **Progress Meetings.** The District may elect to conduct on-site progress meetings with Contractor on a frequency to be determined by the District. In such event, Contractor shall make available its Project Manager and/or superintendent and other appropriate personnel to discuss matters pertinent to the Work.
- (f) **Failure to Meet Schedule.** If progress of the Work falls five percent or more behind schedule, except as a result of District-approved delays, Contractor shall take all necessary steps to augment the work effort to get the project back on schedule. Should the progress of the Work fall ten percent or more behind schedule, the District may advise Contractor through a “cure” notice that this Agreement is subject to termination for cause if the failure is not cured within the time frame specified in said notice.

13. FORCE MAJEURE; DELAYS

- (a) **Force Majeure.** Contractor shall not be liable for failure to carry out the terms of this Agreement to the extent such failure is due to a Force Majeure event, except for failures that could have been reasonably foreseen and guarded against so as to avoid or reduce the adverse impact thereof. A Force Majeure event is hereby defined as the failure to carry out any of the terms of this Agreement due to any one of the following circumstances beyond the control of Contractor: (a) the operation and effect of rules, regulations, or orders promulgated by any commission, county, municipality, or governmental agency of the State of Florida or the United States, (b) a restraining order, injunction, or similar decree of any court of competent jurisdiction, (c) war, (d) flood, (e) earthquake, (f) fire, (g) severe wind storm, (h) acts of public disturbance, (i) quarantine restrictions, (j) epidemics, (k) strikes, (l) freight embargoes, or (m) sabotage. The times specified herein for performances include delays that can ordinarily be anticipated due to adverse weather conditions. The District is not obligated to grant an extension of time due to adverse weather conditions unless such conditions rise to the level of Force Majeure.
- (b) **Delay.** Contractor shall not be compensated for delays caused by Contractor’s inefficiency, rework made necessary by Contractor’s error, failure to perform the Work as scheduled, or any other corrective or productivity measures made necessary by errors, omissions, or failures to properly perform the Work. Within ten days after the onset of a delay, Contractor shall notify the District in writing of the delay, which shall provide: (1) a detailed description the delay and its probable duration, (2) the specified portion of the Work affected, and (3) an opinion as to the cause of the delay and liability (if any) for the delay. Notices provided more than ten days after the inception of the delay shall only be effective as to additional costs or delay incurred during the ten day period preceding receipt of such notice. In the case of continuing cause delay for the same cause, only one notice of delay is necessary. **Failure to provide this notice waives any claim for extension of time or additional compensation resulting from such delay.** If the delay is due to the failure of another District contractor to complete its work in a timely manner, changes ordered in the Work, a Force Majeure event, or any other cause which the District, in its sole judgment and discretion, determines to justify the delay, then the Completion Date may be extended as necessary to compensate for the delay. All time extensions shall be in the form of a written amendment signed by both parties.

14. MODIFICATION OF SPECIFICATIONS; CHANGE ORDERS; EMERGENCY CHANGES IN WORK

- (a) **Modification of Specifications.** No verbal agreement or conversation with any officer, agent, or employee of the District after execution of this Agreement shall affect or modify any of its terms. No one is authorized to change any provision of the specifications without written authorization of the District. The presence or absence of a District inspector shall not relieve Contractor from any requirements of this Agreement. The District’s Project Manager may also issue a District

Supplemental Instruction (DSI) form (Attachment C) to authorize minor adjustments to the Work that are consistent with the purpose of the Work. A DSI may not be used to change the Total Compensation, quantity, quality or the Completion Date of the Work, or to change or modify the Agreement. The DSI shall indicate that both parties agree the adjustments to the Work do not affect the Total Compensation or the Completion Date. Both parties must sign the DSI. If Contractor believes that the proposed supplemental instructions will involve extra cost or extend the Completion Date and the District continues to direct that the DSI be implemented, Contractor shall implement said instructions and may submit a Change Order, subject to the dispute resolution procedure. In an emergency condition, the parties shall follow the procedure for “Emergency Changes in the Work.”

(b) Change Orders

- (i) The District may alter, add to, or deduct from the Work by executing a Change Order without liability to Contractor, except for the reasonable cost of any additional Work. All such Work within Contractor’s capacity to perform shall be performed pursuant to the Change Order. Any associated claim for extension of time will be adjusted when the Change Order is issued. The parties shall negotiate the cost of the Change Order on an equitable basis, which may be determined in one or more of the following ways: (1) estimate and acceptance of a lump sum, (2) unit prices named in the contract or subsequently agreed upon, (3) costs and percentage or by (4) cost and a fixed fee. If the parties cannot agree upon cost, Contractor shall implement the Change Order and shall maintain and present in such form as the District Project Manager may direct the correct amount of the net cost of labor and materials, together with vouchers. The Project Manager will certify the amount due Contractor, including reasonable allowances for overhead and profit. Pending a final determination of value, payments will be based upon the District Project Manager’s certification. Final resolution of the amount due to Contractor shall be pursuant to the dispute resolution procedure.
- (ii) For any Change Order requests submitted by Contractor, the District may determine that District instructions to correct deficient Work, to stop the Work due to deficiencies in the Work, or any other matters that impose additional costs upon Contractor, do not warrant an increase in the Total Compensation or extension of the Completion Date. If Contractor disputes this determination, final resolution shall be pursuant to the dispute resolution procedure.

- (c) **Emergency Changes in Work.** In the event an emergency endangering life or property requires immediate action, the District may give Contractor an oral instruction to proceed with an emergency change in the Work, which will be confirmed in writing within five days. Within 15 days after commencement of the emergency change in the Work, Contractor shall provide the District with a written estimate of any increased costs or delays as a result thereof. **Failure to so notify the District constitutes a waiver of any right to an extension of time or increase in compensation.** Within 15 days after receipt of Contractor’s estimate, the parties shall negotiate a Change Order. If unable to reach agreement, disputed issues shall be resolved pursuant to the dispute resolution procedure. In no event shall Contractor decline to perform the emergency change in the Work.

15. TERMINATION AND SUSPENSION

- (a) **District Termination for Cause.** The Agreement may be terminated by the District for cause in the event of any breach hereof, including, but not limited to, Contractor’s: (1) failing to carry forward and complete the Work as provided herein; (2) failing to comply with applicable laws, regulations, permits, or ordinances; (3) failing to timely correct defective Work; (4) making a

general assignment for the benefit of its creditors; (5) having a receiver appointed because of insolvency; (6) filing bankruptcy or having a petition for involuntary bankruptcy filed against it; (7) failing to make payments when due to subcontractors, vendors, or others for materials or labor used in the Work; (8) making a material misrepresentation to the District regarding the Work, or (9) any other material breach of this Agreement. In such event, the District shall provide Contractor with written notice of its intention to terminate this Agreement, stating the nature of the deficiency and the effective date of termination. At the District's sole judgment and discretion, the District may afford Contractor an opportunity to cure said deficiency, in which event the notice shall specify the time allowed. Upon termination, the District may take possession of the premises and of all materials thereon and finish the Work by whatever means it deems expedient. In such event, Contractor shall not receive any further payment until the Work is completed by the District. Contractor shall be liable for all costs involved in completing the Work, including additional managerial and administrative services, which shall be offset against any amount due to Contractor.

- (b) **District Termination for Convenience.** Notwithstanding any other provision hereof, the District may at any time terminate this Agreement or any Work issued under it, in whole or in part, without cause, upon 30 days' written notice to Contractor. In such event, Contractor shall be compensated for any Work performed prior to the date of termination and for materials that were ordered prior to receipt of notice of termination that cannot be returned to the vendor, which shall become District property. Upon receipt of notice, Contractor shall discontinue the Work on the date and to the extent specified therein and shall place no further orders for materials, equipment, services, or facilities, except as needed to continue any portion of the Work not terminated. Contractor shall also make every reasonable effort to cancel, upon terms satisfactory to the District, all orders or subcontracts related to the terminated Work. Contractor may not claim any compensation not specifically provided for herein, including, but not limited to: loss of anticipated profits; idle equipment, labor, and facilities; any additional claims of subcontractors and vendors.
- (c) **District Suspension for Cause.** The District may issue a written partial or full Stop Work Notice in the event Contractor fails to comply with or is negligent in performing any provision hereof. All performance shall immediately cease as per such notice and no further billable costs shall be incurred. The District may terminate this Agreement if Contractor fails or refuses to comply with a Stop Work Notice.
- (d) **District Suspension for Convenience.** The District may direct Contractor to stop Work, in whole or in part, whenever, in the District's sole judgment and discretion, such stoppage is necessary to ensure proper completion of the Work, avoid injury to third persons, or otherwise meet the District's objectives. The District shall provide Contractor not less than five days' written notice, except in emergency circumstances. Contractor shall immediately comply with such notice. Should such stoppage increase Contractor's cost, an equitable adjustment will be made by Change Order. The notice shall be effective until rescinded in writing, unless the period of suspension is stated in the notice.
- (e) **Contractor's Right to Stop Work or Terminate Agreement**
- (i) **Stop Work.** Contractor may stop work only under the following circumstances: (1) the Work is ordered temporarily discontinued by a court or other public authority; (2) it is necessary to stop work in order to protect the safety of Contractor or third persons; or (3) the District fails to pay Contractor when due any undisputed and adequately documented sum certified for payment by the District Project Manager. In such event, Contractor shall provide the District not less than seven days prior written notice of its

intention to stop work, except in emergency circumstances or when necessary to prevent injury to persons or property.

- (ii) **Termination.** Contractor may terminate this Agreement under only the following circumstances: (1) the Work is ordered discontinued by a court or other public authority, through no act or fault of Contractor, for a period of not less than three months; (2) the District fails to pay Contractor when due any undisputed and adequately documented sum certified for payment by the District Project Manager. In such event, Contractor shall provide not less than 20 days written notice of its intention to terminate and afford the District the opportunity to cure said deficiency within said time period.
- (iii) **Duty to Perform.** Except as expressly provided above, in the event of any event, dispute, or other matter arising under this Agreement, Contractor shall fully perform the Work in accordance with the District's written instructions and may claim additional compensation as a Change Order, subject to the dispute resolution procedure.

ADDITIONAL PROVISIONS (In Alphabetical Order)

16. DEFINITIONS

ADDENDA: Written or graphic instruments issued prior to the opening of responses, which make additions, deletions, or revisions to the solicitation or contract documents.

AGREEMENT: The written contract between the District and Contractor covering the Work, which includes all documents attached to this Agreement or incorporated herein by reference. The words "contract" and "Agreement" are synonymous in these documents.

AMENDMENT: Any written change made to the terms and conditions of the Agreement.

BID: The written offer of Respondent (when submitted on the reproduced approved forms) to perform the Work and furnish the necessary materials in accordance with the provisions of this Agreement.

BID BOND: The security furnished with a Bid to guarantee that Respondent will enter into a contract and execute, deliver, and perform all other obligations described in the Invitation for Bids if Contractor receives a Notice of Intent to Award the contract from the District.

BUSINESS DAY: Monday through Friday, excepting those holidays observed by the District – New Years Day, Martin Luther King Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving (and Friday), and Christmas Day.

CHANGE ORDER: A written agreement of the parties after the Commencement Date to amend this Agreement so as to modify the Statement of Work or the Total Compensation or provide for an extension of time.

CONTRACTOR: Contractor, its officers, employees, agents, successors, and assigns.

CONTRACTOR'S PROJECT MANAGER: The individual designated by the Contractor to be responsible for overall coordination, oversight, and management of the Work for Contractor.

CONTRACTOR'S SUPERINTENDENT: Contractor's representative who is present during the progress of the Work and authorized to receive and fulfill instructions from the Contractor's Project Manager or the District.

CPM or CRITICAL PATH METHOD: The use of a calculated task duration with no regard for probabilities. A path has no float and is the longest path through the project. A critical path encompasses

those project activities that are crucial and cannot be shifted, having a calculated task duration. They are the important activities driving the project. Float belongs to the District.

DELIVERABLES: All Work that is to be performed pursuant to the Statement of Work, in whole or in part, including, but not limited to, all equipment or materials that are incorporated within the Work.

DISTRICT'S PROJECT MANAGER: The District employee designated by the District to be responsible for overall coordination, oversight, and management of the Work for the District.

FINAL RELEASE OF LIENS: The instrument that is to be signed by Contractor and submitted to the District upon completion of the Work showing that all bills from subcontractors have been paid.

INVITATION FOR BIDS: An advertised solicitation for sealed competitive Bids, with the title, date, and hour of the public opening designated. It includes a detailed description of the goods and/or services sought, the date for submittal of Bids, and all contractual terms and conditions.

INSPECTOR: The District's Project Manager or an authorized representative of the District who is assigned to inspect the Work.

PERFORMANCE AND PAYMENT BOND: The security furnished by Contractor and surety in either the form provided or in a form approved by the District as a guarantee that Contractor will perform all of its contractual obligations in accordance with the terms of the Agreement and pay in full all bills and accounts for material, labor, services, and supplies used directly or indirectly in the performing the Work.

PERSON: Any individual, partnership, society, association, joint stock company, corporation, estate, receiver, trustee, assignee, referee, or capacity, whether appointed by a court or others, and any combination of individuals.

PRINCIPAL: When used in a bid, proposal, or Performance and Payment Bond, the word "principal" means the same as the word "Contractor."

STATEMENT OF WORK: The District's written directions, requirements and technical specifications for completing the Work. Standards for specifying materials or testing that are incorporated therein by reference shall have the same force and effect as if fully set forth therein.

SUBCONTRACTORS: Those persons having a direct contract with Contractor relating to performance of the Work, including one who furnishes material worked into a special design in accordance with the plans or specifications of the Work, but not including one who merely furnishes material.

SURETY: The person bound by the Agreement bond with and for Contractor, and who is primarily liable and engages to be responsible for Contractor's satisfactory performance of the Work and for its payment of all debts pertaining thereto.

TOTAL BID: The total cost to be paid to Contractor for completion of the Work.

TOTAL COMPENSATION: The total funds to be expended pursuant to this Agreement upon satisfactory completion of the Work.

WORK: All labor, materials, equipment, transportation, supporting documentation, and other products, services, or facilities necessary for complete performance of the Agreement.

17. ACCESS; WORK AREA; GATES

- (a) **Access.** The District will provide sufficient access to accomplish Work performed on District property. Contractor shall maintain all on-site roadways and paved and unpaved access roadways to and from the worksite in an acceptable and passable condition at no additional cost to the District, which shall, upon conclusion of the Work, be returned to their original condition. Land

access to construction sites is restricted to the route designated by the District. Contractor is responsible for improvements and repairs to access routes required during construction. All access routes shall be used for the purpose of construction only. Contractor shall not disturb lands or waters outside the area of construction, except as may be found necessary and authorized by the District.

- (b) **Work Area.** All Work shall be confined to the designated work area(s). Contractor shall obtain written approval from the District before making any adjustments.
- (c) **Gates.** Contractor shall keep all gates to District lands or easements closed and locked in accordance with District specifications when not in use, and shall immediately notify the District when a gate has become impaired due to vandalism or other cause. Unless otherwise stated in the specifications, Contractor shall be responsible for providing lock(s) to District properties.

18. ASSIGNMENT AND SUBCONTRACTS

- (a) Contractor shall not sublet, assign, or transfer any Work involving more than 15% of the total cost of the Work, or assign any monies due hereunder, without the District's prior written consent. As soon as practicable after signing this Agreement, but not less than seven business days prior to the effective date of any subcontracts, Contractor shall notify the District's Project Manager in writing of the name of any subcontractor that has not been previously disclosed in the procurement process. Within five business days the District shall indicate its approval or disapproval, which shall not be unreasonably withheld. Failure to timely provide such approval or disapproval shall constitute approval. Neither District approval of a subcontractor nor any other provision of this Agreement creates a contractual relationship between any subcontractor and the District. Contractor shall be allowed a maximum 15% markup of their subcontractor's work for oversight and management.
- (b) Contractor is responsible for fulfilling all work elements in any subcontracts and payment of all monies due. Contractor is fully responsible to the District for the acts and omissions of its subcontractors and persons directly or indirectly employed by them, and shall hold the District harmless from any liability or damages resulting from any subcontract to the extent allowed by law.

19. **AUDIT; ACCESS TO RECORDS.** Contractor must preserve its books and other records involving transactions related to this Agreement and provide the District, or its duly authorized representatives, access and necessary facilities to inspect and audit those records for five years after the receipt of funds. If an examination or audit is performed, Contractor must continue to maintain all required records until such audit has been completed and all questions arising from it are resolved. Contractor shall refund any payment(s) that are found to not constitute allowable costs based upon an audit examination.

20. BONDS

- (a) **Payment Bond.** A payment bond equal to the Total Compensation is required for fixed price contracts greater than \$200,000. The District may require, in its sole judgment and discretion, a payment bond for fixed price contracts of \$200,000 or less, in which event the bonding requirement shall be disclosed in the solicitation.
- (b) **Performance Bond.** A performance bond equal to the Total Compensation is required for fixed price contracts greater than \$200,000. The District may require, in its sole judgment and discretion, a performance bond for fixed price contracts of \$200,000 or less, in which event the bonding requirement shall be disclosed in the solicitation.

- (c) **Recording.** Bonds shall be recorded in the public records of the county where the Work is located. A certified copy of completed and recorded bonds must be delivered to and accepted by the District prior to commencement of the Work. Bond premiums shall be paid by Contractor. Bonds shall be on the form provided in the Bid Documents and written through a licensed agency that fulfills the requirements of §287.0935, Fla. Stat.
- (d) **Qualification-Management and Strength.** The Surety executing a bond must be rated no less than "Excellent" for both financial strength and issuer credit, with a rating outlook of stable or positive for both, and must have a financial size rating of VII or better according to the latest information available from A.M. Best Company, Inc.'s, rating and analysis web site.
- (e) In lieu of the bond, Contractor may submit an alternative form of security in the form of cash, money order, certified check, cashiers check, irrevocable letter of credit, or other security acceptable to the District.
21. **CIVIL RIGHTS.** Pursuant to chapter 760, Fla. Stat., Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, pregnancy, or national origin, age, handicap, or marital status.
22. **CLEANUP; EQUIPMENT REMOVAL.** Upon expiration or termination of this Agreement, Contractor shall restore the worksite to its original condition, except for replacement of vegetation, unless otherwise required by this Agreement. Contractor shall remove from District property and all public and private property all machinery, equipment, supplies, surplus materials, temporary structures, rubbish, and waste materials resulting from its activities. After 20 days, the District may sell or dispose of any materials left at the worksite as it sees fit and deduct the cost of sale or disposal from any amounts due to Contractor. Any revenues obtained shall be applied toward costs incurred by the District, with excess revenues paid to Contractor.
23. **COOPERATION WITH THE INSPECTOR GENERAL, PURSUANT TO §20.055(5) FLA. STAT.** Contractor and any subcontractors understand and will comply with their duty, pursuant to §20.055(5), Fla. Stat., to cooperate with the inspector general in any investigation, audit, inspection, review, or hearing.
24. **COORDINATION WITH THE DISTRICT AND OTHER DISTRICT CONTRACTORS**
- (a) The District may let other contracts in connection with the Work. Wherever work done by the District or another District contractor is contiguous to Contractor's Work, the respective rights of the various interests shall be established by the District so as to secure completion of the Work. Contractor shall arrange its Work so as not to interfere with the District or other District contractors and join its Work to that of others in a proper manner, and in accordance with the intent of the Statement of Work. Contractor shall perform its Work in the proper sequence in relation to that of other District contractors, as may be directed by the District. Contractor shall afford other District contractors reasonable opportunity for introduction and storage of their materials and execution of their work, and shall properly conduct and coordinate its Work with theirs. Contractor shall take into account all contingent work to be done by others and shall not plead its want of knowledge of such contingent work as a basis for delay or non-performance. Contractor shall be liable for any damage it causes to the work performed by other District contractors.
- (b) If any part of the Work depends for proper execution or results upon the work of other District contractors, Contractor shall inspect and promptly report any defects in the other contractors' work that render it unsuitable for Contractor's Work. Failure to so inspect and report shall constitute an acceptance of the other contractors' work as fit and proper for the reception of its

Work, except as to defects which may develop in the other contractors' work after execution of the Work.

25. CORRELATION AND INTENT OF DOCUMENTS; QUESTIONS OR ISSUES REGARDING PERFORMANCE OF THE WORK

- (a) This Agreement and all attachments are complementary. What is called for by one is as binding as if called for by all. The intent is to include all labor and materials, equipment, transportation, and incidentals necessary for the proper and complete execution of the Work. Materials or work described in words, which so applied have a well-known technical or trade meaning, shall be held to refer to such recognized standards.
- (b) It is the District's intention to fully assist Contractor in the successful performance of the Work and to respond in a timely manner to questions or issues that arise. Contractor should discuss any questions or issues with the District's Project Manager and communicate such questions or issues in writing when required by this Agreement. The District shall respond through its Project Manager.

26. DISPUTE RESOLUTION

- (a) **During the course of work.** In the event any dispute arises during the course of the Work, Contractor shall fully perform the Work in accordance with the District's written instructions and may claim additional compensation. Contractor is under a duty to seek clarification and resolution of any issue, discrepancy, or dispute by submitting a formal request for additional compensation, schedule adjustment, or other dispute resolution to the District's Project Manager no later than 15 days after the precipitating event. If not resolved by the Project Manager within five business days, the Project Manager shall forward the request to the District's Office of General Counsel, which shall issue a written decision within 15 days of receipt. This determination shall constitute final action of the District and shall then be subject to judicial review upon completion of the Work. **Contractor shall proceed with the Work in accordance with said determination. This shall not waive Contractor's position regarding the matter in dispute.**
- (b) **Invoices.** In the event the District rejects an invoice as improper, and the Contractor declines to modify the invoice, the Contractor must notify the District in writing within ten days of receipt of notice of rejection that the Contractor will not modify the invoice and state the reason(s) therefor. Within five business days of receipt of such notice, if not informally resolved through discussion with the District Project Manager, the Project Manager shall forward the disputed invoice and the Contractor's written response to the District's Office of General Counsel. The matter shall then proceed as described in subsection (a), above.

27. DIVERSITY REPORTING. The District is committed to the opportunity for diversity in its procurement activities, and encourages its prime vendors (contractors and suppliers) to make a good faith effort to ensure that women and minority-owned business enterprises (W/MBE) are given the opportunity for maximum participation as sub-contractors. The District will assist Contractor by sharing information on W/MBEs. Contractor shall provide with each invoice a report describing the company names for all W/MBEs, the type of minority, and the amount spent with each at all levels. The report will also denote if there were no W/MBE expenditures.

28. DUTY TO INSPECT AND REPORT DEFICIENCIES IN PLANS AND SPECIFICATIONS

- (a) For any Work that is dependent upon conditions at the worksite, Contractor's acceptance of contract award represents and warrants that Contractor has inspected and satisfied itself concerning the nature and location of the Work and general and local conditions, including, without limitation: (1) conditions affecting transportation, disposal, handling, and storage of

materials; (2) availability and quality of labor; (3) availability and condition of roads; (4) climatic conditions and seasons; (5) hydrology of the terrain; (6) topography and ground surface conditions; (7) nature and quantity of surface materials to be encountered; (8) equipment and facilities needed preliminary to and during the Work; and (9) all other matters that can affect the Work and the cost thereof. Contractor's failure to acquaint itself with such conditions will not relieve it from its responsibility for properly estimating the time required or cost of performing the Work. Where the District has investigated subsurface conditions, this data may be provided to Contractor or is available upon request. Contractor must either seek clarification concerning the data or assume the responsibility for its interpretation.

- (b) If Contractor discovers hidden or subsurface conditions that differ materially from those normally expected or indicated in the technical specifications, Contractor shall immediately, and before such conditions are disturbed, notify the District in writing of: (1) subsurface or latent physical conditions differing materially from those indicated in the technical specifications, or (2) unknown physical conditions of an unusual nature differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for herein. The District shall promptly investigate the conditions and determine whether they materially differ so as to cause an increase or decrease in Contractor's cost. Where the differing site conditions materially impact Contractor's cost, an equitable adjustment shall be made and the Agreement modified accordingly. No claim will be allowed if Contractor fails to provide the required notice.
- (c) If Contractor in the course of the Work finds any defect in the plans and specifications, including, but not limited to, any discrepancy between the drawings and the physical conditions at the worksite, or any errors or omissions in the drawings or in the layout, as given by points and instructions, it shall immediately inform the District in writing, which shall be promptly verified by the District. Any Work done after such discovery, until authorized, will be done at Contractor's risk as to cost overruns and modifications necessary to correct deficiencies in the Work. To ensure the proper execution of its subsequent Work, Contractor shall measure Work already in place or completed and shall immediately report any discrepancy between the executed Work and the drawings or other specifications.

29. GOVERNING LAW, VENUE, ATTORNEY'S FEES, WAIVER OF RIGHT TO JURY

TRIAL. This Agreement shall be construed according to the laws of Florida and shall not be construed more strictly against one party than against the other because it may have been drafted by one of the parties. As used herein, "shall" is always mandatory. In the event of any legal proceedings arising from or related to this Agreement: (1) venue for any state or federal legal proceedings shall be in Orange County; (2) each party shall bear its own attorney's fees, including appeals; (3) for civil proceedings, the parties hereby consent to trial by the court and waive the right to jury trial.

- 30. INTEREST IN THE BUSINESS OF CONTRACTOR; NON-LOBBYING.** Contractor certifies that no officer, agent, or employee of the District has any material interest, as defined in chapter 112, Fla. Stat., either directly or indirectly, in the business of Contractor to be conducted under this Agreement, and that no such person shall have any such interest at any time during the term of this Agreement. Pursuant to §216.347, Fla. Stat., monies received from the District pursuant to this Agreement shall not be used to lobby the Florida Legislature or any other state agency.

- 31. INDEPENDENT CONTRACTOR.** Contractor is an independent contractor. Neither Contractor nor Contractor's employees are employees or agents of the District. Contractor controls and directs the means and methods by which the Work is accomplished. Contractor is solely responsible for compliance with all labor and tax laws pertaining to it, its officers, agents, and employees, and shall indemnify and hold the District harmless from any failure to comply with such laws. Contractor's

duties include, but not be limited to: (1) providing Workers' Compensation coverage for employees as required by law; (2) hiring employees or subcontractors necessary to perform the Work; (3) providing any and all employment benefits, including, but not limited to, annual leave, sick leave, paid holidays, health insurance, retirement benefits, and disability insurance; (4) payment of all federal, state and local taxes, income or employment taxes, and, if Contractor is not a corporation, self-employment (Social Security) taxes; (5) compliance with the Fair Labor Standards Act, 29 U.S.C. §§ 201, et seq., including payment of overtime as required by said Act; (6) compliance with the Patient Protection and Affordable Care Act 42 U.S.C. §§ 18001, et seq.; and (7) providing employee training, office or other facilities, equipment and materials for all functions necessary to perform the Work. In the event the District provides training, equipment, materials, or facilities to meet specific District needs or otherwise facilitate performance of the Work, this shall not affect Contractor's duties hereunder or alter Contractor's status as an independent contractor. This paragraph does not create an affirmative obligation to provide any employee benefits not required by law.

32. **INSPECTION AND TESTING OF WORK; REJECTION OF WORK AND MATERIALS; TOOLS, PLANT, AND EQUIPMENT; MATERIAL SUBSTITUTION**

- (a) **Standards for Quality and Workmanship.** All materials, equipment, and supplies furnished by Contractor for permanent incorporation into the Work shall be new and of the quality standards specified. Unless otherwise specified, all material and workmanship shall meet the requirements in the applicable standards specifications of the American Society for Testing and Materials. If two or more brands, makes of material, devices, or equipment are shown or specified, each should be regarded as the equal of the other. First-calls and the finished product shall be equal to the best-accepted standards of the trade class. The finished product shall be equal to the best-accepted standards of the trade for the category of Work performed. The District's intent is to obtain a high quality job that will operate and function with the lowest possible maintenance costs. Inspection standards will be established to ensure that this objective is achieved.
- (b) **Materials and Equipment Schedules.** The District shall have the right of prior approval for all materials or equipment incorporated into the Work. Within ten days after the date of contract award and before any material or equipment is purchased, Contractor shall submit to the District's Project Manager a complete list of materials or equipment to be incorporated into the Work. The list shall include catalog cuts, diagrams, drawings, and such other descriptive data as may be required. The use of materials or equipment not in accordance with this Agreement may be rejected.
- (c) **Inspection.** The Work and all materials or equipment used therefor are subject to inspection by the District at all times in order to ensure compliance herewith. Upon request, Contractor shall provide samples of the type and quantity of the various materials used in the Work, as determined and directed by the District. The District's Project Manager and inspector(s) shall be provided access to the Work wherever it is in preparation or progress. Contractor shall provide proper facilities for such access and inspection. Construction contractors shall maintain one complete copy of the drawings and specifications for the Work at the worksite, which shall be made available to the District upon request.
- (d) **Re-examination of Work.** The District may order re-examination of questioned Work and, if so ordered, the Work shall be uncovered by Contractor. If such Work is found to be in accordance with specifications, the District will pay the cost of re-examination and replacement. If such Work is found to be not in accordance with specifications, Contractor will pay such cost.

(e) **Testing**

- (i) The District may require that materials be tested prior to incorporation in the Work. In some instances it may be expedient to make these tests at the source of supply. Therefore, upon request, Contractor shall furnish the District with information identifying the source of supply before incorporating material into the Work. Upon request, Contractor shall furnish two copies of the manufacturer's certificate of compliance with these specifications covering manufactured items. All tests performed by a laboratory to ascertain whether the material, as placed, meets the required specification will be paid for by Contractor. This paragraph does not obligate the District to perform tests for acceptance of material or relieve Contractor of its responsibility to furnish satisfactory material.
- (ii) If the specifications, the District's instructions, laws, ordinances, or any public authority require any Work to be specifically tested or approved, Contractor shall give the District's Project Manager timely notice of its readiness for inspection. If inspection is by an authority other than the District's Project Manager, Contractor's Project Manager shall supply the District's Project Manager with 72-hours prior notice of such inspection. Inspections by the District's Project Manager will be made promptly and, where practicable, at the source of supply. If any Work should be covered up without the prior approval of the District's Project Manager, it shall, if required by the District, be uncovered for examination at Contractor's expense.
- (f) **Rejection of Work and Materials.** Contractor shall promptly notify the District of any defective material and shall not incorporate such material into the Work. The District may reject all Work and material that does not conform to this Agreement, which shall be removed and replaced with approved quality material at no additional cost to the District. If the District deems any portion of the Work unsatisfactory, Contractor shall rework those areas so that the total Work is completed in a manner satisfactory to the District. If disputed, Contractor may submit a Change Order, subject to the dispute resolution procedure.
- (g) **Tools, Plant, and Equipment.** If at any time before commencement of or during progress of the Work, tools, plant, or equipment appear to the District to be insufficient, inefficient, or inappropriate to secure the quality of Work or the proper rate of progress, the District may order Contractor to increase its efficiency, to improve its character, or to augment the number of or substitute new tools, plant, or equipment, as the case may be. Contractor shall conform to such order. If Contractor maintains that any such order is not in conformance with this Agreement, is unnecessary, or requires Contractor to incur excessive costs or delays, Contractor may submit a Change Order, subject to the dispute resolution procedure. Failure of the District to make such demand shall not relieve Contractor of its obligation to secure the quality of the Work and the rate of progress necessary to timely complete the Work.
- (h) **Material substitution.** Except where otherwise indicated, whenever a material or a piece of equipment required in the Work is shown in the specifications by using the name of the proprietary product or that of a particular manufacturer or vendor, any material, equipment, device, or article that will in the District's opinion at least equally perform the same duties imposed by the general design, considering quality, workmanship, economy of operation, and suitability for the purpose intended, may be considered "equal" and substituted for the material or piece of equipment originally specified. In the event Contractor desires the District to consider an item for substitution, Contractor shall submit a written request, which shall give all pertinent details and comparisons of the substitute with the item specified. The District will notify Contractor in writing of its acceptance or rejection. In all cases, new material shall be used. Contractor shall pay all costs resulting from inspection or testing of materials or equipment proposed for substitution.

33. **LAND AND WATER RESOURCES.** Contractor shall not discharge or permit the discharge, directly or indirectly, of any fuels, oils, calcium chloride, acids, insecticides, herbicides, wastes, toxic or hazardous substances, or other pollutants or harmful materials, onto any lands or into any surface or ground waters, including, but not limited to, streams, lakes, rivers, canals, ditches, or reservoirs. Contractor shall investigate and comply with all applicable federal, state, county, and municipal laws concerning toxic wastes, hazardous substances, and pollution of surface and ground waters. If any waste, toxic or hazardous substance, or other material that can cause pollution, as defined in §403.031, Fla. Stat., is dumped or spilled in unauthorized areas, Contractor shall notify the District thereof within one workday and thereafter shall remove the material and restore the area to its original condition. If necessary, contaminated ground shall be excavated and disposed of as directed by the District and replaced with suitable fill material, compacted and finished with topsoil, and planted as required to re-establish vegetation. All cleanup and disposal costs shall be borne by Contractor.
34. **LIENS.** Neither final payment nor payment of any part of the retainage shall become due until Contractor delivers to the District releases of all labor and material cost liens arising from Contractor's performance of the Work, including Contractor and any subcontractor(s), and an affidavit by Contractor stating that the releases and receipts include all labor and material costs for which a lien could be filed. If any subcontractor refuses to furnish Contractor a release or a receipt in full, Contractor may furnish to the District a bond satisfactory to the District, indemnifying the District against any such potential lien. If any lien or potential lien remains unsatisfied, the District may discharge the same forthwith and deduct the cost thereof from any amounts due to Contractor. In the event Contractor has been fully paid or the amount of such lien exceeds the amount due to Contractor, Contractor shall refund to the District all monies that the District paid in discharging such lien, including all costs and a reasonable attorney's fee. The discharging of such a lien by the District shall not constitute a waiver of any claims or defenses that Contractor may have against the lienor.
35. **NUISANCE.** Contractor shall exercise every reasonable means to avoid creating or continuing a public or private nuisance resulting from the Work, including, but not limited to: (1) excessive noise associated with radio or other forms of electronic entertainment for persons at the worksite; (2) dust from construction operations, and (3) the uncontrolled flow of surface waters.
36. **ORGANOCHLORINE PESTICIDES.** The Lake Apopka North Shore Restoration Area (NSRA) is former agricultural property. Soil samples from the NSRA indicate organochlorine pesticide levels that exceed Florida Department of Environmental Protection's Industrial/Commercial soil cleanup target levels. Contractors working in the NSRA are responsible for taking all appropriate measures to provide for the safety of their employees. Recommended measures should be designed to minimize contact with the soil through engineering controls, which may include: (1) wearing waders or rubber boots and gloves to minimize contact with soil and sediments, (2) washing thoroughly with soap and water after contact with soils or sediments, (3) decontaminating any equipment in contact with soil or sediment through washing with soap and water and (4) using enclosed cabs or dust masks to minimize exposure to dust created by Contractor's activities.
37. **PERMITS AND LICENSES; COMPLIANCE WITH LAW.** Contractor shall comply with all applicable federal, state and local laws and regulations, including those pertaining to health and safety. Contractor shall include this requirement in all subcontracts. All materials used and work performed must conform to the laws of the United States, the State of Florida and county and municipal ordinances. Contractor represents and warrants that it is duly licensed to perform the Work in accordance with the laws of the State of Florida and the county or municipality in which the Work is to be performed. For out-of-state contractors, Contractor warrants that it is authorized to do business within the state of Florida and registered with the Secretary of State. Unless otherwise provided in the Statement of Work, the responsibility of the parties for obtaining permits is apportioned as follows:

- (a) The District shall procure all permits required from the Florida Department of Environmental Protection, the U.S. Environmental Protection Agency, and the U.S. Army Corps of Engineers.
- (b) Contractor shall procure any permits required by the county or municipality wherein the Work is located.
- (c) Contractor shall:
 - (i) give to the proper authorities all required notices relative to the Work;
 - (ii) obtain and pay for all official permits and any professional or other licenses, code stamps, and inspections that are Contractor's responsibility;
 - (iii) furnish any bonds, security, or deposits required to permit performance of the Work;
 - (iv) until the Work is accepted as substantially complete, comply with all conditions of governmental permits; and
 - (v) resolve any issues resulting from a finding of noncompliance by any governmental agencies, including all costs for delays, litigation, fines, or other costs.

38. **PETROLEUM STORAGE TANKS.** Any petroleum storage tanks with a capacity of 55 gallons or greater that Contractor brings onto District property must be either double-walled or kept within secondary containment that will contain 110% of the tank volume.

39. **PROTECTION OF THE WORK, DISTRICT EQUIPMENT, AND PROPERTY.** Contractor is responsible for the proper care of the Work and protecting the Work from damage until final acceptance by the District, whether or not the same has been covered by partial payments. Contractor is solely responsible for all District-owned equipment in its possession, if any. Contractor shall adequately protect and maintain all passageways, guard fences, lights, and other facilities as required by public authority or local conditions. Contractor is responsible for locating and protecting all utilities. Contractor shall conduct the Work so as to minimize damage to existing improvements, and shall restore, as nearly as practical, to its original condition, any such improvements damaged by its operations. In the event of temporary suspension of the Work, or during inclement weather, or whenever the District shall direct, Contractor shall carefully protect the Work from damage. If any Work is damaged due to Contractor's failure to so protect the Work, the loss shall be remedied at Contractor's expense. Contractor shall protect public and privately-owned property, structures, utilities, and work of any kind against damage or interruptions of service resulting from its activities. Contractor shall repair, replace, or restore any damage or loss to any public or private property to the District's satisfaction. Should Contractor fail to perform these obligations, the District may make good any such damage and deduct the cost thereof from Contractor's final payment.

40. **PUBLIC RECORDS**

- (a) Contractor is responsible for identifying confidential trade secret information as such upon submittal to the District. Notwithstanding any other provision hereof, the District shall not be liable to Contractor for release of confidential information not identified as such upon submittal. If the District receives a public records request that requests information claimed to be confidential by Contractor, the District shall take such steps as are necessary to comply with chapter 119, Fla. Stat., while protecting the confidentiality of trade secret information. In the event of a dispute as to whether the requested information is a trade secret, Contractor shall be liable for all costs incurred by the District resulting from the dispute, including any court costs and attorney's fees. The calculation of those costs shall not include costs that are charged to the public records requestor.

- (b) Contractor shall comply with Florida Public Records law under Chapter 119, Fla. Stat. Records made or received in conjunction with this Agreement are public records under Florida law, as defined in §119.011(12), Fla. Stat. Contractor shall keep and maintain public records required by the District to perform the services under this Agreement.
- (c) If Contractor meets the definition of “Contractor” found in §119.0701(1)(a), Fla. Stat.; [i.e., an individual, partnership, corporation, or business entity that enters into a contract for services with a public agency and is acting on behalf of the public agency], then the following requirements apply:
- (i) Pursuant to §119.0701, Fla. Stat., a request to inspect or copy public records relating to this Agreement for services must be made directly to the District. If the District does not possess the requested records, the District shall immediately notify the Contractor of the request, and the Contractor must provide the records to the District or allow the records to be inspected or copied within a reasonable time. If Contractor fails to provide the public records to the District within a reasonable time, the Contractor may be subject to penalties under s. 119.10, Fla. Stat.
 - (ii) Upon request from the District’s custodian of public records, Contractor shall provide the District with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in Chapter 119, Fla. Stat., or as otherwise provided by law.
 - (iii) Contractor shall identify and ensure that all public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the Agreement term and following completion of the Agreement if the Contractor does not transfer the records to the District.
 - (iv) Upon completion of the Agreement, Contractor shall transfer, at no cost to District, all public records in possession of Contractor or keep and maintain public records required by the District to perform the services under this Agreement. If the Contractor transfers all public records to the District upon completion of the Agreement, the Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public disclosure requirements. If the Contractor keeps and maintains public records upon completion of the Agreement, the Contractor shall meet all applicable requirements for retaining public records. All records that are stored electronically must be provided to the District, upon request from the District’s custodian of public records, in a format that is accessible by and compatible with the information technology systems of the District.

(d) IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLA. STAT., TO THE CONTRACTOR’S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE DISTRICT’S CUSTODIAN OF PUBLIC RECORDS AT:

**District Clerk
 St. Johns River Water Management District
 4049 Reid Street
 Palatka, Florida 32177-2571
 (386) 329-4127
clerk@sjrwm.com**

41. **RELEASE OF INFORMATION.** Contractor shall not publish or release any information related to performance of this Agreement, or prepare, publish, or release any news or press release in any way related to this Agreement, without prior District review and written consent.

42. **REMEDIES FOR NON-PERFORMANCE**

- (a) **District Remedies.** The remedies enumerated herein are non-exclusive. In addition to the remedies set forth below, the District may avail itself of any statutory and/or common law remedies not set forth herein. In the event of a breach, the District may terminate this Agreement for cause. Alternatively, the District may allow Contractor to correct the deficiency, or may take such action as is necessary to correct such deficiency through District action or that of a third party. Delay or failure by the District to enforce any right or remedy hereunder shall not impair, or be deemed a waiver of, any such right or remedy, or impair the District's rights or remedies for any subsequent breach of this Agreement.
- (b) **Contractor Correction of Deficiencies.** The District shall provide Contractor with written notice of deficiency. At the District's sole judgment and discretion, the District may afford an opportunity to correct said deficiency, in which event the notice shall specify the time allowed to cure. If Contractor disputes that a failure of performance has occurred, Contractor shall, nevertheless, perform the corrective action and may submit a request for a Change Order subject to the dispute resolution procedure. Unless authorized through a Change Order, the Completion Date shall not be extended in order to correct deficiencies. Contractor shall bear the cost of correcting all work of other contractors that is destroyed, damaged, or otherwise negatively impacted by its corrective action. Failure to take timely corrective action may result in termination for cause or the District pursuing alternative remedies, as provided herein.
- (c) **Alternative Remedies to Correct Deficiency.** If the District determines that it is not in its best interest for Contractor to correct incomplete or damaged Work caused by Contractor's failure of performance, the District may pursue any or all of the following remedies, in whole or in part: (1) accept the Work as is and deduct the reasonable value of the deficient Work from the Total Compensation; (2) complete the Work through the utilization of District employees and deduct the cost thereof from the Total Compensation; (3) contract with a third party to complete the deficient Work and deduct the cost thereof from the Total Compensation.
- (d) **District Technical Assistance.** The District may elect to provide technical assistance to Contractor in order to complete satisfactory performance of the Work. If the District is performing a function that Contractor is required to perform, the District may deduct the cost of providing such technical assistance from the Total Compensation. Prior to providing any such technical assistance, the District shall notify Contractor that it considers such assistance to be above and beyond its duties under this Agreement and that it intends to deduct the cost of providing such assistance from the Total Compensation. Contractor shall not be entitled to reject technical assistance when the District determines that such assistance is necessary to complete the Work.

43. **ROYALTIES AND PATENTS.** Contractor certifies that, to the best of its information and belief, the Work does not infringe on any patent rights. Unless provided otherwise herein, Contractor shall: (1) pay all royalties, patent, and license fees necessary for the Work; (2) defend all suits or claims for infringement of any patent rights, and (3) save and hold the District harmless from loss on account thereof; provided, however, that the District shall be responsible for any such losses when the utilization of a particular process or product of a particular manufacturer is specified by the District. If Contractor obtains information that the process or article so specified is a patent infringement, it shall be responsible for such loss unless it promptly so notifies the District.

44. **SAFETY.** For any Work that is to be performed on premises that are owned or controlled by the District (the Premises), Contractor has the sole and exclusive duty for the safety of the premises. Contractor shall provide and maintain sufficient protection for the safety of its employees and other persons who may utilize the Premises, and prevent damage to District property, materials, and equipment. Contractor shall at all times enforce strict discipline and good order among its employees and shall not employ any unfit person or anyone not skilled in the work assigned. Neither Contractor nor its subcontractors shall allow or cause to be allowed any hunting or any weapons, animals, alcohol, or drugs, on or from the Premises or adjacent property. Contractor employees shall not park their vehicles or store equipment or materials adjacent to roads where it may be a hazard to traffic. A clear distance of at least 30 feet from the edge of the pavement or right-of-way shall be kept free of any obstacles unless otherwise authorized by the District. Contractor shall ensure that only authorized personnel are allowed on the worksite and shall post notices warning both employees and the public of all safety hazards created by Contractor.
45. **SCRUTINIZED COMPANIES.** Contractor certifies that it is not on the Scrutinized Companies that Boycott Israel List or engaged in a boycott of Israel. Pursuant to §287.135, Fla. Stat., the District may terminate this Agreement at its sole option if the Contractor is found to have submitted a false certification; or if the Contractor is placed on the Scrutinized Companies that Boycott Israel List or is engaged in the boycott of Israel during the term of the Agreement.
46. **SCRUTINIZED COMPANIES.** Contractor certifies that it is not on the Scrutinized Companies that Boycott Israel List or engaged in a boycott of Israel. Pursuant to §287.135, Fla. Stat., the District may terminate this Agreement at its sole option if Contractor is found to have submitted a false certification; or if Contractor is placed on the Scrutinized Companies that Boycott Israel List or is engaged in the boycott of Israel during the term of the Agreement. If this Agreement is for more than one million dollars, Contractor certifies that it is also not on the Scrutinized Companies with Activities in Sudan, Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or engaged with business operations in Cuba or Syria as identified in §287.135, Fla. Stat. Pursuant to §287.135, Fla. Stat., the District may terminate this Agreement at its sole option if Contractor is found to have submitted a false certification; or if Contractor is placed on the Scrutinized Companies with Activities in Sudan List, or Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or engaged with business operations in Cuba or Syria during the term of the Agreement.
47. **SUBSTANTIAL COMPLETION; PUNCH LIST.** Contractor shall notify the District in writing when it considers the Work to be substantially complete. “Substantially complete” is the point when the District can beneficially occupy its property and use the Work for its intended purpose, with only minor items remaining in order for the Work to be fully complete. Within 30 days of receipt of such notice, the District shall review the Work and determine whether the Work is substantially complete. If the District agrees that the Work is substantially complete, the District shall, within said 30-day period, develop a list of items (“Punch List”) required to render the Work complete, satisfactory, and acceptable in all respects. The Punch List shall be delivered to Contractor not later than five days after it is developed. Contractor shall complete the Punch List items by the Completion Date; provided, however, that if the Completion Date is less than 30 days after the date of delivery of the Punch List, the Completion Date shall be extended to 30 days after delivery of the Punch List. Failure to include any corrective work or pending items not yet completed on the Punch List does not alter Contractor’s responsibility to complete all construction services required by the Agreement. Upon completion of all Punch List items, Contractor may request payment of any remaining retainage. If the District disputes the completion of any items on the Punch List, it may withhold 150% of the estimated cost of completing any such items, and shall return the remainder of the retainage to Contractor. Any disputed matters shall be resolved pursuant to the dispute resolution procedure of this Agreement.

48. SURVEYS; PRESERVATION OF MONUMENTS; POINTS AND INSTRUCTION

- (a) **Surveys.** When necessary to performance of the Work, unless otherwise provided in the Statement of Work, the District will furnish horizontal and vertical control necessary to lay out the Work, including horizontal reference point(s) and a vertical control benchmark within 200 feet of the site. The District will set the horizontal reference point(s) and vertical control only at the beginning of the job. Contractor is responsible for interim staking during the job and all staking and layout work not otherwise furnished by the District. Contractor shall furnish all construction layout of the Work, including layout, centerline, and grade stakes for access roadways. Contractor shall furnish all personnel, equipment, and materials to make such surveys as are necessary to determine the quantity of Work performed. Field notes and computations for estimates shall be verified by the District's Project Manager as to the quantities estimated.
- (b) **Preservation of Monuments.** Contractor shall maintain and preserve all new and existing benchmarks, monuments, markers, reference points, and stakes established by others and/or the District. Should any of the aforesaid be destroyed or damaged by Contractor, the same shall be replaced by Contractor's licensed land surveyor at no cost to the District. Contractor shall be responsible for the cost of any deficiencies in the Work caused by such loss or disturbance.
- (c) **Points and Instructions.** Contractor shall provide reasonable and necessary opportunities and facilities for setting points and making measurements. Contractor shall not proceed until it has made a timely request to the District for, and has received, such points and instructions as may be necessary as the Work progresses. The Work shall be done in strict conformity with such points and instructions.

49. TRENCH SAFETY. In the performance of this contract, Contractor may be requested to supply cost estimates for trench excavation to a depth exceeding five feet. §553.62, Fla. Stat., incorporates the Occupational Safety and Health Administration's excavation safety standards, 29 CFR §1926.650 Subpart P, as the standard. Contractor shall separately estimate the cost of compliance with those standards as required by §553.63, Fla. Stat. Such estimate shall be based on the linear feet of trench to be excavated and shall include written assurance of compliance with those standards and any applicable special shoring requirements.

50. USE OF COMPLETED PORTIONS OF THE WORK. The District shall have the right to take possession of and use any completed or partially completed portions of the Work, notwithstanding the fact that the time for completing the entire Work or such portions may not have expired. Such taking of possession and use will not be deemed an acceptance of any Work not completed. If such possession and use increases the cost of or delays the Work, Contractor shall be entitled to a Change Order for extra compensation, or extension of time, as necessary, to offset the effect of such prior possession and use.

51. WARRANTY

- (a) Contractor warrants that the Work, workmanship and material furnished by Contractor shall be new and of specified quality, shall conform to the requirements of this Agreement, shall be free from defects, and shall be free from any security interest, lien, or other encumbrances. This warranty shall remain in effect for a period of 12 months after completion of the Work, unless otherwise specified herein. Any defective Work, workmanship, or material corrected during the warranty period shall be similarly warranted for 12 months following its correction or for such other period as specified herein. The express warranty set forth herein shall not be exclusive and shall not act as a limitation upon any statutory or other warranty of any kind, express or implied, including any implied warranty of merchantability or fitness for a particular purpose.

(b) In the event of breach of this warranty, Contractor shall take the necessary actions to correct the breach in the most expedient manner as dictated by then-existing circumstances. All costs incidental to the repair, replacement, redesign, and testing incurred as a result thereof, including the removal, replacement, and reinstallation of equipment in place when the Work was started, shall be Contractor’s responsibility. Upon written notification of a breach, Contractor shall promptly send the necessary personnel to the project site to assume responsibility for corrective action. Time is of the essence. Contractor shall be afforded necessary and reasonable access to perform warranty work. If Contractor fails to promptly correct the breach, the District may take corrective action without waiving any other rights or remedies it may have, and Contractor shall reimburse the District for all expenses reasonably incurred in performing such corrective action.

52. **WORK SCHEDULE.** For construction or other services upon District property, no Work shall be accomplished on official holidays or weekends unless approved in advance by the District Project Manager. Unless otherwise approved by the District Project Manager, Contractor’s work hours on District property shall not commence before 7:00 a.m. and shall conclude on or before 6:00 p.m. All requests to change the schedule shall be coordinated with the District a minimum of 24 hours in advance of the change and confirmed in writing.

IN WITNESS WHEREOF, the St. Johns River Water Management District has caused this Agreement to be executed on the day and year written below in its name by its Executive Director, or duly authorized designee, and Contractor has caused this Agreement to be executed on the day and year written below in its name by its duly authorized representatives, and, if appropriate, has caused the seal of the corporation to be attached. This Agreement may be executed in separate counterparts, which shall not affect its validity. Upon execution, this Agreement constitutes the entire agreement of the parties, notwithstanding any stipulations, representations, agreements, or promises, oral or otherwise, not printed or inserted herein. This Agreement cannot be changed by any means other than written amendments referencing this Agreement and signed by all parties.

ST. JOHNS RIVER WATER
MANAGEMENT DISTRICT

CONTRACTOR

By: _____
Ann B. Shortelle, Ph.D., Executive Director, or designee

By: _____

Typed Name and Title

Date: _____

Date: _____

Attest: _____

Typed Name and Title

- Attachments:
- Attachment A — Statement of Work/Technical Specifications
- Attachment B — Insurance Requirements
- Attachment C — District’s Supplemental Instructions (sample)
- Attachment D — Contract Payment Requirement for State-Funded Cost Reimbursement Contracts
- Attachment E — Plans and Permits

**ATTACHMENT A — STATEMENT OF WORK
LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION**

I. BACKGROUND

Lake Apopka, the headwaters of the Ocklawaha Chain of Lakes, is the fourth largest lake in Florida (approximately 31,000 acres). The lake is located approximately 15 miles northwest of Orlando. The lake lies mostly within Orange County; the western part of the lake lies in Lake County. Persistent eutrophic conditions sustained algal blooms in the lake for decades (1940s-1990s), resulting in the total loss of submerged aquatic vegetation (SAV), decline in sportfish populations, and accumulation of a 0 to 60 cm thick layer of unconsolidated flocculent organic sediment within the lake. The District has maintained a restoration program to reverse eutrophication in the lake by limiting watershed inputs of the limiting nutrient, phosphorus (P), and removing accumulated P and flocculent sediments from the lake. Documented recovery of SAV and improvements in water quality have shown that the strategy has been successful. However, full recovery of the lake has yet to be achieved due partially to continued introduction of P from pumped Lake Apopka North Shore (LANS) discharges. Efforts are underway to store and more effectively treat more water on the north shore by raising levees and providing pumps to lift water up into storage areas

II. OBJECTIVES

Construct a pump system to move water from the Duda central portion of the LANS to the east side of the LANS. The project consists of the construction of a transfer pumping station, an earthen berm with controlled culverts across lake level canal and a controlled culvert from the lake level canal to the east side of the LANS. The project is located near the intersection of Canal Road and Fudge Road in Apopka, Florida 32703.

III. SCOPE

The Contractor shall furnish all supervision, labor, materials, power, light, heat, fuel, water, tools, appliances, equipment, supplies, and means of construction necessary for proper performance and completion of the work consistent with the plans titled “LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION” dated August 2020, and the “LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION” Specifications dated August 2020.

IV. TASK IDENTIFICATION:

Contractor Responsibilities:

The Contractor shall provide all material, labor, and equipment to comply with all requirements of this scope of work and with the drawings titled “LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION” dated August 2020, and the “LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION” Specifications dated August 2020.

District’s Responsibilities:

1. Provide onsite inspection of project.
2. Provide Contractor with access to the site with a temporary lock combination.

3. Review of shop drawings submittals and provide comments with requested revisions and/or approval.
4. Work with the contractor on selection of material staging areas somewhere on the LANS.
5. Coordinate with Contractor in advising the local Florida Fish & Wildlife Conservation Commission for any problems with nuisance animals, snakes and pests that may interfere with the project.
6. Review weekly reports and approve request for payments.
7. Approve the compaction requirements of the fill placement.
8. Provide geotechnical and concrete testing for installation verifications per project requirements with contractor's aid in access to the site and advanced notification to District.

Pay Items:

See specification section 1025

Attention is brought to pay item 8 in section 1025: Supplemental Work Allowance. The purpose of this item is to allow minor deviations from the construction documents to be paid by the District without the need for a change order. Minor work not covered by the contract documents, must be approved in writing by the District project manager prior to beginning any supplemental work. The supplemental work allowance may only be charged if directed by the project manager to do so. Any work not authorized to be performed under the supplemental work allowance, shall not be performed unless and until an executed change order is issued by the District.

V. TIMEFRAMES & DELIVERABLES

1. Contractor shall begin work within 30 days of the Effective Date. The Effective Date is the date upon which the last party to this Agreement has dated and executed the same.
2. All work and demobilization shall be completed no later than 300 days from the effective date.

VI. BUDGET

The District will pay the Contractor a percent completion of each of the lump sum items amount submitted on its Cost Schedule. The quantities may vary for those items requiring a "per unit cost" and the total quantities of each of these items will be determined during construction. The District reserves the right to increase, decrease, or delete any class, item, or part of the Work at the stated unit prices in determining the value of a change order.

Project Manager

Bob Naleway
Senior Professional Engineer
Phone: 386-312-2366
Cell: 407-209-7391
Email: rnaleway@sjrwmd.com

Project Inspector

Rayford (Flint) McCain
Engineering Construction Inspector
Phone: 321-473-1332
Cell: 321-212-9329
Email: rmccain@sjrwmd.com

ATTACHMENT B — INSURANCE REQUIREMENTS

shall acquire and maintain until completion of the Work the insurance coverage listed below, which constitutes primary coverage. Contractor shall not commence the Work until the District receives and approves Certificates of Insurance documenting required coverage. Contractor's General Liability policy shall include Endorsement CG 20 10 04 13, or equivalent, naming the St. Johns River Water Management District (the "District") as Additional Insured. All required policies shall include: (1) endorsement that waives any right of subrogation (Endorsement CG 24 04 05 09, or equivalent) against the District for any policy of insurance provided under this requirement or under any state or federal worker's compensation or employer's liability act; (2) endorsement to give the District no less than 30 days' notice in the event of cancellation or material change. Certificates of Insurance must be accompanied by copies of the requested endorsements.

Any deductibles or self-insured retentions above \$100,000 must be declared to and approved by the District. Approval will not be unreasonably withheld. Contractor is responsible for any deductible or self-insured retention. Insurance must be placed with insurers having an A.M. Best rating of A-V or greater. District receipt of insurance certificates providing less than the required coverage does not waive these insurance requirements.

- (a) **Workers' Compensation Insurance.** Workers' compensation and employer's liability coverage, including maritime workers' compensation, if applicable, in not less than the minimum limits required by Florida law. If Contractor claims an exemption from workers' compensation coverage, Contractor must provide a copy of the Certificate of Exemption from the Florida Division of Workers' Compensation for all officers or members of an LLC claiming exemption who will be participating in the Work. In addition, Contractor must provide a completed District "Affidavit (Non-Construction)" for non-construction contracts.
- (b) **General Liability.** Commercial General Liability Insurance on an "Occurrence Basis," with limits of liability for each occurrence of not less than \$1,000,000 for personal injury, bodily injury, and property damage, with a project aggregate of \$2,000,000. Coverage shall include: (1) contractual liability, (2) products and completed operations, (3) independent contractors, and (4) property in the care, control, or custody of the Contractor. Extensions shall be added or exclusions deleted to provide the necessary coverage.
- (c) **Automobile Liability.** \$500,000 combined single limit.
- (d) **Pollution/Environmental Impairment Liability Coverage**
 - (i) Contractor is responsible to provide this coverage through its automobile liability, general liability or a separate policy if it transports or stores fuel on a vehicle, trailer or piece of equipment.
 - (ii) Contractor is responsible to provide this coverage through its general liability or a separate policy if it has a fuel storage tank stationed on the worksite.

Policy Limits. Not less than \$1,000,000 per claim, personal injury, bodily injury, and property damage and remediation costs.

ATTACHMENT C — DISTRICT’S SUPPLEMENTAL INSTRUCTIONS (sample)

DISTRICT SUPPLEMENTAL INSTRUCTIONS #

DATE:

TO: _____

FROM: Bob Naleway, Project Manager

CONTRACT NUMBER: 36033

CONTRACT TITLE: Lake Apopka North Shore Interconnect Pump Station

The Work shall be carried out in accordance with the following supplemental instruction issued in accordance with the Contract Documents without change in the Contract Sum or Contract Time. Prior to proceeding in accordance with these instructions, indicate your acceptance of these instructions for minor adjustments to the work as consistent with the Contract Documents and return to the District’s Project Manager.

1. CONTRACTOR’S SUPPLEMENTAL INSTRUCTIONS:
2. DESCRIPTION OF WORK TO BE CHANGED:
3. DESCRIPTION OF SUPPLEMENTAL INSTRUCTION REQUIREMENTS: .

Contractor’s approval: (choose one of the items below):

Approved: _____ Date: _____

(It is agreed that these instructions shall not result in a change in the Total Compensation or the Completion Date.)

Approved: _____ Date: _____

(Contractor agrees to implement the Supplemental Instructions as requested but reserves the right to seek a Change Order in accordance with the requirements of the Agreement.)

Approved: _____ Date: _____
Robert Naleway, District Project Manager

Acknowledged: _____ Date: _____
Gerald Cahalane, District Associate Procurement Specialist

c: Contract file
Financial Services

**ATTACHMENT D – CONTRACT PAYMENT REQUIREMENTS
FOR STATE-FUNDED COST REIMBURSEMENT CONTRACTS**

Invoices for state-funded cost reimbursement contracts must be supported by an itemized listing of expenditures by category (salary, travel, expenses, etc.). Supporting documentation must be provided for each amount for which reimbursement is being claimed, indicating that the item has been paid. Check numbers may be provided in lieu of copies of actual checks. Each piece of documentation shall clearly reflect the dates of service. Only expenditures for categories in the approved contract budget will be reimbursed.

Listed below are examples of the types of documentation representing the minimum requirements by cost category:

- Salaries: Submit a payroll register or similar documentation showing gross salary charges, fringe benefits, other deductions, and net pay. If an individual is paid by the hour, a document reflecting the hours worked times the rate of pay is acceptable.
- Fringe Benefits: Fringe benefits should be supported by invoices showing the amount paid on behalf of the employee (e.g., insurance premiums paid). If the contract specifically states that fringe benefits will be based on a specified percentage, rather than the actual cost of fringe benefits, then the calculation for the fringe benefits amount must be shown.
- Exception: Governmental entities are not required to provide check numbers or copies of checks for fringe benefits.
- Travel: Reimbursement for travel must be in accordance with §112.061, Fla. Stat., which includes submission of the claim on the approved State of Florida (State) or District travel voucher.
- Other direct costs: Reimbursement is based upon paid invoices/receipts. If nonexpendable property is purchased using State funds, the contract should include a provision for the transfer of the property to the State when services are terminated. Documentation must be provided to show compliance with Department of Management Services Rule 60A-1.017, F.A.C., regarding the requirements for contracts which include services and that provide for the contractor to purchase tangible personal property as defined in §273.02, Fla. Stat., for subsequent transfer to the State.
- In-house charges: Charges which may be of an internal nature (e.g., postage, copies, etc.) may be reimbursed on a usage log which shows the units, times the rate being charged. The rates must be reasonable.
- Indirect costs: If the contract specifies that indirect costs will be paid based on a specified rate, then the calculation should be shown.

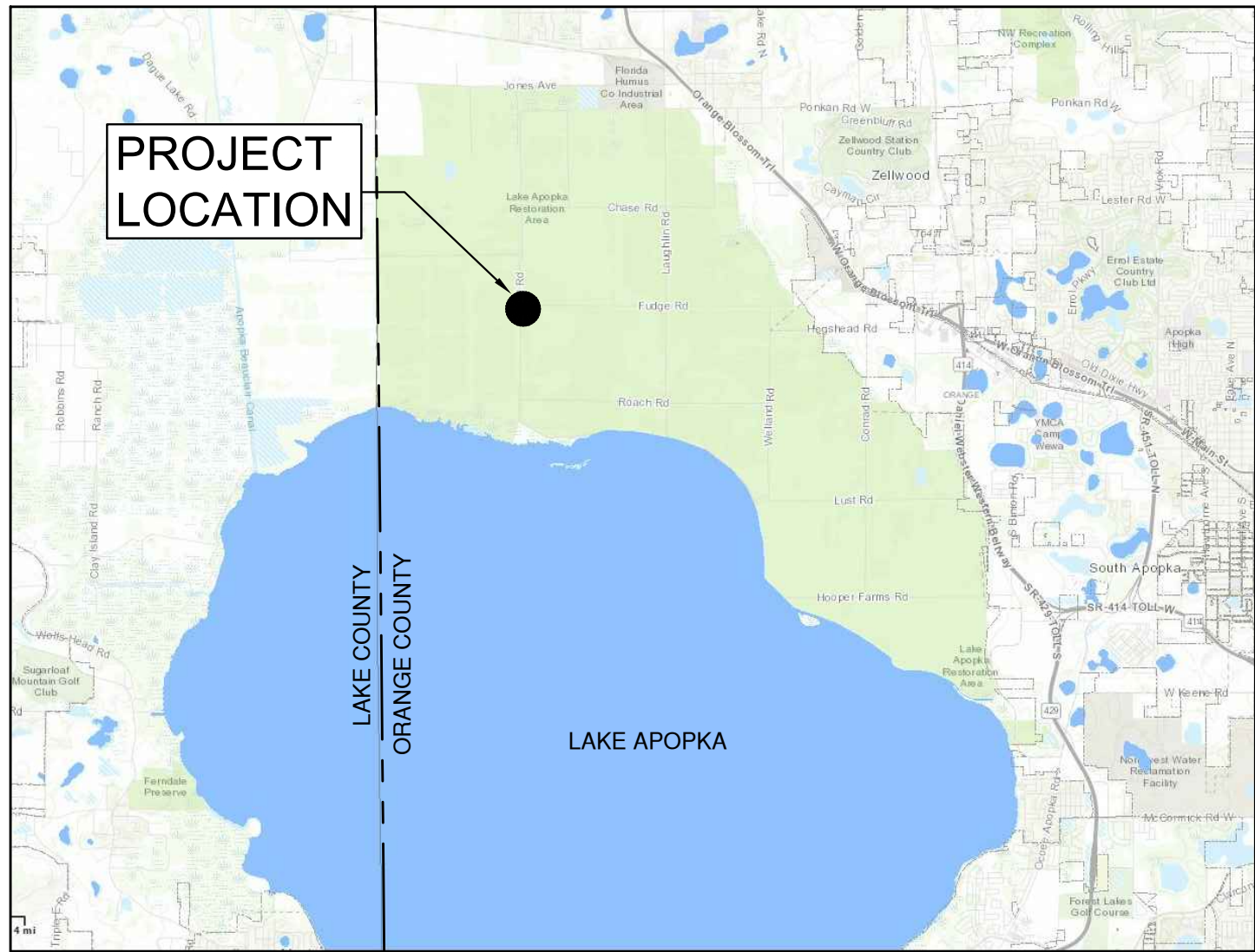
The “Reference Guide for State Expenditures” prepared by the Florida Department of Financial Services can be found at this web address: http://www.fldfs.com/aadir/reference_guide.htm

CONSTRUCTION DRAWINGS FOR:

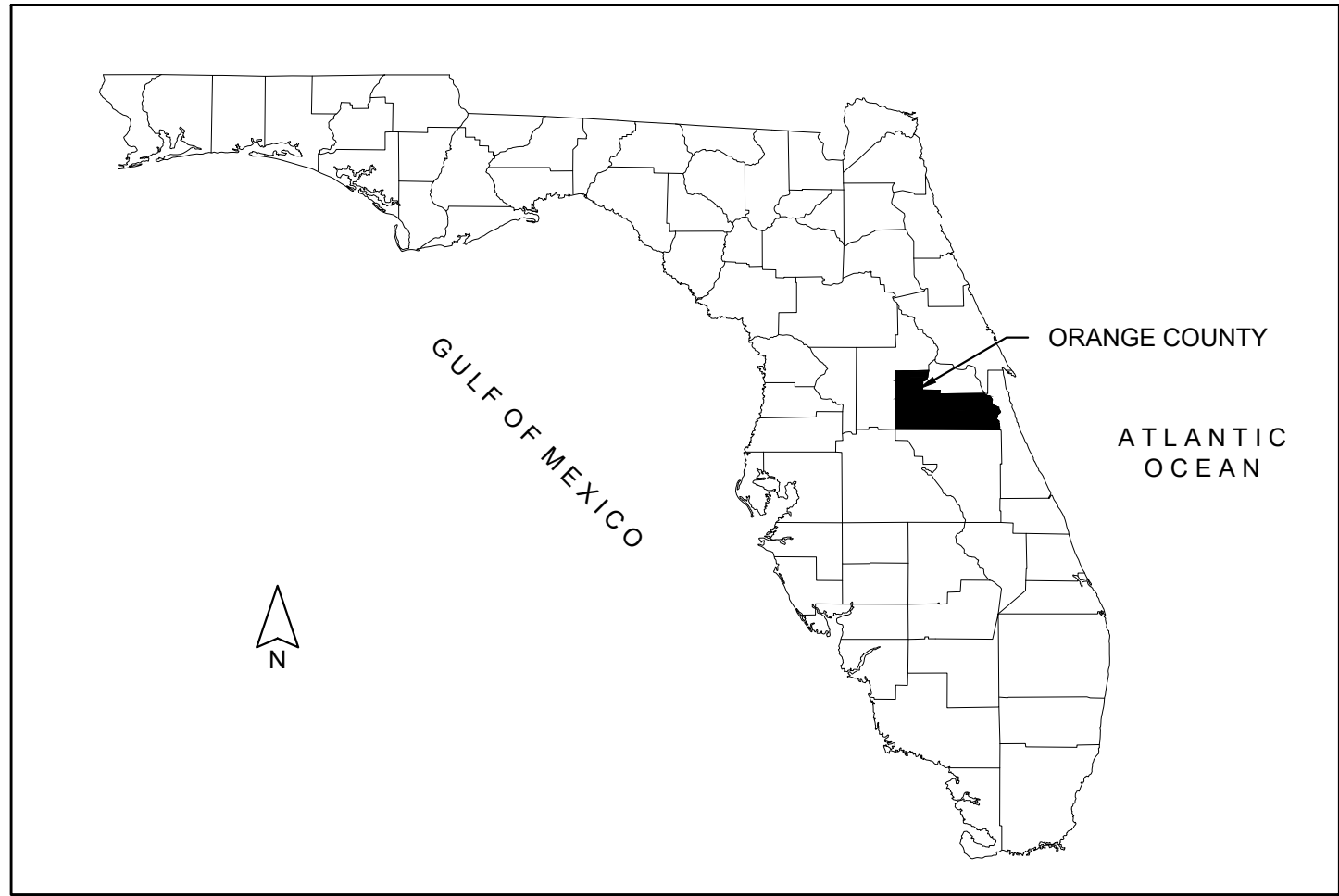
LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION

ORANGE COUNTY, FLORIDA

PREPARED FOR:
ST. JOHNS RIVER WATER MANAGEMENT DISTRICT



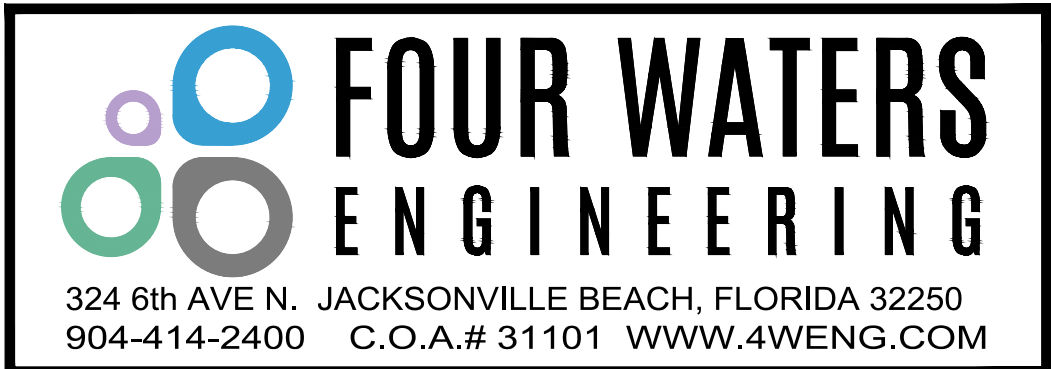
PROJECT LOCATION:



LOCATION MAP:



PREPARED BY:



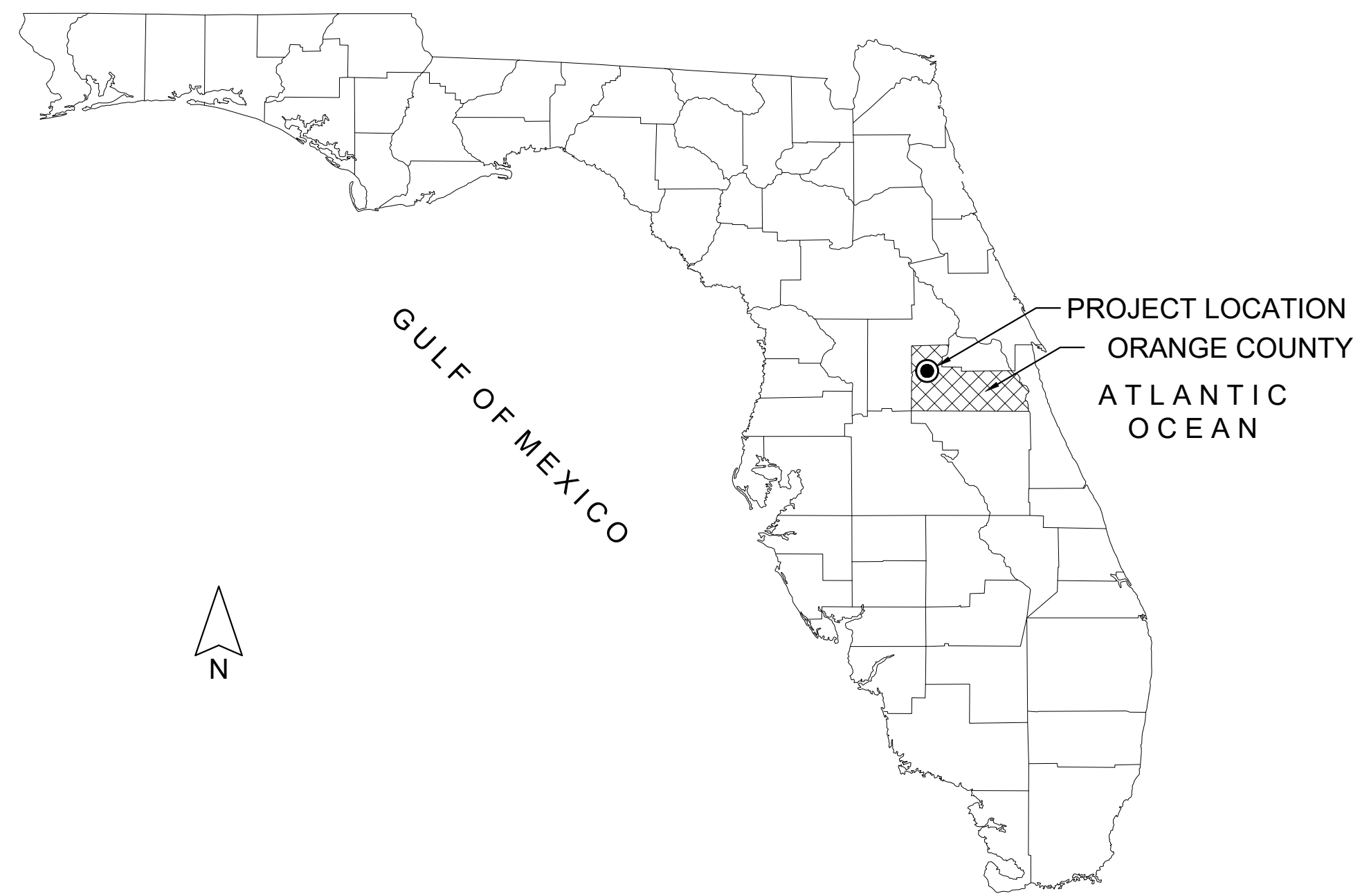
PROJECT #: 19-1010

DRAWING INDEX	
COVER AND GENERAL:	
	COVER SHEET
G-1	GENERAL NOTES
G-2	WILDLIFE DRIVE MAP
G-3	EXISTING CONDITIONS
G-4	OVERALL PROPOSED SITE PLAN AND PROJECT KEY MAP
CIVIL:	
C-1	PROPOSED OVERALL SITE AND GRADING PLAN
C-2	PLAN AND PROFILE PUMP AND PIPE DESIGN
C-3	PLAN AND PROFILE 48" CULVERT AT CANAL ROAD
C-4	PLAN AND PROFILE BERM WITH (2) 60" CULVERTS
D-1	CONSTRUCTION DETAILS
D-2	CONSTRUCTION DETAILS
D-3	CONSTRUCTION DETAILS
STRUCTURAL:	
S-0	GENERAL NOTES AND DESIGN CRITERIA
S-1	PROJECT PLAN VIEW
S-2	PUMP STATION PLATFORM PLANS
S-3	PUMP STATION SECTION AND DETAILS
S-4	PUMP STATION PLATFORM SECTIONS AND DETAILS
S-5	SECTIONS AND DETAILS
S-6	STILLING WELL CONCRETE PADS AND CANOPY DETAILS
ELECTRICAL:	
E-1	ELECTRICAL LEGENDS AND SCHEDULES
E-2	EXISTING SINGLE LINE DIAGRAMS
E-3	CONTROL WIRING DIAGRAMS
E-4	SCADA SYSTEM SCHEMATIC DIAGRAM
E-5	SCADA SYSTEM SCHEMATIC DIAGRAM
E-6	ELECTRICAL DETAILS
E-7	ELECTRICAL DETAILS
E-8	ELECTRICAL SITE PLAN
E-9	ELECTRICAL PLAN PUMP STATION
E-10	ELECTRICAL PLAN MOTOR OPERATED GATES
MECHANICAL:	
M-1	MECHANICAL DETAILS

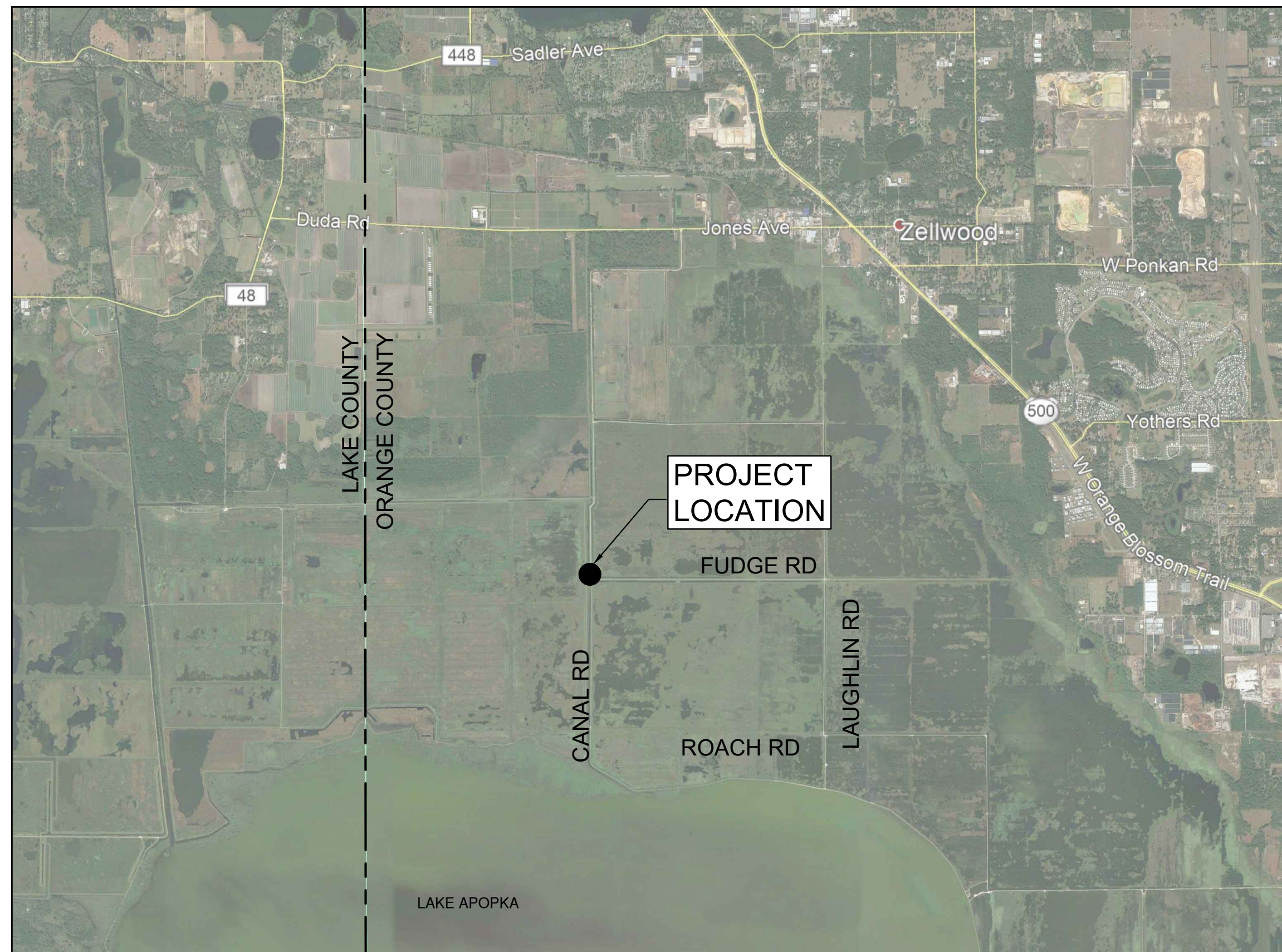
DATE: AUGUST 2020

ISSUE: 100% SUBMITTAL

STEVE DUCHARNE LOCATION: 19-1010 LAKE APOPKA, 100% PERCENT DWS



LOCATION MAP:



GENERAL NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE TO FAMILIARIZE HIMSELF WITH THE NATURE AND EXTENT OF THE CONTRACT DOCUMENTS, SCOPE OF WORK, LOCAL CONDITIONS, ALL FEDERAL, STATE, AND LOCAL LAWS, RULES AND REGULATIONS THAT MAY AFFECT THE WORK.
2. DURING ALL PHASES OF CONSTRUCTION, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM THE WORK INCLUDED IN THIS PROJECT. ALL MATERIALS, EQUIPMENT, SERVICES, ETC. USED OR PROVIDED SHALL CONFORM TO ALL O.S.H.A. REQUIREMENTS.
3. THE EXISTING CONDITIONS REPRESENTED IN THESE DRAWINGS AND THE PROJECT TOPOGRAPHIC SURVEY INFORMATION ARE BELIEVED TO BE ACCURATE ACCORDING TO THE INFORMATION AVAILABLE TO THE DISTRICT. HOWEVER, IT IS THE SOLE RESPONSIBILITY OF THE BIDDER (CONTRACTOR) TO VERIFY ALL EXISTING CONDITIONS AND REPORT ANY DISCREPANCIES TO THE DISTRICT PRIOR TO SUBMITTAL OF THE BID.
4. ALL LABOR, MATERIALS, AND METHODS OF CONSTRUCTION SHALL BE IN STRICT ACCORDANCE WITH THE MINIMUM ENGINEERING AND CONSTRUCTION STANDARDS ADOPTED BY THE FLORIDA DEPARTMENT OF TRANSPORTATION AND THE PLANS AND CONSTRUCTION SPECIFICATIONS. WHERE CONFLICTS OR OMISSIONS EXIST, THE FLORIDA DEPARTMENT OF TRANSPORTATION STANDARDS SHALL DICTATE. SUBSTITUTIONS AND DEVIATIONS FROM PLANS AND SPECIFICATIONS SHALL BE PERMITTED ONLY WHEN WRITTEN APPROVAL HAS BEEN ISSUED BY THE DISTRICT'S PROJECT MANAGER.
5. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT ALL REQUIRED PERMITS ARE OBTAINED AND IN HAND BEFORE BEGINNING ANY CONSTRUCTION. NO CONSTRUCTION OR FABRICATION OF ANY ITEM SHALL BEGIN UNTIL THE CONTRACTOR HAS RECEIVED ALL APPROVED FOR CONSTRUCTION PLANS AND ANY OTHER DOCUMENTATION FROM ALL OF THE PERMITTING AND ANY OTHER REGULATORY AUTHORITIES.
6. PERMITS: THE CONTRACTOR SHALL COMPLY WITH THE CONDITIONS CONTAINED IN ALL PERMITS WHICH HAVE BEEN OBTAINED FOR THE PROJECT.
 - A. DISTRICT OBTAINED PERMITS INCLUDE:
 - (1) US ARMY CORPS OF ENGINEERS 404 CLEAN WATER ACT PERMIT
 - (2) FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION GENERAL PERMIT
 - (3) ORANGE COUNTY ENVIRONMENTAL PERMIT
 - B. THE CONTRACTOR SHALL OBTAIN ANY AND ALL REMAINING PERMITS AS REQUIRED FOR THE CONSTRUCTION OF THE PROJECT PRIOR TO BEGINNING CONSTRUCTION INCLUDING, BUT NOT LIMITED TO:
 - (1) SUBMITTAL OF THE NOTICE OF INTENT (NOI) TO USE THE US EPA NPDES CONSTRUCTION GENERAL PERMIT AND COMPLETION OF ANY SUPPORTING DOCUMENTS REQUIRED FOR THE PERMIT.
 - (2) ORANGE COUNTY BUILDING DEPARTMENT PERMIT
 - (3) FDEP DEWATERING PERMIT
7. THE CONTRACTOR SHALL PROTECT ALL EXISTING STRUCTURES, LEVEES, ROADS, UTILITIES, AND OTHER IMPROVEMENTS FROM DAMAGE WHETHER OR NOT SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL ASSUME ALL RESPONSIBILITY FOR PROTECTION METHODS, COORDINATION WITH OWNERS AND REPAIRS TO UTILITIES AND OTHER SITE IMPROVEMENTS DAMAGED DURING CONSTRUCTION.
8. THE CONTRACTOR SHALL NOTIFY THE DISTRICT'S PROJECT MANAGER AT LEAST FIVE DAYS PRIOR TO BEGINNING CONSTRUCTION.
9. CONSTRUCTION INSPECTION WILL BE PERFORMED BY THE DISTRICT. THE CONTRACTOR SHALL NOTIFY THE DISTRICT AT LEAST 48 HOURS PRIOR TO THE REQUIRED TIME OF INSPECTION FOR EACH AND EVERY PHASE OF WORK.
10. SHOP DRAWINGS OF ALL MATERIALS BEING USED SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO INSTALLATION PER SPECIFICATION SECTION 01300.
11. ALL MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE PROJECT CONTRACT CONSTRUCTION DOCUMENTS.
12. ALL DISCREPANCIES ON THE DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY AND PRIOR TO COMMENCING WORK.
13. SECURITY OF THE SITE AND CONTRACTOR'S EQUIPMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AT NO ADDITIONAL COST TO THE DISTRICT.
14. ALL ELEVATIONS SHOWN ARE IN NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88).
15. THE CONTRACTOR SHALL HAVE AVAILABLE AT THE JOB SITE, AT ALL TIMES, ONE COPY OF THE CONTRACT DOCUMENTS INCLUDING STAMPED CONFORMED PLANS, SPECIFICATIONS, AND ALL SPECIAL PROVISIONS, AND COPIES OF ALL REQUIRED CONSTRUCTION PERMITS.
16. ALL DEWATERING COSTS ASSOCIATED WITH THE INSTALLATION AND CONSTRUCTION OF THIS PROJECT SHALL BE INCLUDED IN THE CONSTRUCTION COSTS, INCLUDING ALL WATER USE PERMITS THAT MAY BE REQUIRED FOR DEWATERING ACTIVITIES DURING CONSTRUCTION.

MOBILIZATION/DEMOBILIZATION

1. TASKS RELATED TO MOBILIZATION SHALL ADHERE TO THE CURRENT REQUIREMENTS OF SECTION 101 (MOBILIZATION) OF THE FDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (LATEST EDITION).
2. AREA IS AVAILABLE ADJACENT TO THE PROJECT AREA FOR EQUIPMENT STAGING AND MATERIALS STORAGE. THE CONTRACTOR SHALL COORDINATE EXACT LOCATION WITH DISTRICT'S PROJECT MANAGER PRIOR TO BEGINNING MOBILIZATION.
3. WORK WILL BE CONSIDERED COMPLETE ONLY AFTER ALL RUBBISH AND UNUSED MATERIAL DUE TO OR CONNECTED WITH THE WORK HAS BEEN REMOVED AND THE PREMISES LEFT IN A CONDITION SATISFACTORY TO THE DISTRICT.
4. ALL PROPERTY DISTURBED OR DAMAGED DURING PROSECUTION OF THE WORK SHALL BE RESTORED TO ITS FORMER CONDITION OR BETTER AT NO ADDITIONAL EXPENSE TO THE DISTRICT. FINAL PAYMENT WILL BE WITHHELD UNTIL SUCH CLEANUP IS COMPLETED AND APPROVED BY THE DISTRICT.

MAINTENANCE OF TRAFFIC

1. CONTRACTOR SHALL PROVIDE ALL SAFETY AND TRAFFIC CONTROL NECESSARY FOR ACCESS TO THE SITE AND WORK WITHIN THE PROJECT LIMITS.
2. THE CONTRACTOR SHALL COORDINATE WITH THE DISTRICT'S PROJECT MANAGER, OR DISTRICT'S CONSTRUCTION INSPECTOR REGARDING MAINTENANCE OF TRAFFIC ALONG THE WILDLIFE DRIVE.
3. THE CONTRACTOR SHALL NOT SCHEDULE WORK REQUIRING WILDLIFE DRIVE ROAD CLOSURES OR REQUIRING HEAVY USE OF WILDLIFE DRIVE FOR HAULING/DELIVERIES ON THE DAYS THE WILDLIFE DRIVE IS OPEN (FRIDAY, SATURDAY, SUNDAY AND FEDERAL HOLIDAYS).
4. THE CONTRACTOR SHALL ENSURE ALL WILDLIFE DRIVE ROADS ARE PASSABLE FOR SMALL 2-WHEEL DRIVE VEHICLES BEFORE LEAVING THE JOB SITE ON THURSDAYS.
5. ALL CONSTRUCTION TRAFFIC ON DAYS THAT THE WILDLIFE DRIVE IS OPEN SHALL FOLLOW THE DIRECTION OF ONE-WAY TRAFFIC OF THE WILDLIFE DRIVE AS POSTED BY THE DISTRICT FOR PUBLIC ACCESS (SEE DRAWING G2). NO LARGE DELIVERIES OF MATERIALS SHALL BE SCHEDULED FOR DAYS THE WILDLIFE DRIVE IS OPEN.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE CONSTRUCTION OF THE WORK AND MAINTENANCE OF TRAFFIC WITH OTHER DISTRICT CONSTRUCTION PROJECTS. THE CONTRACTOR SHALL COORDINATE WITH THE DISTRICT'S PROJECT MANAGER TO RESOLVE CONFLICTS BETWEEN CONSTRUCTION OF THE WORK AND OTHER DISTRICT CONSTRUCTION PROJECTS.

AS-BUILT DRAWINGS

1. THROUGHOUT THE CONSTRUCTION PHASE, CONTRACTOR SHALL MAINTAIN ONE (1) COMPLETE SET OF THE SIGNED AND SEALED CONTRACT PLANS ON FULL-SIZED PLAN SHEETS AS THE AS-BUILT DRAWINGS FOR THE PROJECT. THE AS-BUILT DRAWINGS SHALL INCLUDE ALL CHANGES, BOTH DESIGN AND CONSTRUCTION, WITH ALL SHOP DRAWINGS, INCLUDING ADEQUATE SKETCHES, DIMENSIONS, AND NOTES. ALL REVISIONS, INCLUDING THOSE OCCURRING DURING CONSTRUCTION, WILL BE INCLUDED IN THE AS-BUILT DRAWING SET.
2. UPON CONSTRUCTION COMPLETION CONTRACTOR WILL INCORPORATE ALL CHANGES AND REVISIONS MADE TO THE PROJECT AND RECORDED ON THE ON-SITE AS-BUILT PLANS INTO A FINAL (ELECTRONIC PDF AND CAD) AS-BUILT PLAN. SEE CONTRACT DOCUMENTS FOR SPECIFIC AS-BUILT DRAWING SUBMITTAL REQUIREMENTS.

Signature
Michael R. Kink, P.E.
FL Professional Eng. # 71640
Date

REV	NO	DATE	DRWN	CHKD	BY	DESCRIPTION
1						
2						
3						
4						
5						
6						

LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION

GENERAL NOTES

LAKE APOPKA
LAKE APOPKA, FLORIDA

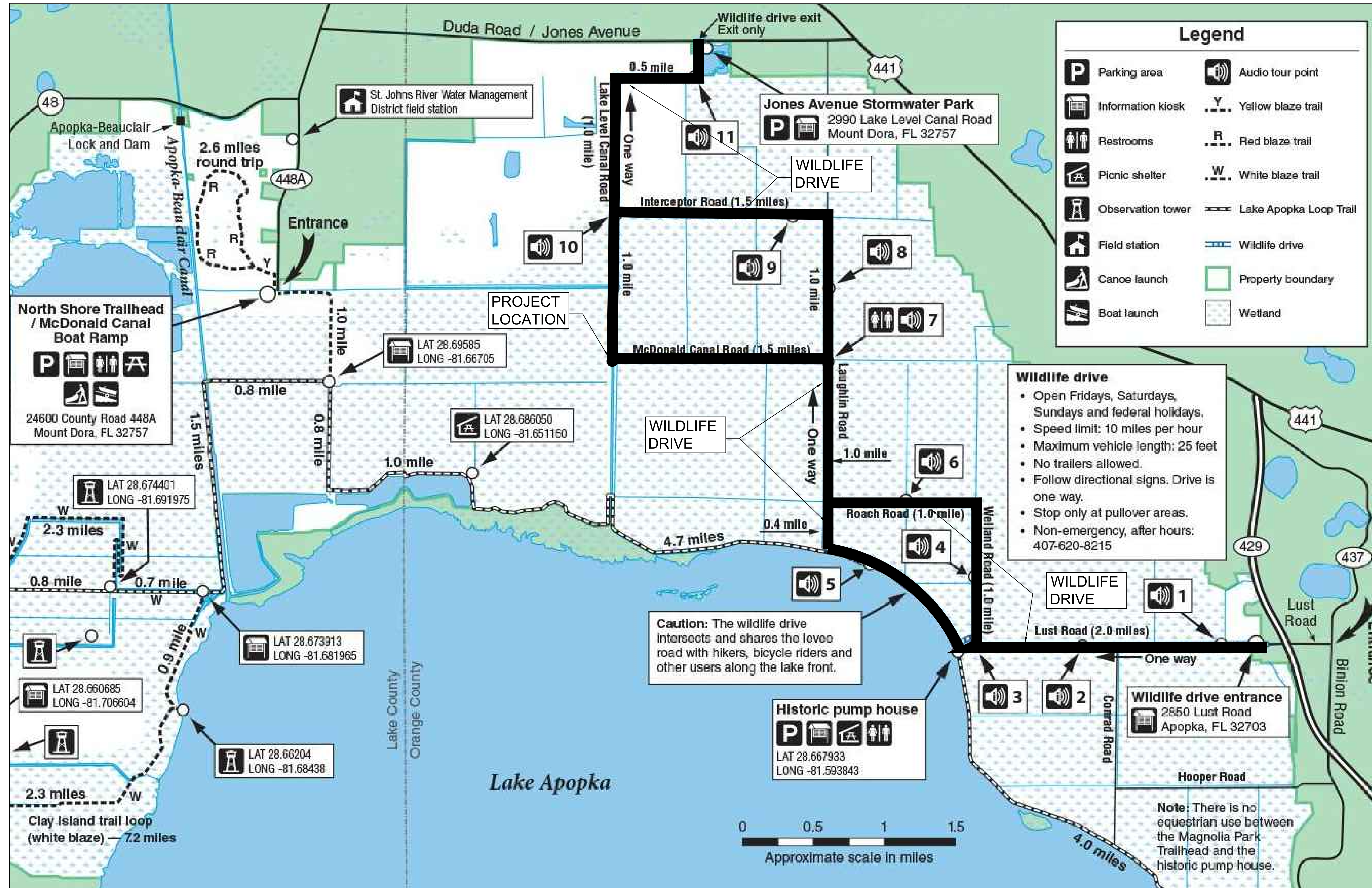
DESIGN	DRAWN	SLD	ISSUE	DATE	ISSUE
MRK			19-1010	AUGUST	2020
JOB NUMBER					100%

FOUR WATERS ENGINEERING

324 6th AVE. N. JACKSONVILLE BEACH, FLORIDA 32250
904-414-2400 C.O.A.# 31101 WWW.FWENG.COM

DRAWING NUMBER
G-1

STEVE DUCHARME LOCATION: R:\19-1010 LAKE APOPKA\X\DES\100 PERCENT.DWG



STEVE DUCHARME LOCATION: R/A 19-1010 LAKE APOPKA X/ACS 100 PERCENT.DWG

Signature
Michael R. King, P.E.
FL Professional Eng. # 71640
Date

REV	DATE	DESCRIPTION
1		
2		
3		
4		
5		
6		

LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION
WILDLIFE DRIVE MAP
LAKE APOPKA, FLORIDA

DESIGN	DATE	ISSUE	ISSUE
MIRK <td>19-1010 <td>AUGUST <td>2020</td> </td></td>	19-1010 <td>AUGUST <td>2020</td> </td>	AUGUST <td>2020</td>	2020
100%			

FOUR WATERS ENGINEERING
324 6th AVE. N. JACKSONVILLE BEACH, FLORIDA 32250
904-414-2400 C.O.A.# 31101 WWW.FWENG.COM

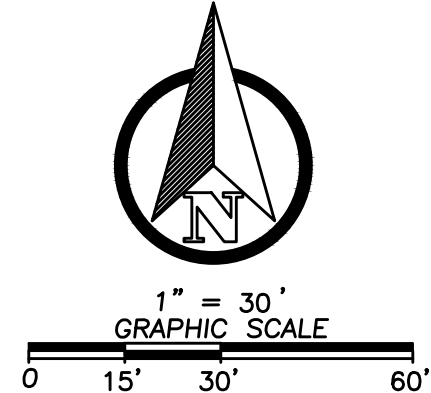
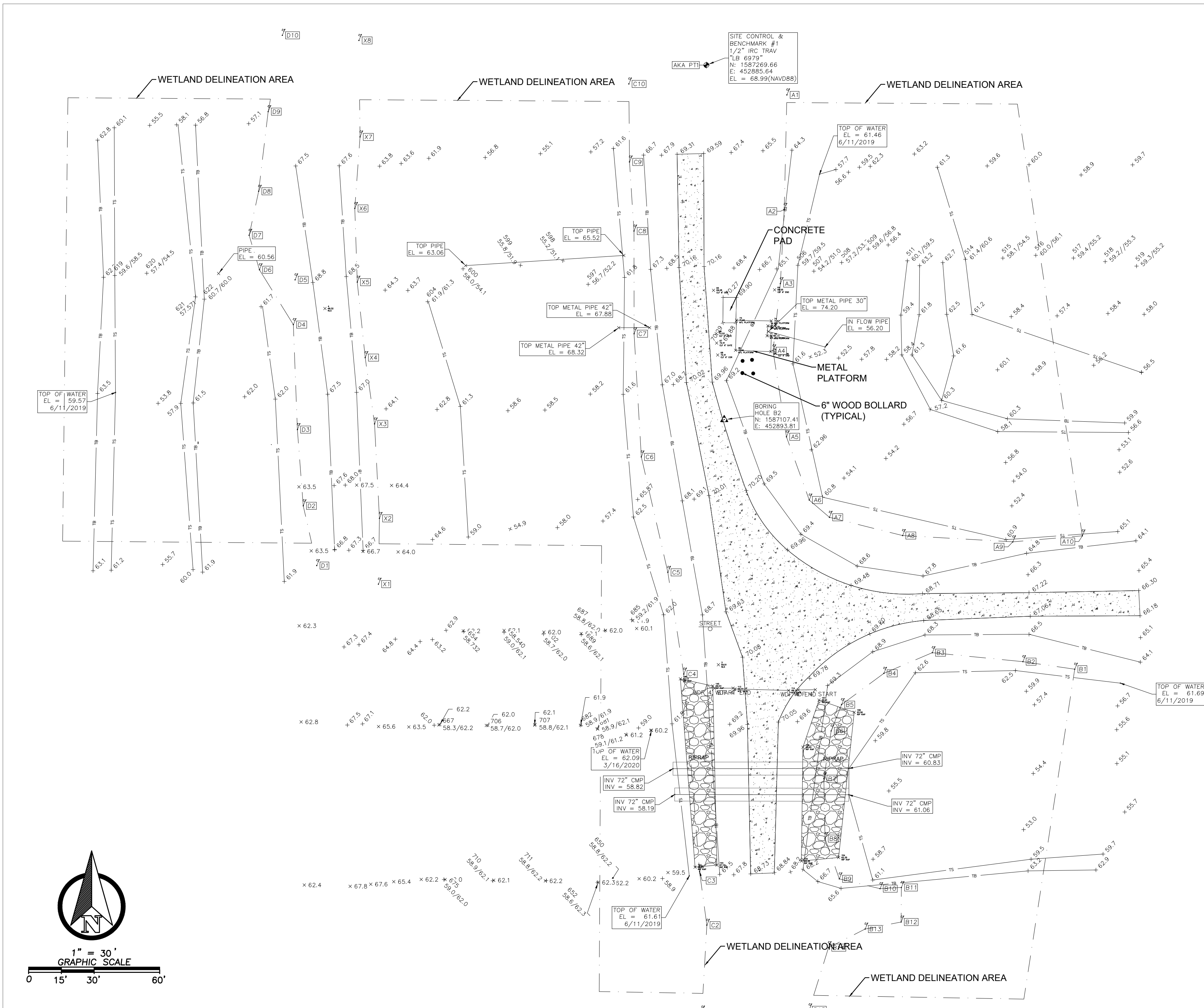
DRAWING NUMBER
G-2

A MAP SHOWING A TOPOGRAPHIC SURVEY OF LAKE APOPKA INTERCONNECT PUMP STATION ORANGE COUNTY, FLORIDA FOR: FOUR WATERS ENGINEERING, INC.

SITE CONTROL & BENCHMARK #1
1/2" IRC TRAV
N: 158735.19
E: 452888.04
EL = 68.41 (NAVD88)

Symbol Legend	
Symbol	Denotes
	SIGN, AS NOTED
	WETLAND FLAG
	WOOD BOLLARD
	WOOD POWER POLE
	BENCHMARK
	CONTOURS
	TOP OF BANK
	TOE OF SLOPE
	CORUGATE METAL PIPE
NGVD_29	NATIONAL GEODETIC VERTICAL DATUM of 1929
NAVD_88	NORTH AMERICAN VERTICAL DATUM OF 1988
EL	ELEVATION
EOP	EDGE OF PAVEMENT
No.	NUMBER
LB	LICENSED BUSINESS
JEA	JACKSONVILLE ELECTRIC AUTHORITY
EOP	EDGE OF PAVEMENT
IDENT	IDENTITY
0.0/0.0	BOTTOM OF MUCK / TOP OF MUCK LOCATION

MUCK TABLE			
POINT No	NORTHING	EASTING	DEPTH OF MUCK
506	1587178.07	452927.53	MUCK DEPTH -0.3
507	1587175.36	452934.83	MUCK DEPTH -3.2
508	1587179.30	452947.56	MUCK DEPTH -3.7
509	1587185.45	452959.77	MUCK DEPTH -2.8
511	1587180.10	452977.62	MUCK DEPTH -0.6
514	1587180.80	453004.21	MUCK DEPTH -0.8
515	1587181.34	453021.33	MUCK DEPTH -3.6
516	1587182.59	453036.41	MUCK DEPTH -3.9
517	1587181.35	453053.65	MUCK DEPTH -4.2
518	1587179.74	453068.17	MUCK DEPTH -3.9
519	1587177.67	453082.53	MUCK DEPTH -4.1
597	1587169.35	452831.54	MUCK DEPTH -4.5
598	1587180.14	452819.98	MUCK DEPTH -4.1
599	1587178.05	452800.57	MUCK DEPTH -3.9
600	1587176.43	452774.27	MUCK DEPTH -3.9
604	1587161.26	452758.40	MUCK DEPTH -0.6
619	1587173.39	452614.87	MUCK DEPTH -1.1
620	1587174.41	452629.50	MUCK DEPTH -2.9
621	1587163.60	452651.86	MUCK DEPTH -0.7
622	1587162.56	452655.84	MUCK DEPTH -0.7
650	1586895.48	452841.95	MUCK DEPTH -3.4
652	1586895.68	452835.88	MUCK DEPTH -3.7
654	1587010.49	452774.56	MUCK DEPTH -3.0
667	1586967.75	452763.15	MUCK DEPTH -3.9
675	1586896.98	452765.55	MUCK DEPTH -3.0
678	1586963.38	452848.83	MUCK DEPTH -2.1
681	1586966.05	452835.63	MUCK DEPTH -3.2
682	1586967.59	452828.21	MUCK DEPTH -3.0
685	1587015.87	452851.45	MUCK DEPTH -2.7
687	1587010.94	452839.16	MUCK DEPTH -3.2
689	1587009.09	452828.39	MUCK DEPTH -3.3
701	1587010.11	452793.06	MUCK DEPTH -3.1
702	1587009.34	452811.08	MUCK DEPTH -3.3
706	1586967.51	452784.92	MUCK DEPTH -3.3
707	1586967.97	452807.18	MUCK DEPTH -3.3
710	1586896.41	452787.89	MUCK DEPTH -3.2
711	1586896.49	452812.42	MUCK DEPTH -3.4



WETLAND DELINEATION FLAG					
POINT No	NORTHING	EASTING	LATITUDE	LONGITUDE	FLAG NUMBER
1000	1587040.646	452707.295	N028°41'52.98"	W081°38'04.70"	D1
1001	1587067.988	452701.130	N028°41'53.25"	W081°38'04.78"	D2
1002	1587102.861	452686.446	N028°41'53.60"	W081°38'04.81"	D3
1003	1587150.904	452686.589	N028°41'54.08"	W081°38'04.83"	D4
1004	1587171.391	452687.378	N028°41'54.28"	W081°38'04.82"	D5
1005	1587176.004	452681.075	N028°41'54.32"	W081°38'05.01"	D6
1006	1587191.786	452676.367	N028°41'54.48"	W081°38'05.06"	D7
1007	1587211.914	452680.718	N028°41'54.68"	W081°38'05.01"	D8
1008	1587248.352	452685.064	N028°41'55.04"	W081°38'04.97"	D9
1009	1587283.281	452691.546	N028°41'55.39"	W081°38'04.90"	D10
1010	1587280.933	452726.612	N028°41'55.36"	W081°38'04.50"	X8
1011	1587236.779	452727.122	N028°41'54.93"	W081°38'04.49"	X7
1012	1587204.053	452724.723	N028°41'54.60"	W081°38'04.52"	X6
1013	1587170.332	452725.852	N028°41'54.27"	W081°38'04.50"	X5
1014	1587135.796	452729.480	N028°41'53.93"	W081°38'04.46"	X4
1015	1587105.467	452733.766	N028°41'53.63"	W081°38'04.41"	X3
1016	1587062.234	452735.989	N028°41'53.20"	W081°38'04.38"	X2
1017	1587032.159	452735.538	N028°41'52.90"	W081°38'04.39"	X1
1018	1586836.350	452883.580	N028°41'50.97"	W081°38'02.71"	C1
1019	1586876.105	452885.862	N028°41'51.36"	W081°38'02.69"	C2
1020	1586900.587	452822.518	N028°41'51.61"	W081°38'02.73"	C3
1021	1586891.004	452875.297	N028°41'52.50"	W081°38'02.82"	C4
1022	1587037.543	452868.003	N028°41'52.96"	W081°38'02.90"	C5
1023	1587090.367	452855.856	N028°41'53.48"	W081°38'03.04"	C6
1024	1587146.723	452855.550	N028°41'54.04"	W081°38'03.08"	C7
1025	1587193.710	452852.506	N028°41'54.51"	W081°38'03.08"	C8
1026	1587225.336	452850.460	N028°41'54.82"	W081°38'03.11"	C9
1027	1587261.027	452850.144	N028°41'55.17"	W081°38'03.11"	C10
1028	1587256.007	452922.487	N028°41'55.13"	W081°38'02.30"	A1
1029	1587203.645	452921.287	N028°41'54.61"	W081°38'02.31"	A2
1030	1587169.648	452919.506	N028°41'54.27"	W081°38'02.33"	A3
1031	1587138.031	452916.149	N028°41'53.97"	W081°38'02.37"	A4
1032	1587099.558	452922.296	N028°41'53.58"	W081°38'02.29"	A5
1033	1587070.646	452932.721	N028°41'53.29"	W081°38'02.18"	A6
1034	1587062.729	452941.950	N028°41'53.22"	W081°38'02.07"	A7
1035	1587054.380	452975.448	N028°41'53.13"	W081°38'01.89"	A8
1036	1587051.509	453025.903	N028°41'53.11"	W081°38'01.13"	A9
1037	1587054.254	453057.729	N028°41'53.14"	W081°38'00.77"	A10
1038	1586993.234	453054.230	N028°41'52.93"	W081°38'00.81"	B1
1039	1586996.681	453030.515	N028°41'52.77"	W081°38'01.07"	B2
1040	1587000.778	452989.046	N028°41'52.60"	W081°38'01.54"	B3
1041	1586991.338	452966.885	N028°41'52.51"	W081°38'01.79"	B4
1042	1586977.006	452947.499	N028°41'52.37"	W081°38'02.00"	B5
1043	1586964.975	452942.769	N028°41'52.25"	W081°38'02.08"	B6
1044	1586943.128	452939.401	N028°41'52.03"	W081°38'02.08"	B7
1045	1586915.714	452939.956	N028°41'51.76"	W081°38'02.08"	B8
1046	1586897.293	452946.486	N028°41'51.58"	W081°38'02.01"	B9
1047	1586892.812	452965.128	N028°41'51.33"	W081°38'01.80"	B10
1048	1586893.339	452974.884	N028°41'51.54"	W081°38'01.69"	B11
1049	1586877.555	452974.782	N028°41'51.38"	W081°38'01.69"	B12
1050	1586874.331	452958.299	N028°41'51.35"	W081°38'01.88"	B13
1051	1586865.810	452941.411	N028°41'51.27"	W081°38'02.06"	B14
1052	1586837.363	452932.677	N028°41'50.98"	W081°38'02.16"	B15

SURVEYOR'S REPORT:

- This is not a Boundary Survey.
- Utility locations if shown herein are based on field location of markings by Utility Company representatives, surface features and construction plans furnished to the surveyor. Additional sub-surface utilities may exist that have not been field located.
- Measurement methods used for this survey meet STANDARDS OF PRACTICE FOR LAND SURVEYING Chapter 5J-17 requirements.
- Underground foundations have not been located.
- Bearings and distances shown herein are measured unless otherwise noted.
- The survey map and report or the copies thereof are not valid without the signature and the original raised seal of a Florida Licensed Surveyor and Mapper.
- Features shown by symbol as indicated in the legend are not to scale.
- Bearings, coordinates and elevations shown herein refer to the Florida State Plane Coordinate System, Florida East Zone (S01), North American Datum of 1983, NAD83 (2011) epoch 2010.00, and were derived from GPS observations utilizing Trimble VRS now RTK Network, unless noted otherwise. Coordinates shown are expressed in U.S. Survey Feet. Elevations shown herein are North American Vertical Datum of 1988 (NAVD88).
- The subject property lies in flood zone "X", according to the Flood Insurance Rate Map(FIRM), community-panel number 12109C0276J revised December 7, 2018. The said Flood Insurance Rate Map is referenced to the North American Vertical Datum of 1988 (NAVD 88).
- The horizontal positions for all features shown on the map are relative to North American Datum, NAD 1983, State Plane Coordinate System, Florida East Zone. Distance shown herein are ground.
- Unless shown, only those visible features found within the boundaries of this survey or in the immediate vicinity of the above described parcel boundary have been located.
- Dimensions are shown in United States standard survey feet and decimals thereof.
- No attempt was made by this survey to locate wetland jurisdictional areas, should any exist, those shown are from Carter Environmental Services, Inc. Dated June 4, 2019, Project No. 5.19030.

REV 3 - DATE 6-10-2020 ADDED ADDITIONAL BENCHMARK INFORMATION
 REV 2 - DATE 3-25-2020 ADDED ADDITIONAL MUCK TABLE INFORMATION
 REV 1 - DATE 3-16-2020 ADDED ADDITIONAL TOPOGRAPHIC INFORMATION

Terry M. Durden, Florida PSM #5261
 Not Valid Without The Signature And Original Raised Seal Of A Florida Licensed Surveyor & Mapper

GEOMATICS CORP.
 SURVEYING-MAPPING-GPS
 2804 N. FIFTH STREET, UNIT 101
 ST. AUGUSTINE, FL 32084
 PHONE (904) 824-3088 FAX (904) 824-0783

LICENSED BUSINESS
 FLORIDA #0770 GEORGIA #888
 SOUTH CAROLINA #837 ALABAMA #794
 NORTH CAROLINA COA #7552

 Michael R. King, P.E. FL Professional Eng. # 71640 Date	DESCRIPTION	
	DRAWN/CHECKED BY	DATE
NO.	NO.	NO.
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6

EXISTING CONDITIONS

LAKE APOPKA
 LAKE APOPKA, FLORIDA

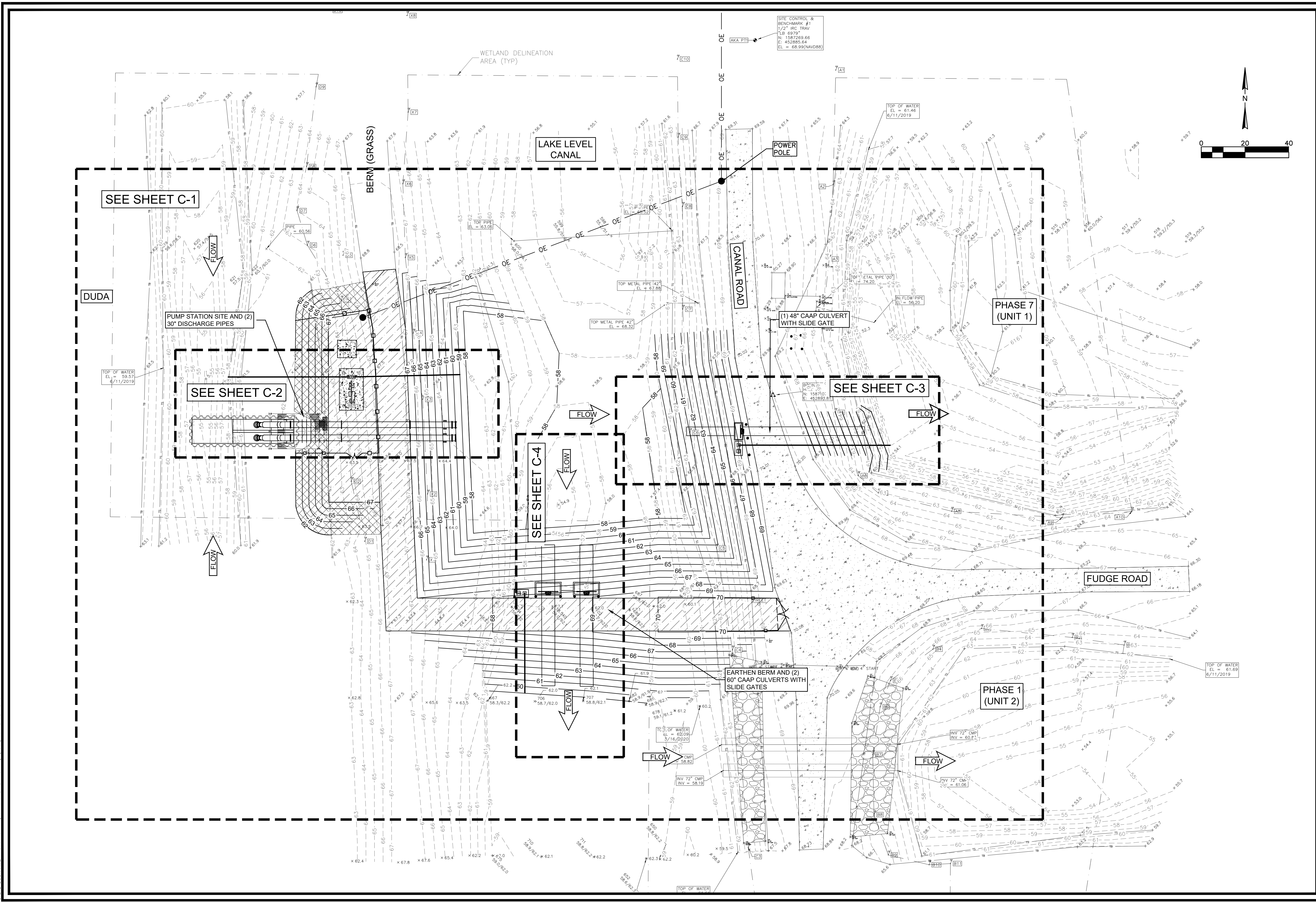
FOUR WATERS ENGINEERING

324 6th AVENUE, JACKSONVILLE BEACH, FLORIDA 32250
 CO.#: #31101 WWW.FWENGINEERING.COM

DRAWING NUMBER
G-3

STEVE DUCHARME LOCATION R.V. 19-10 TO LAKE APOPKA X.AXES 100% PERCENT DWG

STEVE DUCHARNE LOCATION: R.V. 19-1010 LAKE APOPKA, A.D.S. 100 PERCENT DWS



Signature
Michael R. King, P.E.
FL Professional Eng. # 71640
Date

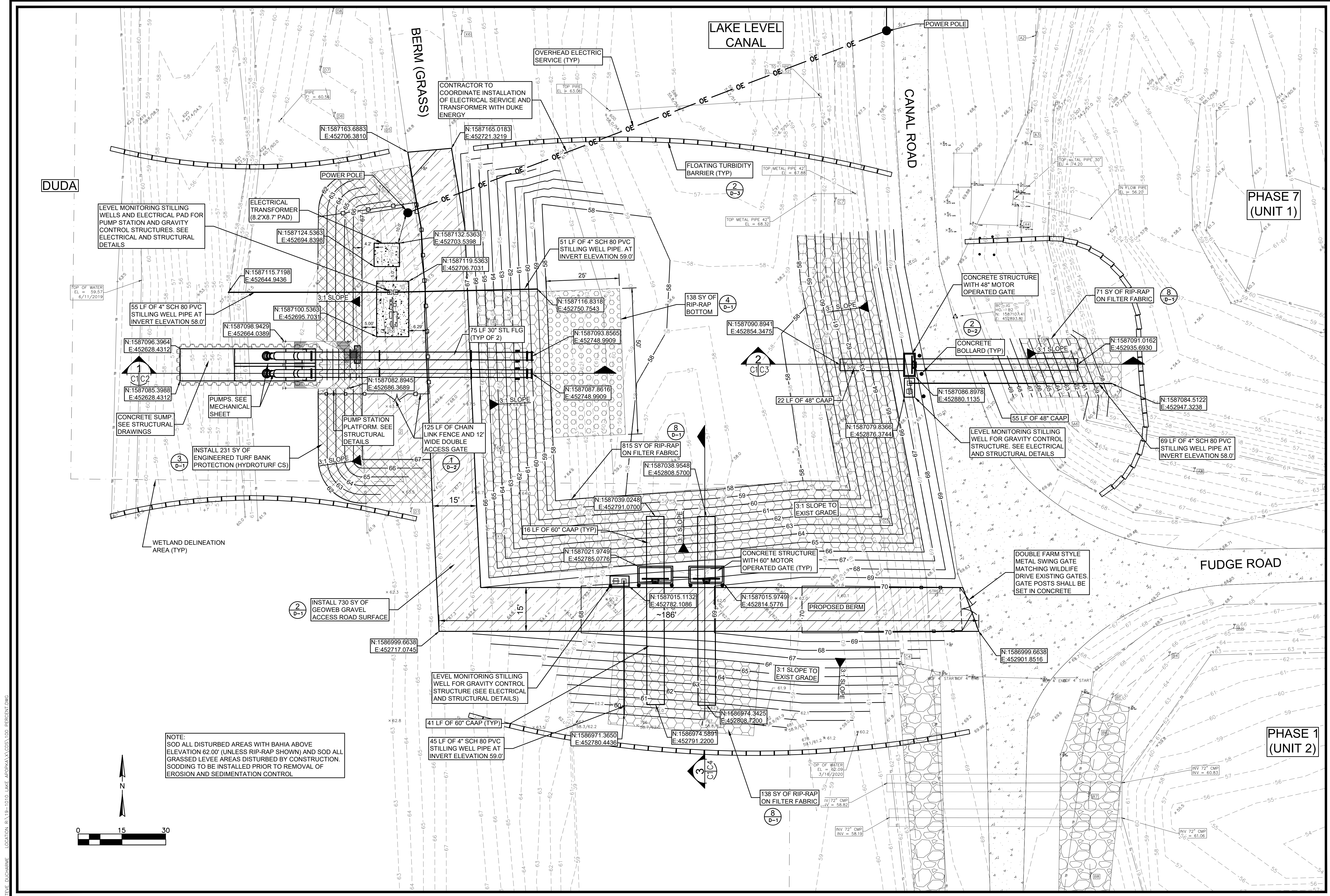
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LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION
OVERALL PROPOSED SITE PLAN AND PROJECT KEY MAP
LAKE APOPKA, FLORIDA

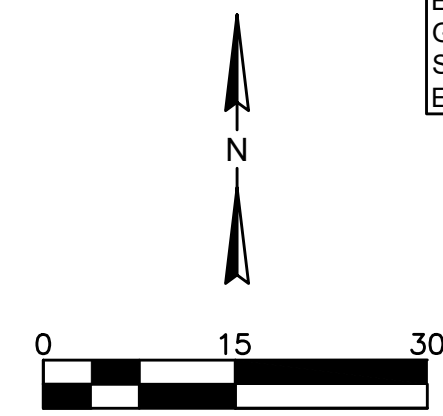
DESIGN	DATE	ISSUE	ISSUE
MRK	19-1010	AUGUST 2020	100%

FOUR WATERS ENGINEERING
324 6th AVE. N. JACKSONVILLE BEACH, FLORIDA 32250
904-441-2400 C.O.A.# 31101 WWW.FWENG.COM

DRAWING NUMBER
G-4



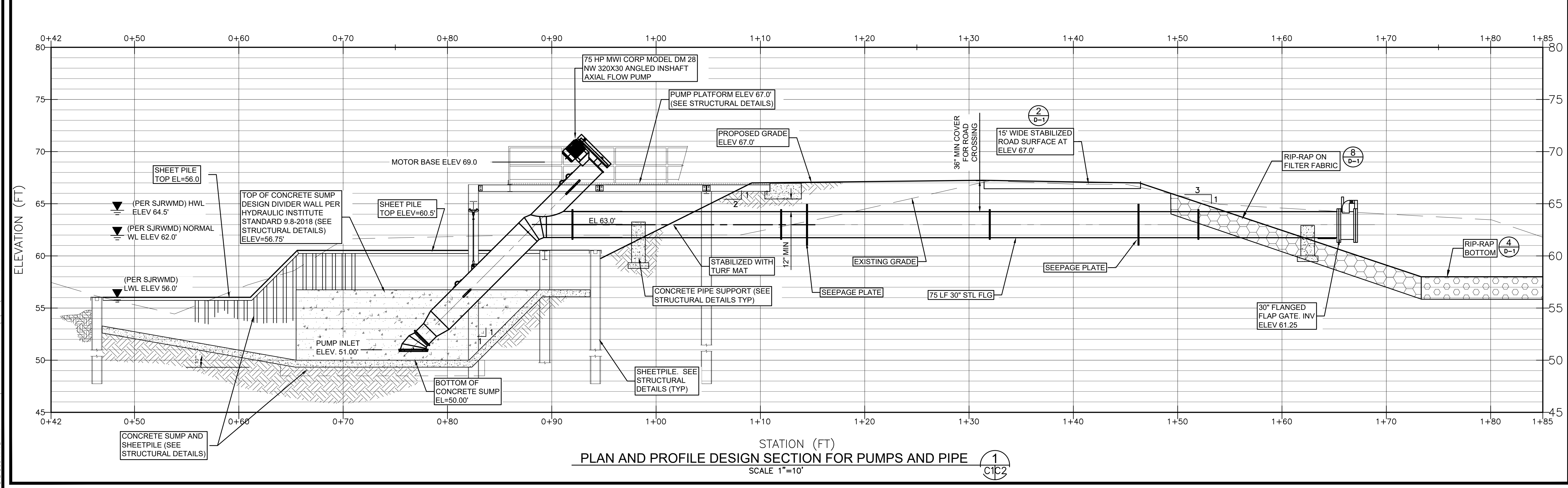
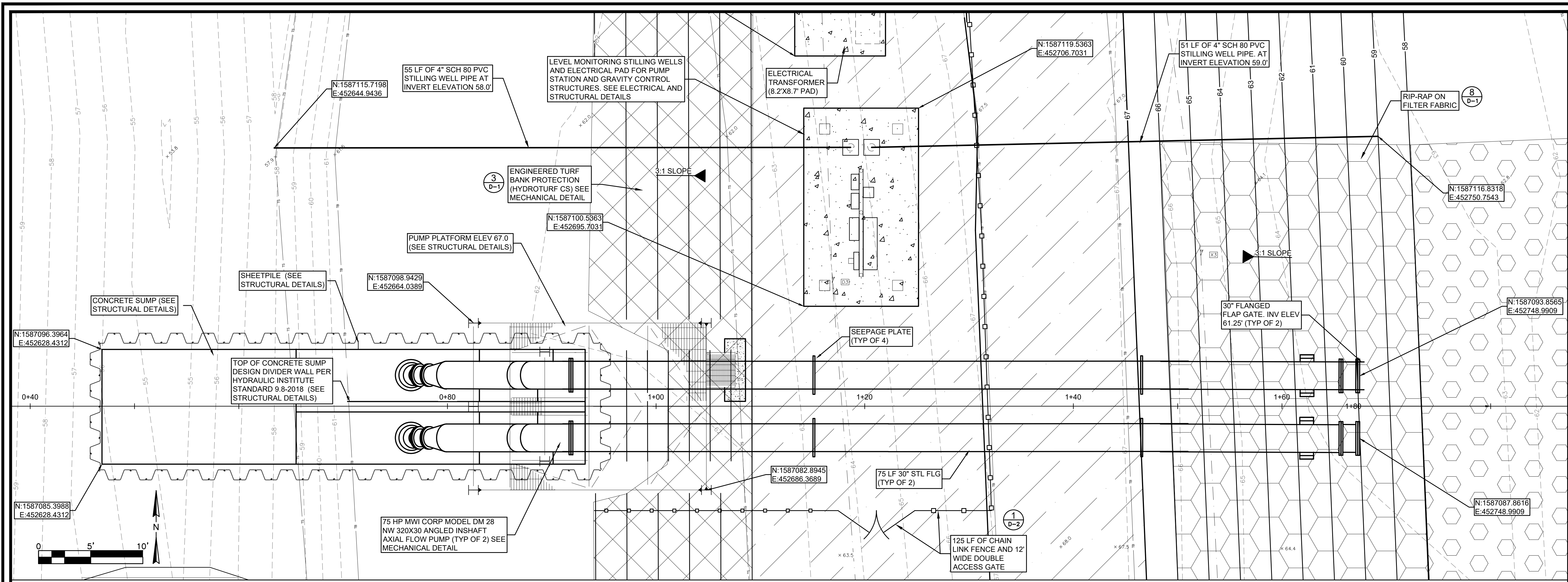
DUDA



NOTE:
SOD ALL DISTURBED AREAS WITH BAHIA ABOVE ELEVATION 62.00' (UNLESS RIP-RAP SHOWN) AND SOD ALL GRASSED LEVEE AREAS DISTURBED BY CONSTRUCTION. SODDING TO BE INSTALLED PRIOR TO REMOVAL OF EROSION AND SEDIMENTATION CONTROL.

PROPOSED OVERALL SITE AND GRADING PLAN LAKE APOPKA, FLORIDA	
DESIGN: MJK JOB NUMBER: 19-1010 ISSUE DATE: AUGUST 2020 ISSUE: 100%	DRAWN: SLD SLD DATE: 19-1010 AUGUST 2020 100%
LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION	
PHASE 7 (UNIT 1)	
PHASE 1 (UNIT 2)	
FOUR WATERS ENGINEERING 324 6th AVE. N. JACKSONVILLE BEACH, FLORIDA 32250 904-444-2460 C.O.A.# 31101 WWW.FWENG.COM	
DRAWING NUMBER C-1	

STEVE DUCHARNE LOCATION: R/A 19-1010 LAKE APOPKA, FLORIDA 100 PERCENT DWG



STATION (FT)
PLAN AND PROFILE DESIGN SECTION FOR PUMPS AND PIPE
 SCALE 1"=10'

LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION

PLAN AND PROFILE PUMP AND PIPE DESIGN

LAKE APOPKA, FLORIDA

REV	NO	DATE	BY	DESCRIPTION
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	4			
	5			
	6			

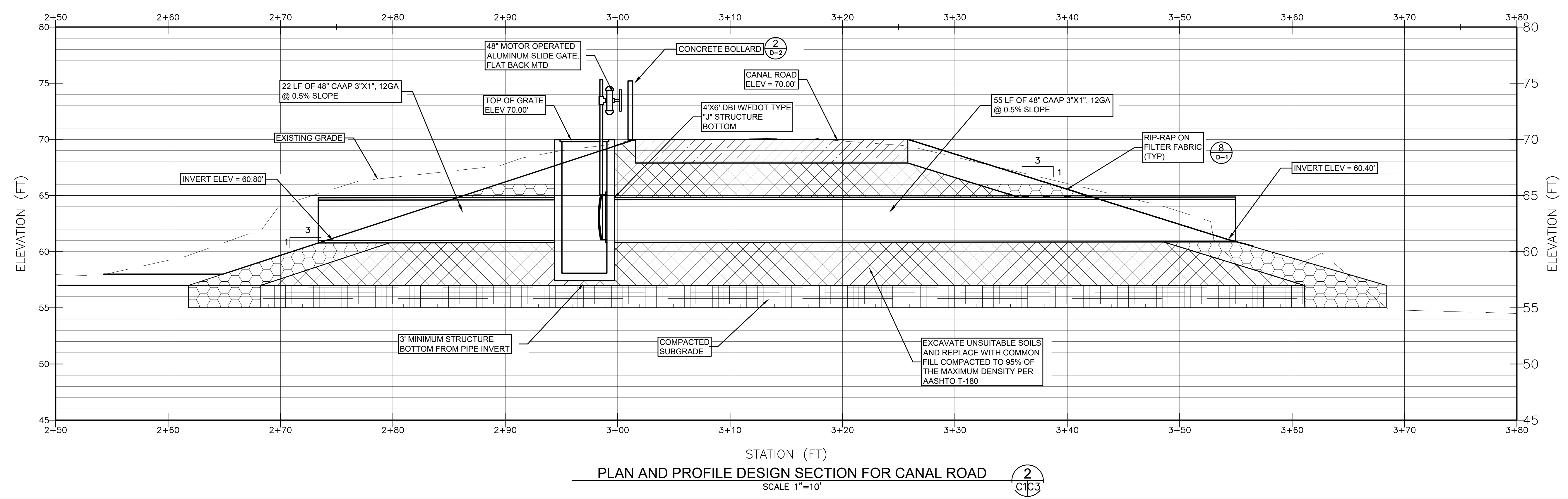
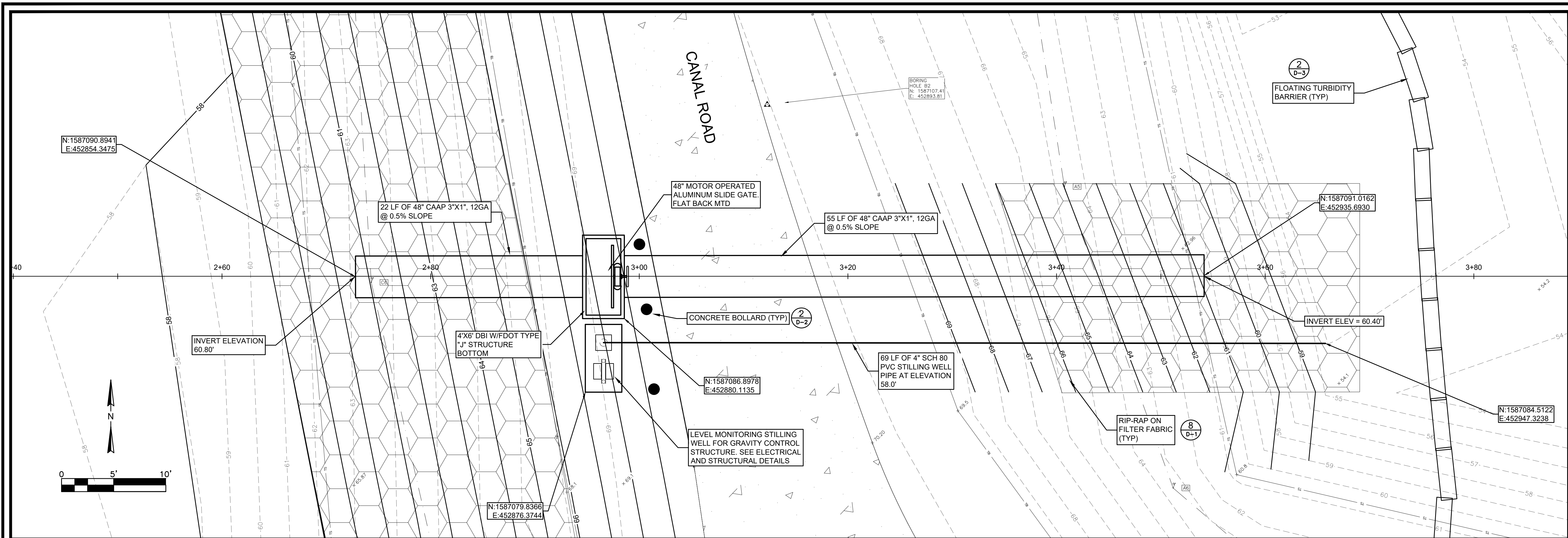
DESIGN: MJK JOB NUMBER: 19-1010 ISSUE DATE: AUGUST 2020 ISSUE: 100%	DRAWN: SLD SLD DATE: 19-10-10 100%
--	--

FOUR WATERS ENGINEERING
 324 6th AVE. N. JACKSONVILLE BEACH, FLORIDA 32250
 904-414-2400 C.O.A.# 31101 WWW.FWENG.COM

Signature: Michael R. King, P.E.
 FL Professional Eng. # 71640
 Date:

DRAWING NUMBER
C-2

STEVE DUCHARNE LOCATION: RVA 19-1010 LAKE APOPKA X/CDS 100 PERCENT DWG



STATION (FT)
PLAN AND PROFILE DESIGN SECTION FOR CANAL ROAD
 SCALE 1"=10'

Signature
 Michael R. King, P.E.
 FL Professional Eng. # 71640
 Date

REV	NO	DATE	DESCRIPTION
1	1		
2	2		
3	3		
4	4		
5	5		
6	6		

LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION
PLAN AND PROFILE
48" CULVERT AT CANAL ROAD
 LAKE APOPKA, FLORIDA

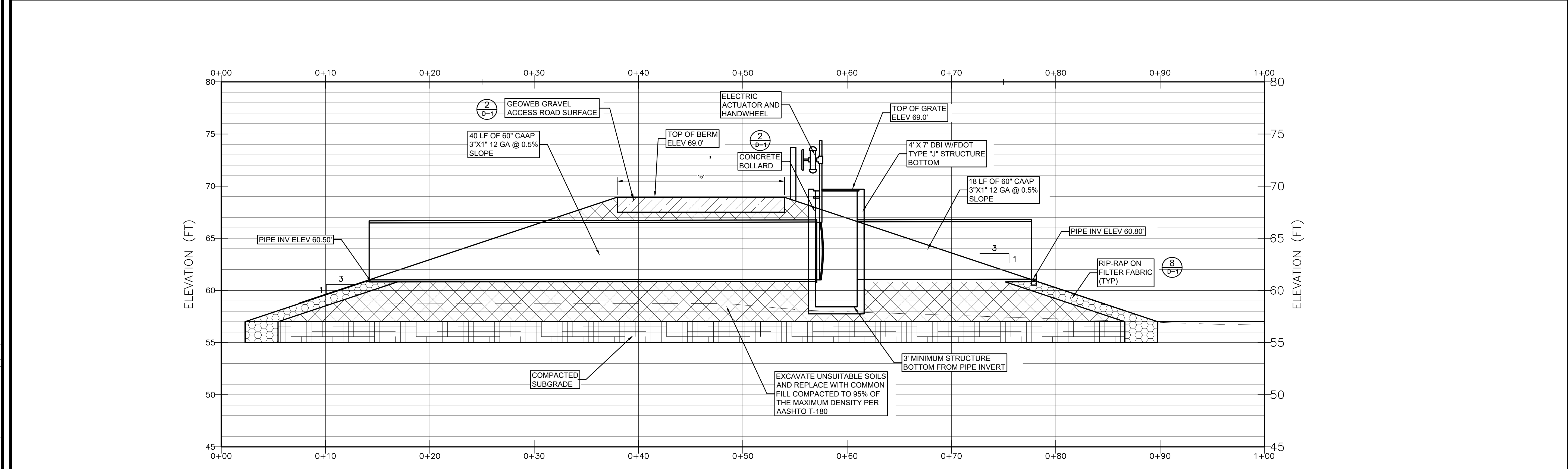
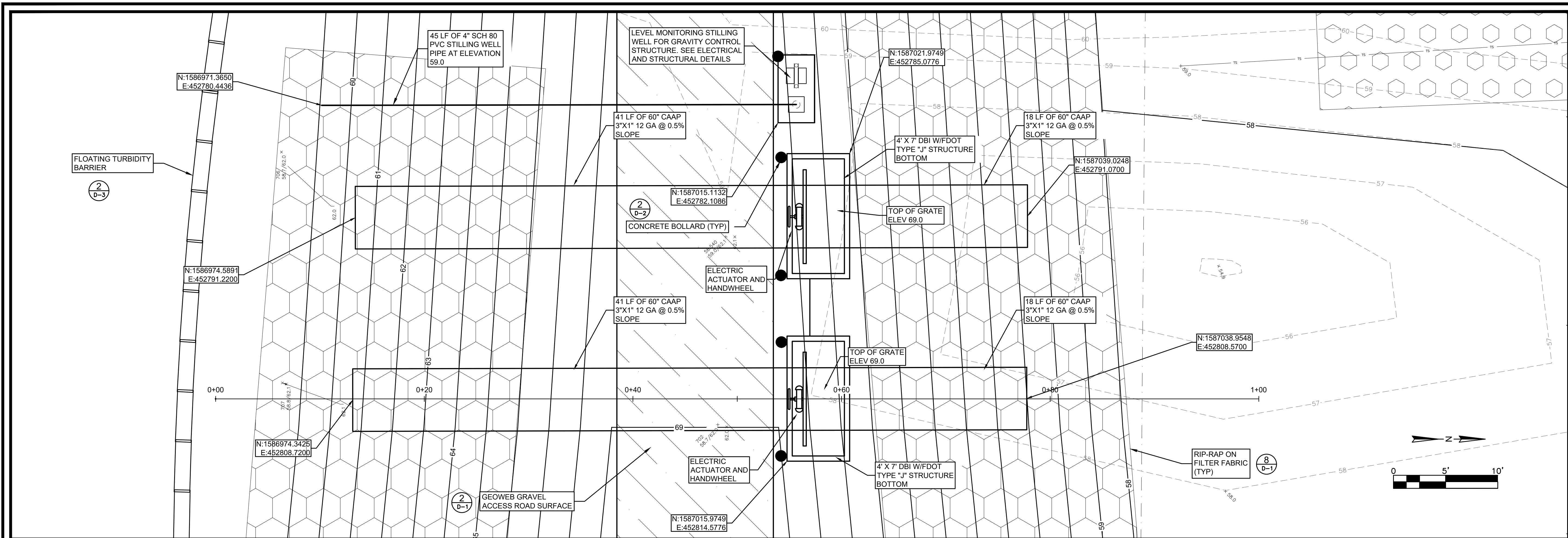
DESIGN	DATE	ISSUE	ISSUE
MRK	19-10-10	AUGUST	2020
JOB NUMBER			
ISSUE			
DATE			
ISSUE			

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DRAWING NUMBER
C-3

STEVE DUCHARNE LOCATION: R/A 19-1010 LAKE APOPKA X/CDS 100 PERCENT.DWG

STEVE DUCHARNE LOCATION: R/A 19-1010 LAKE APOPKA X/CDS 100 PERCENT DWS



PLAN AND PROFILE DESIGN SECTION FOR BERM "B" ³
 SCALE 1"=10' C-1C-4

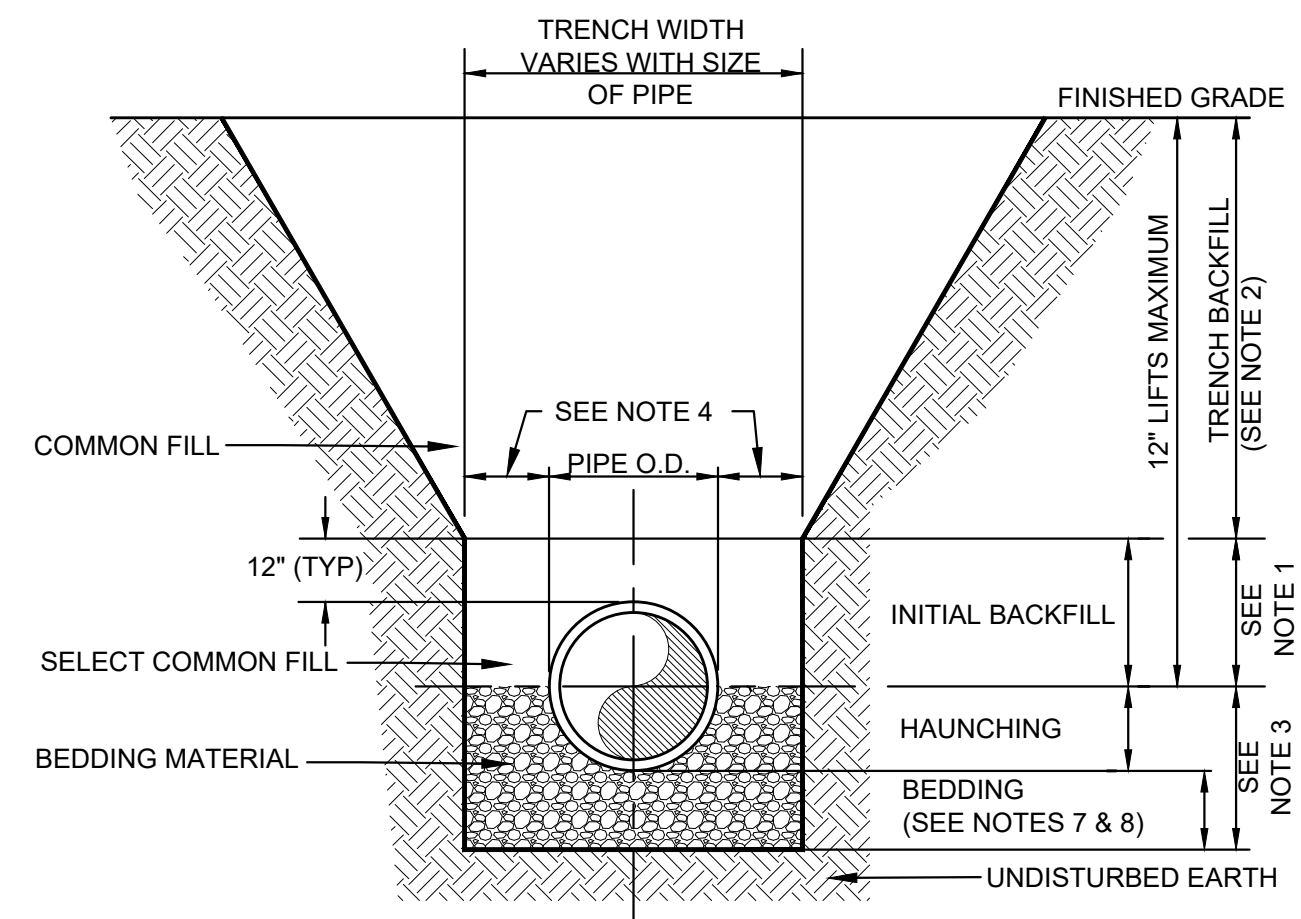
Signature Michael R. King, P.E. FL Professional Eng. # 71640 Date			
REV	NO	DATE	DESCRIPTION
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6	6		

LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION
PLAN AND PROFILE
BERM WITH (2) 60" CULVERTS
 LAKE APOPKA, FLORIDA

DESIGN	DRAWN	S.D.	ISSUE	ISSUE
M.R.K.	S.L.D.	19-1010	AUGUST	100%
NUMBER	JOB	19-1010	DATE	ISSUE
1	1	AUGUST	2020	1

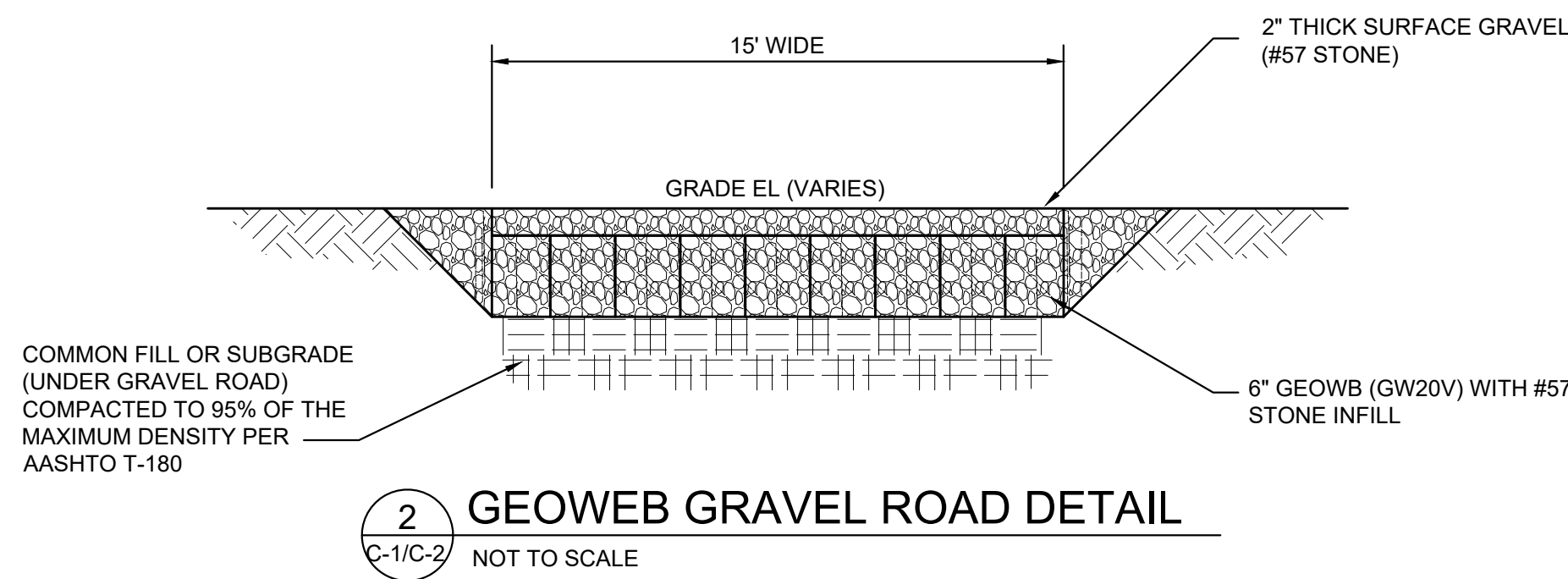
FOUR WATERS ENGINEERING
 324 6th AVE. N. JACKSONVILLE BEACH, FLORIDA 32250
 904-414-2460 C.O.A.# 31101 WWW.FWENG.COM

DRAWING NUMBER
C-4

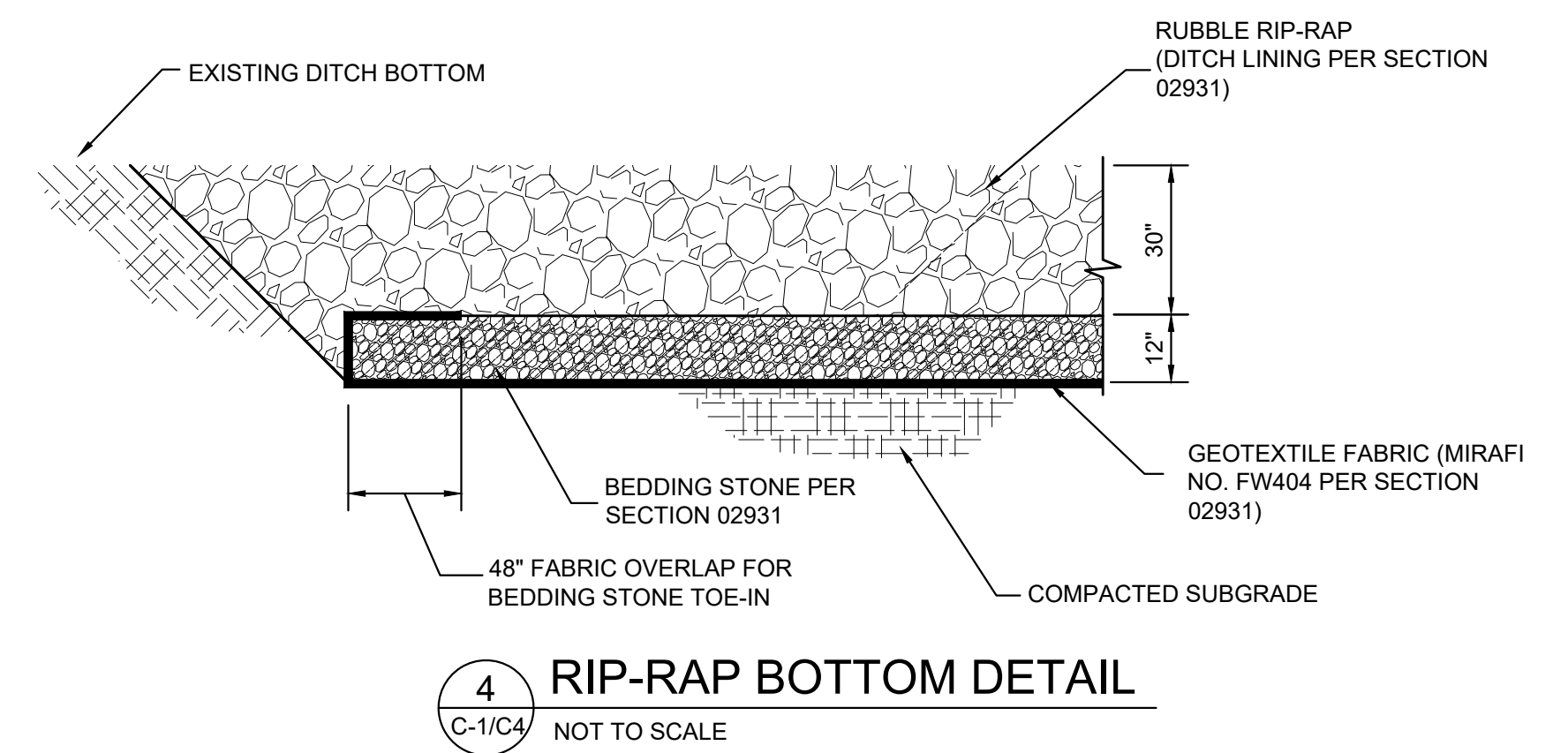


- NOTES**
- INITIAL BACKFILL: SELECT COMMON FILL COMPACTED TO 95% (98% UNDER PAVEMENT) OF THE MAXIMUM DENSITY AS PER AASHTO T-180
 - TRENCH BACKFILL: COMMON FILL COMPACTED TO 95% (98% UNDER PAVEMENT) OF THE MAXIMUM DENSITY AS PER AASHTO T-180
 - BEDDING MATERIAL SHALL BE SELECT GRANULAR BEDDING PER SECTION 02370
 - 15" MAXIMUM (12" MINIMUM) FOR PIPE DIAMETER LESS THAN 24" AND 24" MAXIMUM (12" MINIMUM) FOR PIPE DIAMETER 24" AND LARGER
 - WATER SHALL NOT BE PERMITTED IN THE TRENCH DURING CONSTRUCTION.
 - ALL PIPE TO BE INSTALLED WITH BELL FACING UPSTREAM TO THE DIRECTION OF THE FLOW.
 - BEDDING DEPTH SHALL BE 4" MINIMUM FOR PIPE DIAMETER UP TO 12" AND 6" MINIMUM FOR PIPE DIAMETER 16" AND LARGER
 - DEPTH FOR REMOVAL OF UNSUITABLE MATERIAL SHALL GOVERN DEPTH OF BEDDING MATERIAL BELOW THE PIPE. UTILITIES SHALL DETERMINE IN THE FIELD REQUIRED REMOVAL OF UNSUITABLE MATERIAL TO REACH SUITABLE FOUNDATION
 - FINAL RESTORATION IN IMPROVED AREAS SHALL BE IN COMPLIANCE WITH ALL APPLICABLE REGULATIONS OF GOVERNING AGENCIES. SURFACE RESTORATION WITHIN THE RIGHT-OF-WAY SHALL COMPLY WITH REQUIREMENTS OF RIGHT-OF-WAY UTILIZATION PERMIT

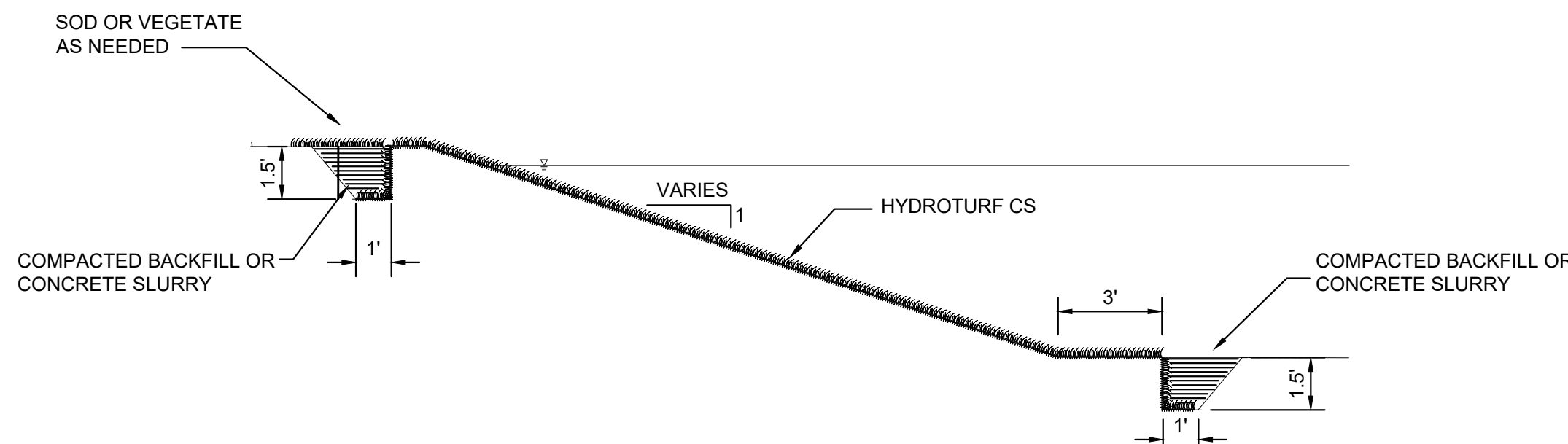
1 BEDDING AND TRENCHING - TYPE A
NOT TO SCALE



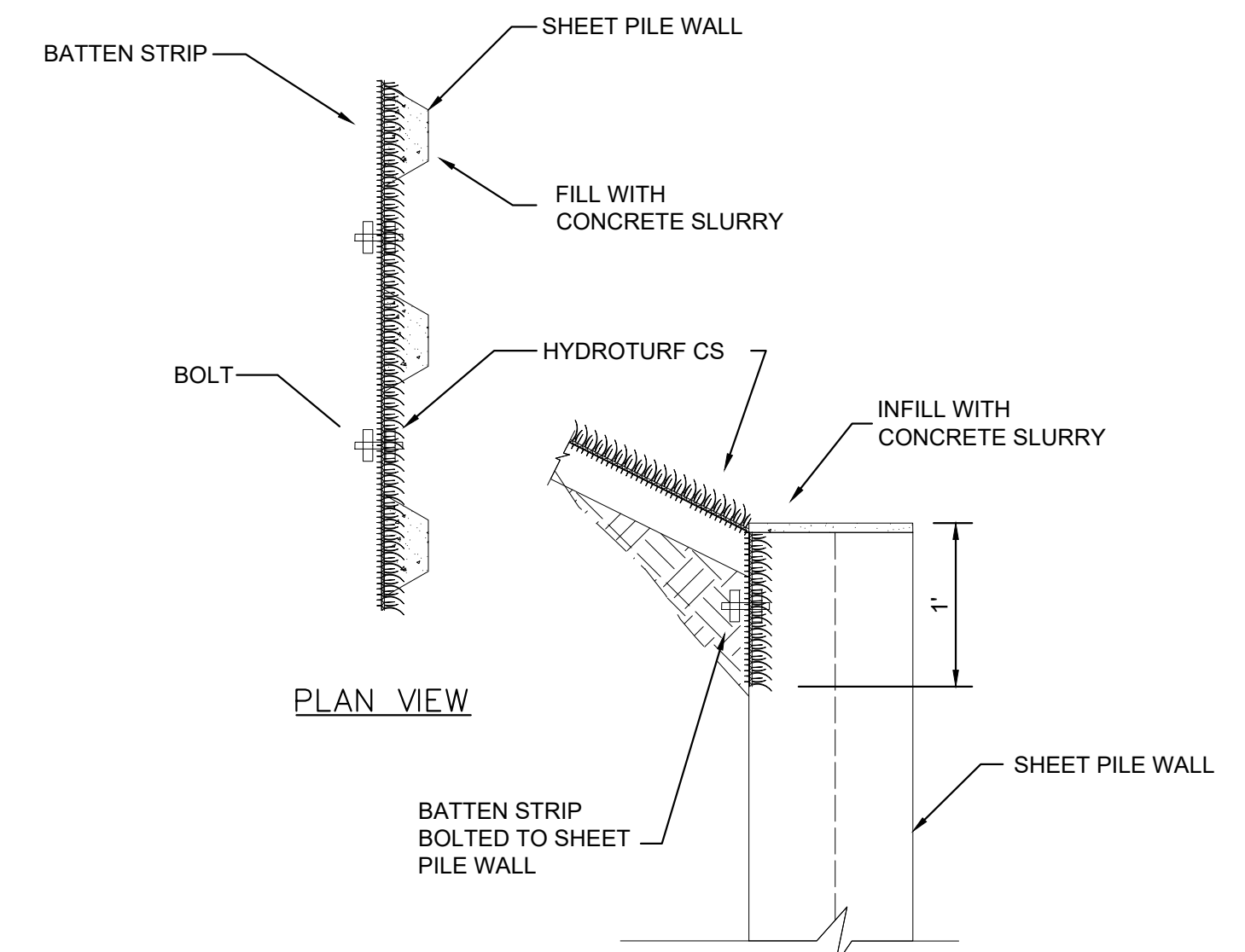
2 GEOWEB GRAVEL ROAD DETAIL
NOT TO SCALE



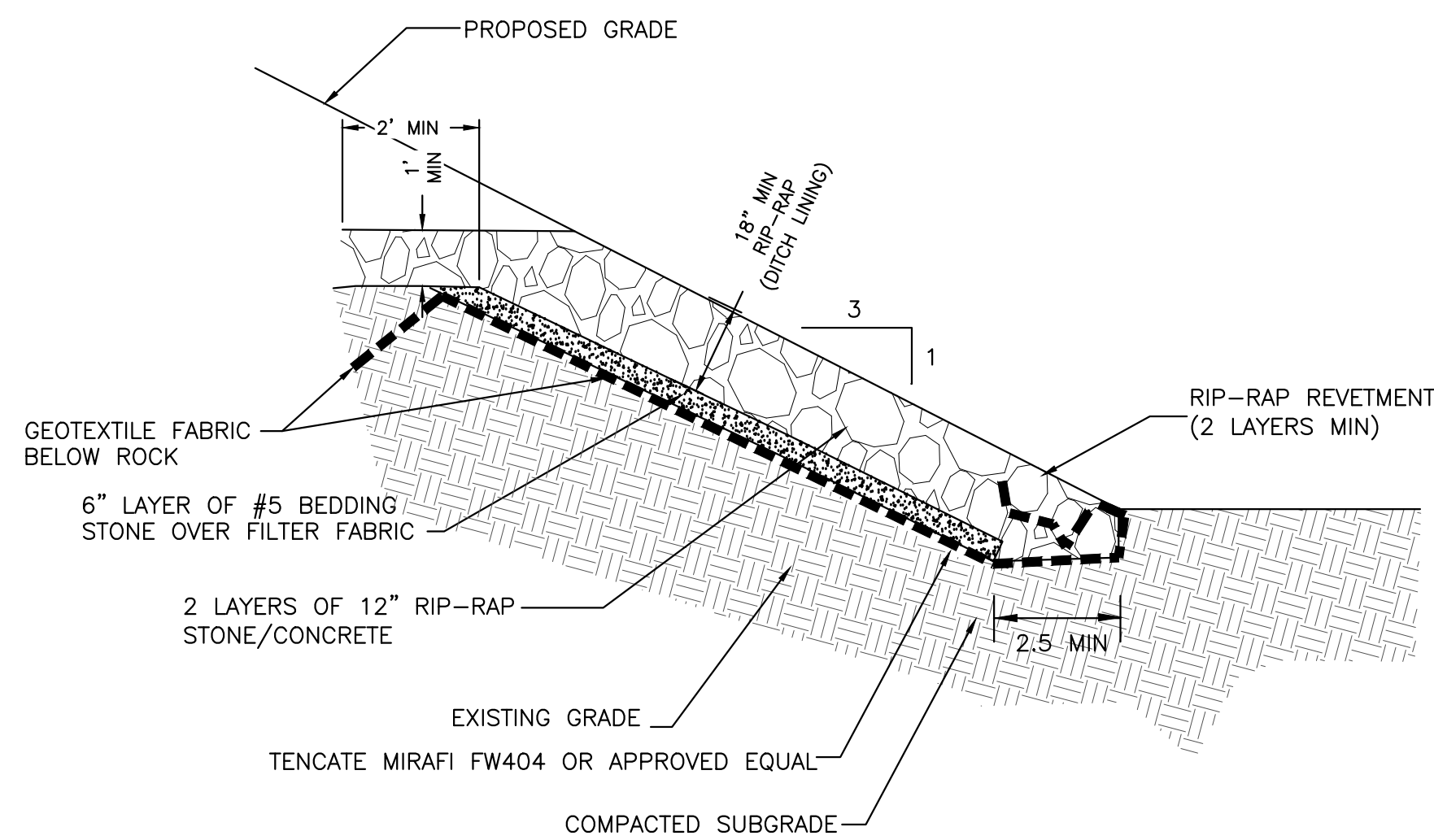
4 RIP-RAP BOTTOM DETAIL
NOT TO SCALE



3 HYDROTURF BANK PROTECTION
NOT TO SCALE

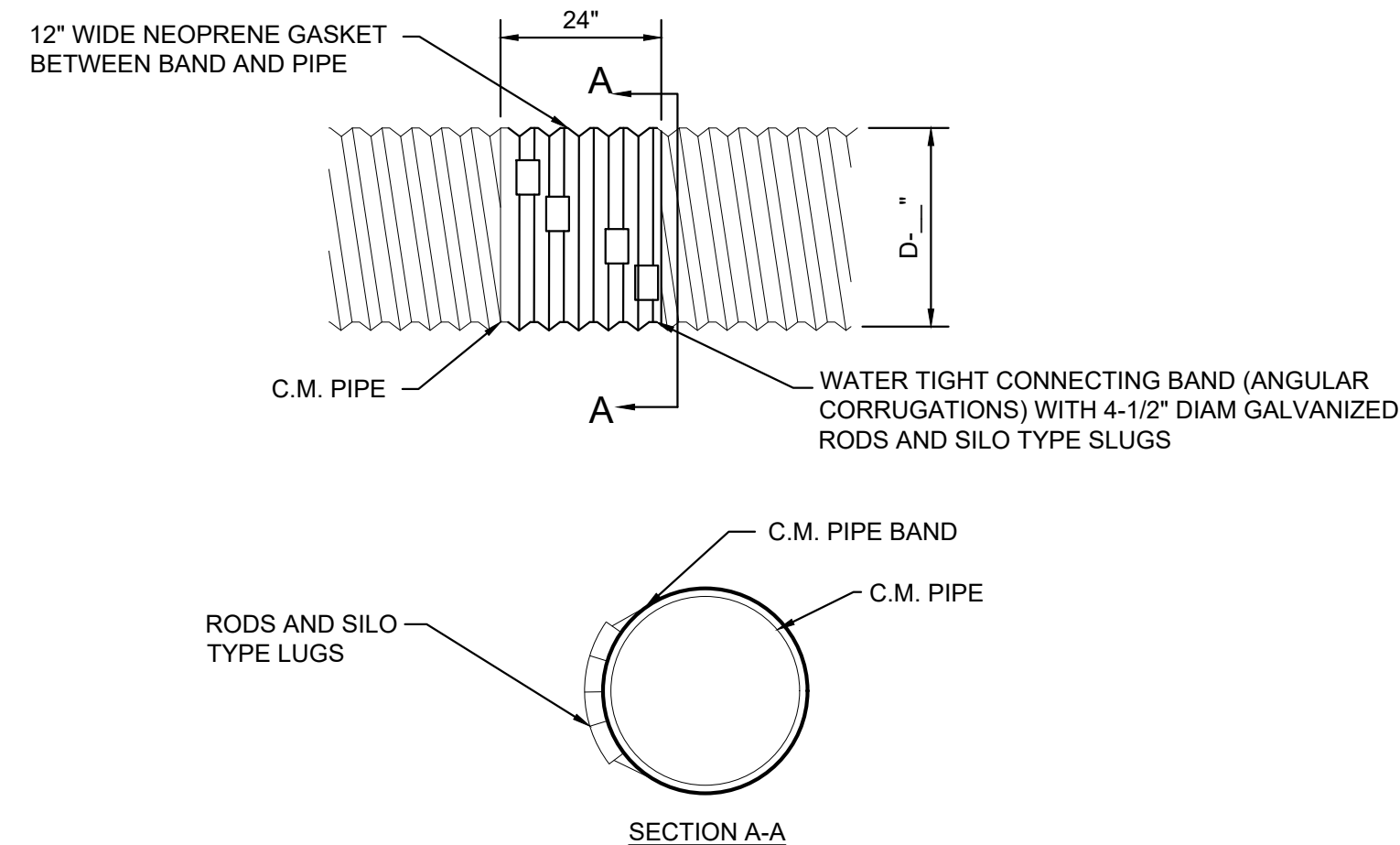


5 HYDROTURF CONNECTION TO SHEET PILE WALL
NOT TO SCALE

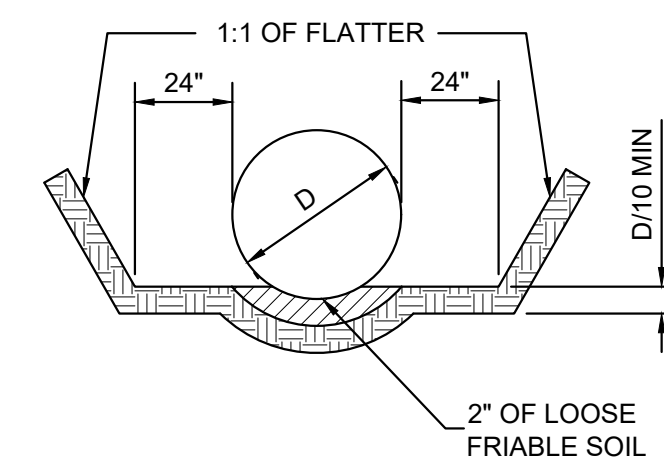


- NOTES**
- REVETMENT STONE OR CONCRETE SHALL BE A MINIMUM OF TWO UNITS THICK AND BE PLACED TO MAXIMIZE CONTACT BETWEEN ADJACENT STONES OR CONCRETE PIECES
 - SMALLER STONES OR CONCRETE PIECES SHALL BE UTILIZED FOR CHINKING TO ACHIEVE UNIFORM INSTALLATION CONFORMITY TO LINES AND GRADES
 - ROCK AND CONCRETE SIZE SHOWN IS BASED ON A MINIMUM DRY UNIT WEIGHT OF 150 PCF
 - EXISTING GRADE SHOWN AT TIME OF SURVEY. CONTRACTOR TO VERIFY PRIOR TO CONSTRUCTION
 - GEOTEXTILE FABRIC SHALL HAVE A MINIMUM OVERLAP OF TWO FEET AND PLACED BETWEEN STONE LAYERS AT TOP OF BANK AND AS SHOWN AT TOE.

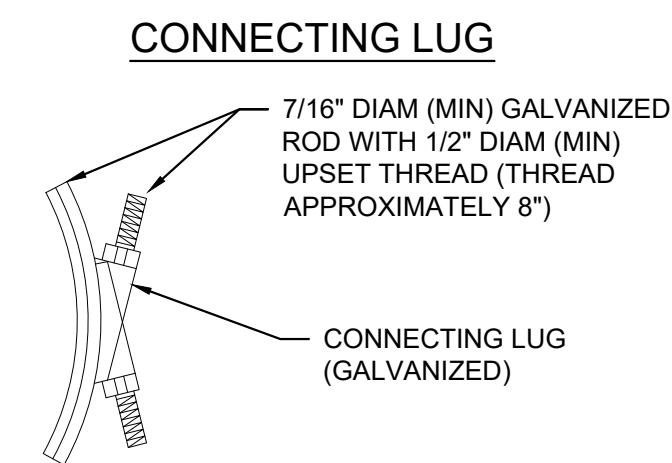
8 RIP-RAP (DITCH LINING) DETAIL
NOT TO SCALE



6 CORRUGATED METAL PIPE DETAILS
NOT TO SCALE



7 TYPICAL PIPE BEDDING DETAIL
NOT TO SCALE



STEVE DUCHARNE LOCATION: 13A-19-1010 LAKE APOPKA, X:\DESIGN\100 PERCENT.DWG

Signature: Michael R. King, P.E.
FL Professional Eng. # 71640
Date:

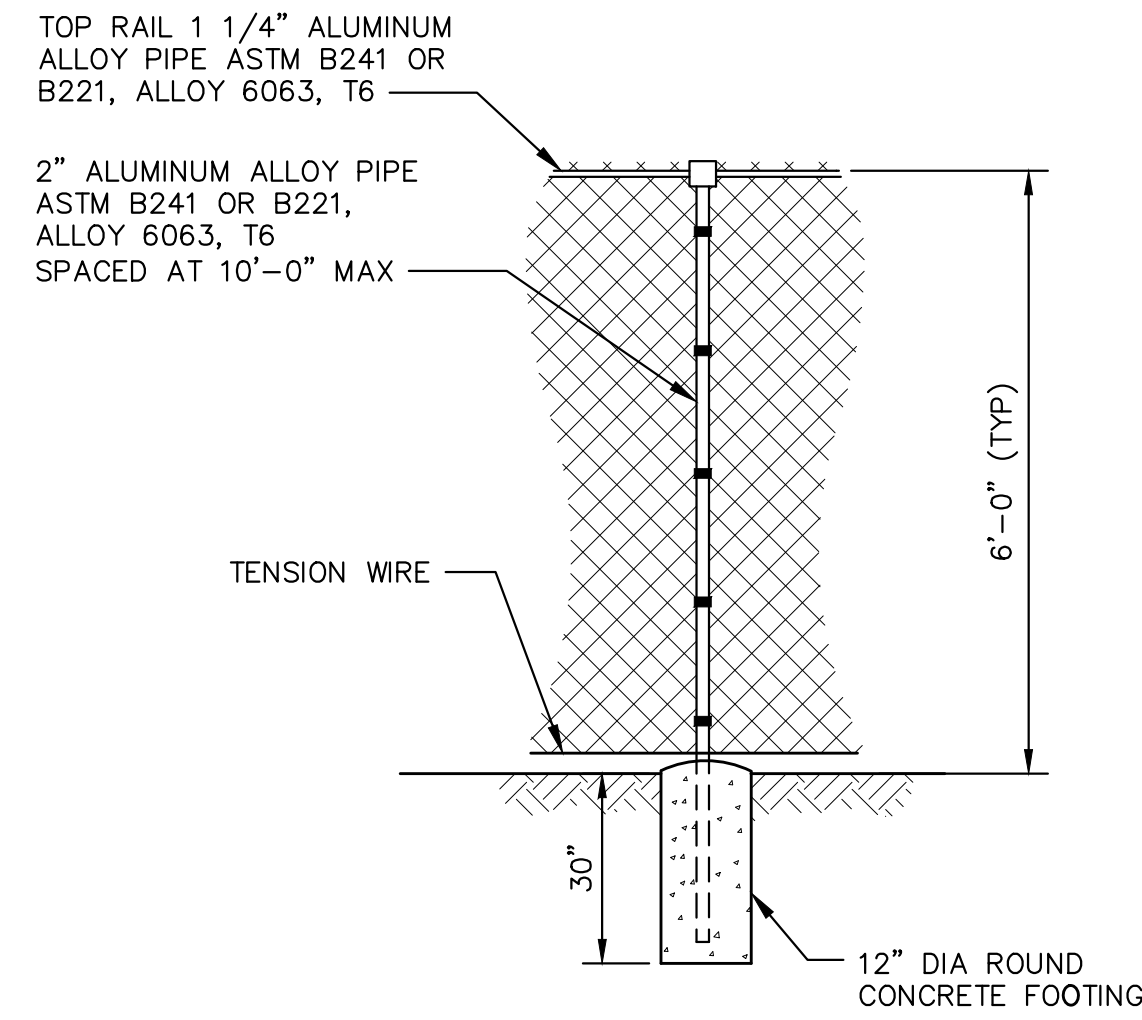
REV	NO	DATE	DESCRIPTION
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6	6		

LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION
CONSTRUCTION DETAILS
LAKE APOPKA, FLORIDA

DESIGN	MRK	JOB	NUMBER	ISSUE	DATE	ISSUE
			19-1010	AUGUST	2020	100%

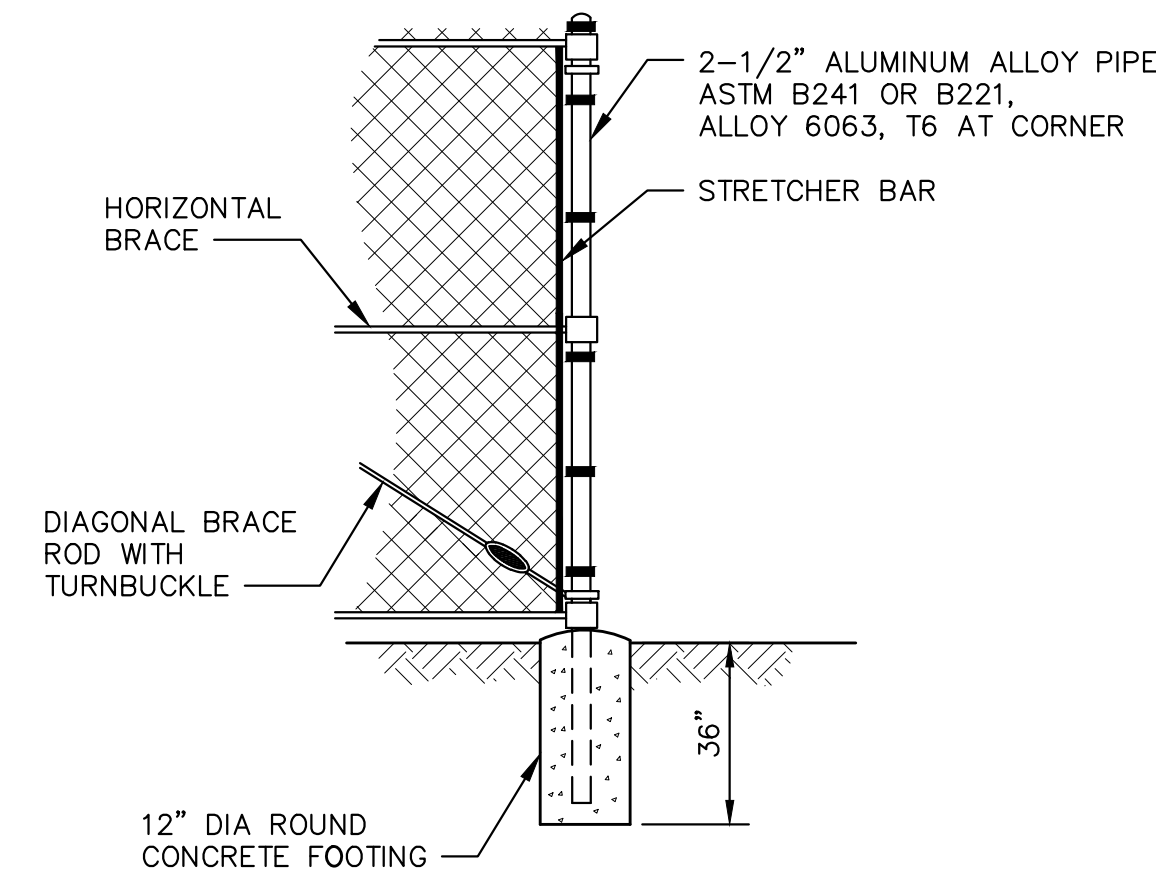
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324 6th AVE. N. JACKSONVILLE BEACH, FLORIDA 32250
904-441-2460 C.O.# 13101 WWW.FWENG.COM

DRAWING NUMBER
D-1

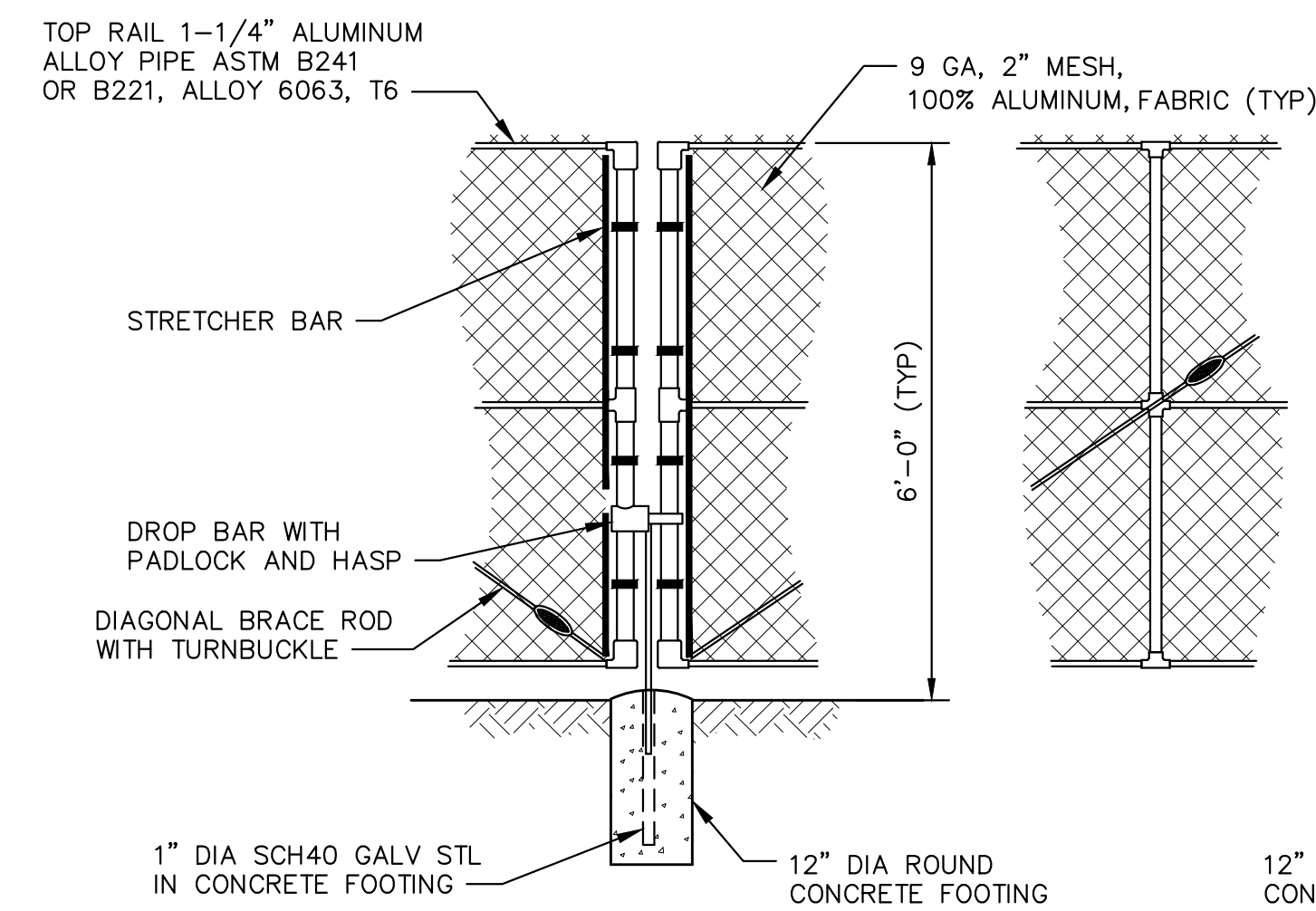


LINE POST

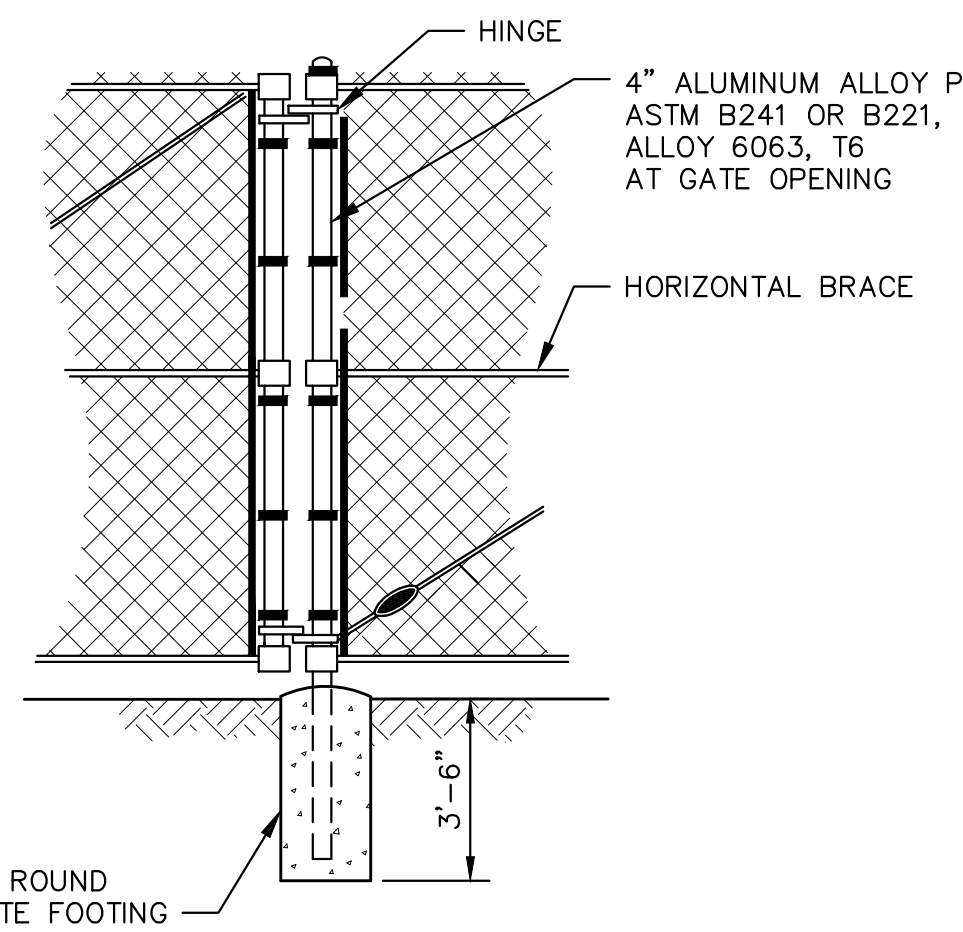
NOT TO SCALE



CORNER POST



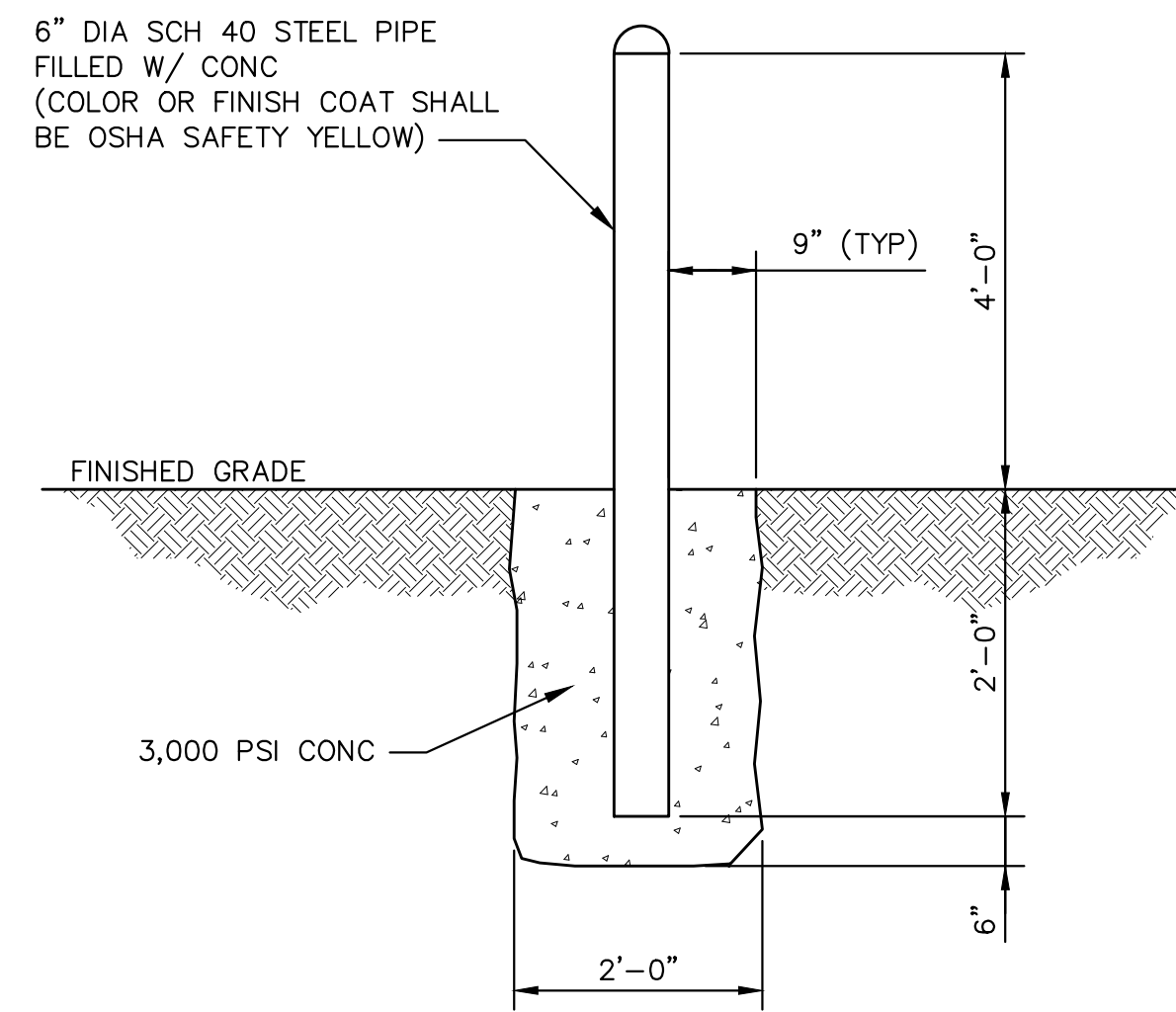
GATE



GATE POST

- NOTES:
- 2'-6' GATES TO HAVE A CLEAR OPENING OF 12'-0"
 - 100% ALUMINUM WOVEN WIRE FABRIC SHALL BE STRETCHED TAUT WITH STRETCHER BARS AND STRAPS AND FASTENED TOP AND BOTTOM AT LINE POSTS WITH HOG RING TIES.
 - FENCING TO INCLUDE FENCE TYPE B BARB WIRE ATTACHMENT PER INDEX 452, FDOT DESIGN STANDARDS (LATEST EDITION).
 - TENSION WIRE: ALUMINUM ALLOY WIRE, 0.1875" DIAMETER OR LARGER CONFORMING TO ASTM B211, ALLOY 5056 TEMPER H192.
 - TIE WIRE AND HOG RINGS: ALUMINUM ALLOY WIRE, 0.1443" DIAMETER OR LARGER CONFORMING TO ASTM B211, ALLOY 5056 TEMPER H38, OR ALCLAD ALLOY 5056, TEMPER H192.

1 FENCE POST DETAIL
C-1 NOT TO SCALE



2 BOLLARD GRADE INSTALLATION DETAIL
C-1/C3/C4 NOT TO SCALE

STEVE DUCHARNE LOCATION: R/A 19-1010 LAKE APOPKA X/CDS 100 PERCENT.DWG

Signature
Michael R. King, P.E.
FL Professional Eng. # 71640
Date

REV	NO	DATE	DESCRIPTION
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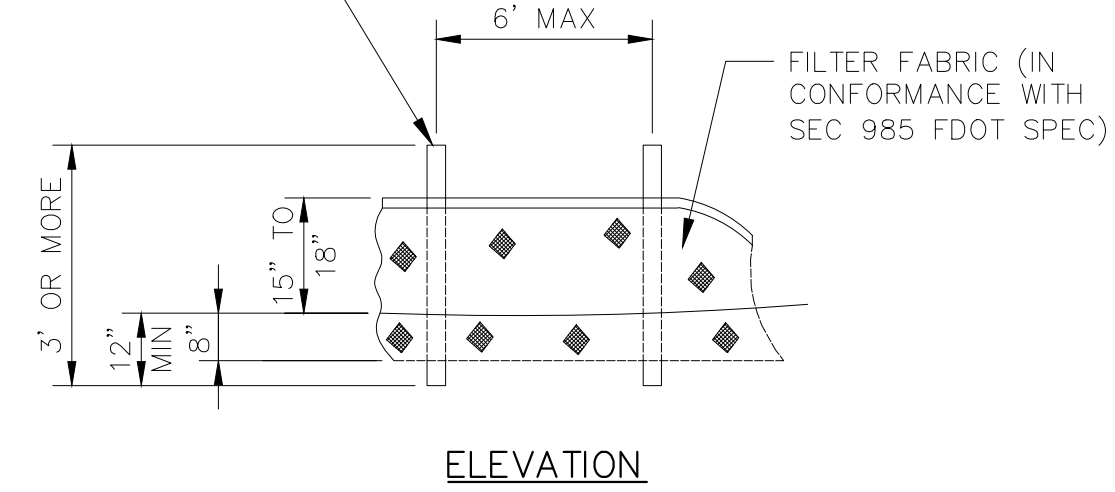
LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION
CONSTRUCTION DETAILS
LAKE APOPKA, FLORIDA

DESIGN	MRK	JOB	NUMBER	ISSUE	DATE	ISSUE

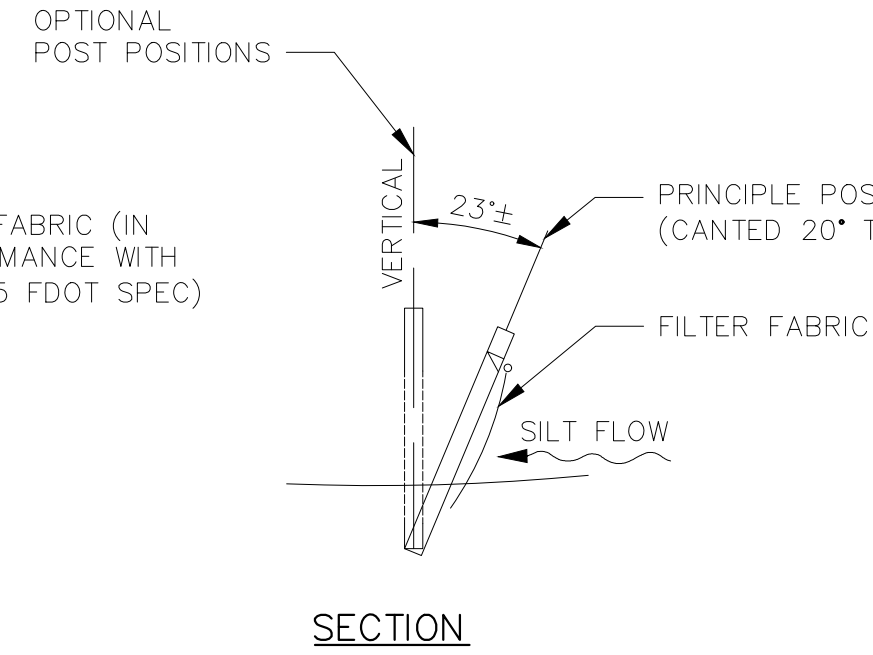
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324 6th AVE. N. JACKSONVILLE BEACH, FLORIDA 32250
904-414-2400 C.O.A.# 31101 WWW.FWENG.COM

DRAWING NUMBER
D-2

POST OPTIONS: SOFTWOOD 2 1/2" DIA
 HARDWOOD 2"x4"
 HARDWOOD 1 1/2"x1 1/2"
 STEEL 1.33 LBS/FT

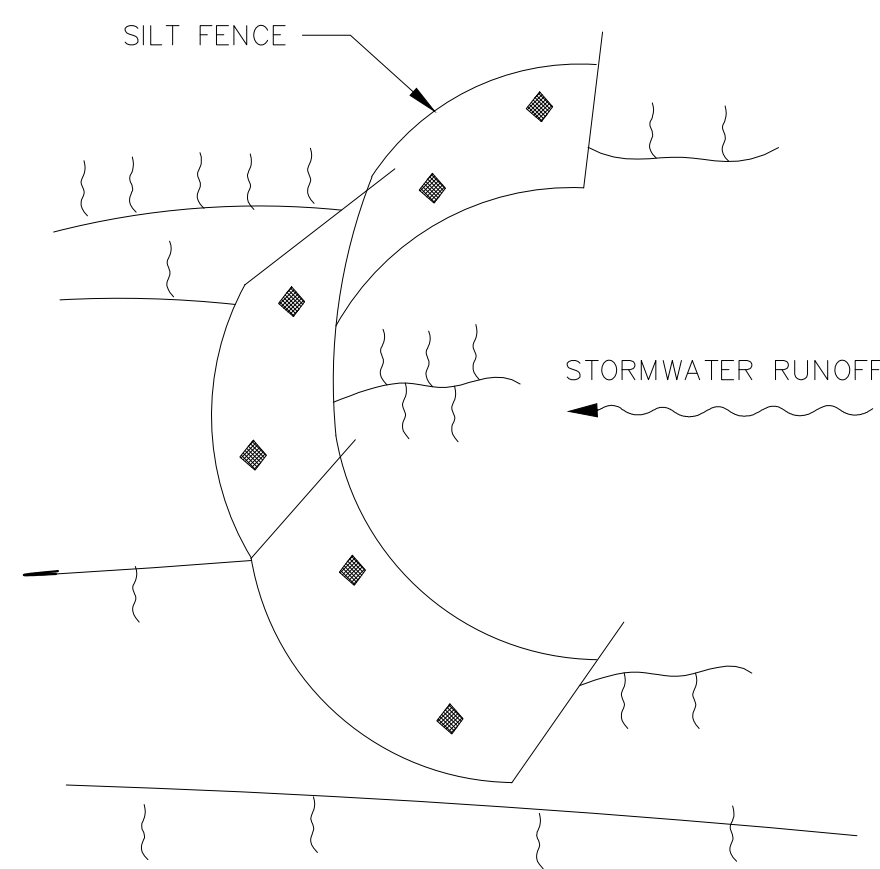


ELEVATION

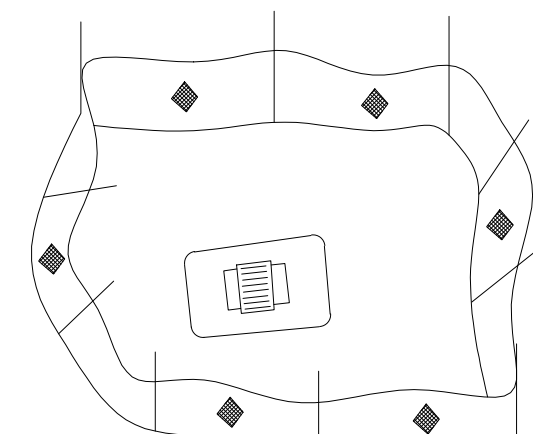
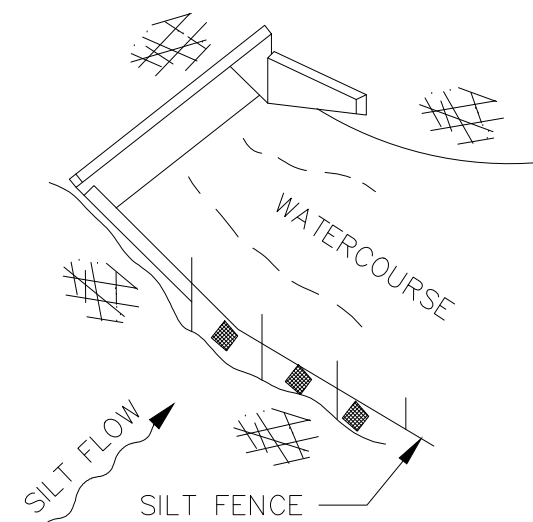


SECTION

TYPE III SILT FENCE



SILT FENCE PROTECTION IN
 DITCHES WITH INTERMITTENT FLOW



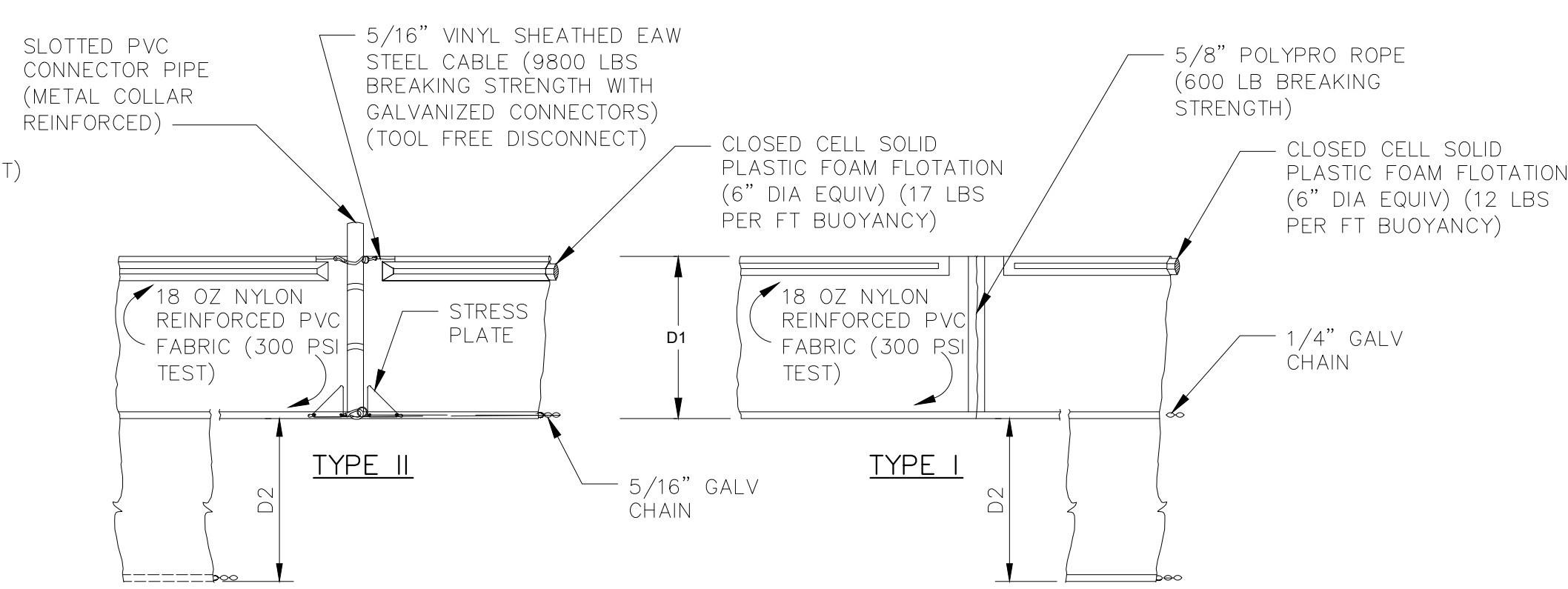
SILT FENCE PROTECTION
 AROUND DITCH BOTTOM INLETS

TYPE III SILT FENCE APPLICATIONS

NOTES FOR SILT FENCES

- TYPE III SILT FENCE TO BE USED AT MOST LOCATIONS. WHERE USED IN DITCHES, THE SPACING FOR TYPE III SILT FENCE SHALL BE IN ACCORDANCE WITH CHART 1, SHEET 1 (2010 FDOT DESIGN STANDARDS, INDEX NO. 102).
- TYPE IV SILT FENCE TO BE USED WHERE LARGE SEDIMENT LOADS ARE ANTICIPATED. SUGGESTED USE IS WHERE FILL SLOPE IS 1:2 OR STEEPER AND LENGTH OF SLOPE EXCEEDS 25 FEET. AVOID USE WHERE THE DETAINED WATER MAY BACK INTO TRAVEL LANES OR OFF THE RIGHT OF WAY.
- DO NOT CONSTRUCT SILT FENCES ACROSS PERMANENT FLOWING WATERCOURSES. SILT FENCES ARE TO BE AT UPLAND LOCATIONS AND TURBIDITY BARRIERS USED AT PERMANENT BODIES OF WATER.
- WHERE USED AS SLOPE PROTECTION, SILT FENCE IS TO BE CONSTRUCTED ON 0% LONGITUDINAL GRADE TO AVOID CHANNELIZING RUNOFF ALONG THE LENGTH OF THE FENCE.
- SILT FENCE TO BE PAID FOR UNDER THE CONTRACT UNIT PRICE FOR STAKED SILT FENCE, (LF).

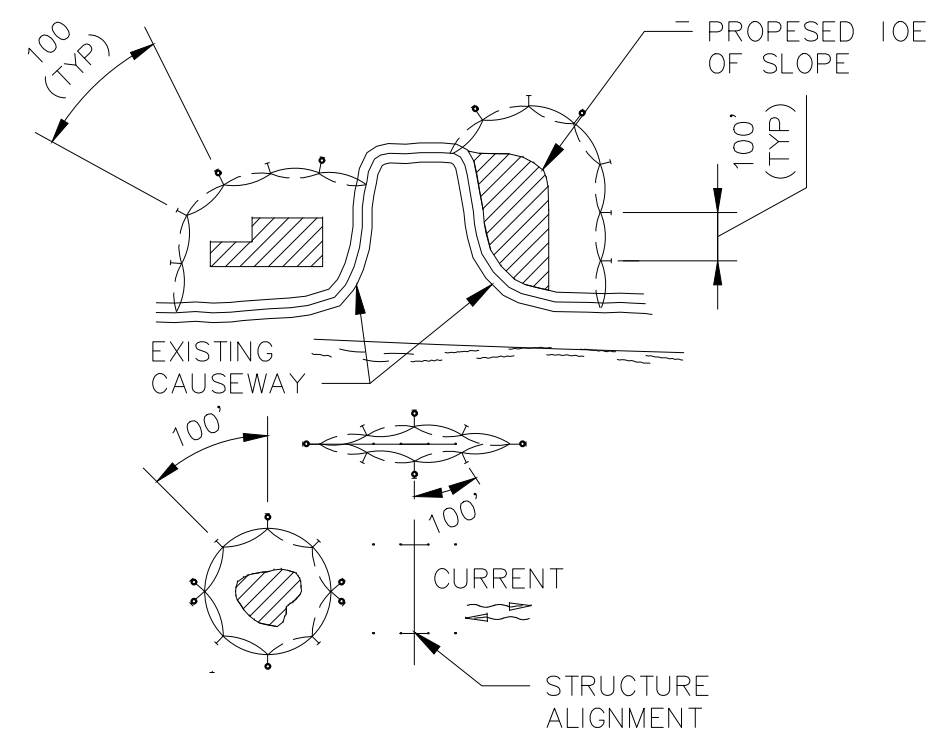
1 TEMPORARY SILT FENCE DETAIL
 NOT TO SCALE



D1=5' STD (SINGLE PANEL FOR DEPTHS 5' OR LESS)
 D2=5' STD (ADDITIONAL PANEL FOR DEPTHS > 5')
 CURTAIN TO REACH BOTTOM UP TO DEPTHS OF 10 FEET
 TWO (2) PANELS TO BE USED FOR DEPTHS GREATER THAN
 10 FEET UNLESS SPECIAL DEPTH CURTAINS SPECIFICALLY
 CALLED FOR IN THE PLANS OR AS DETERMINED BY THE ENGINEER

NOTE: COMPONENTS OF TYPE I AND II MAY BE SIMILAR OR IDENTICAL TO PROPRIETARY DESIGN. ANY INFRINGEMENT ON THE PROPRIETARY RIGHTS OF THE DESIGNER SHALL BE THE SOLE RESPONSIBILITY OF THE USER. SUBSTITUTIONS FOR TYPES I AND II SHALL BE AS APPROVED BY THE ENGINEER.

2 FLOATING TURBIDITY BARRIER
 NOT TO SCALE

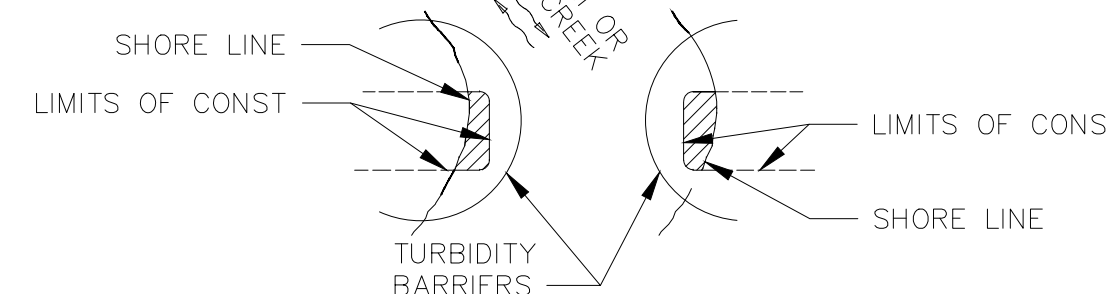


NOTES

- TURBIDITY BARRIERS ARE TO BE USED IN ALL PERMANENT BODIES OF WATER REGARDLESS OF WATER DEPTH.
- NUMBER AND SPACING OF ANCHORS DEPENDENT ON CURRENT VELOCITIES.
- DEPLOYMENT OF BARRIER AROUND PILE LOCATIONS MAY VARY TO ACCOMMODATE CONSTRUCTION OPERATIONS.
- NAVIGATION MAY REQUIRE SEGMENTING BARRIER DURING CONSTRUCTION OPERATIONS.
- TURBIDITY BARRIERS SHALL CONFORM TO SECTION 104 OF THE FLORIDA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITION.

GENERAL NOTES

- FLOATING TURBIDITY BARRIERS ARE TO BE PAID FOR UNDER THE CONTRACT UNIT PRICE FOR FLOATING TURBIDITY BARRIER, LF.
- STAKED TURBIDITY BARRIERS ARE TO BE PAID FOR UNDER THE CONTRACT UNIT PRICE FOR STAKED TURBIDITY BARRIER, LF.

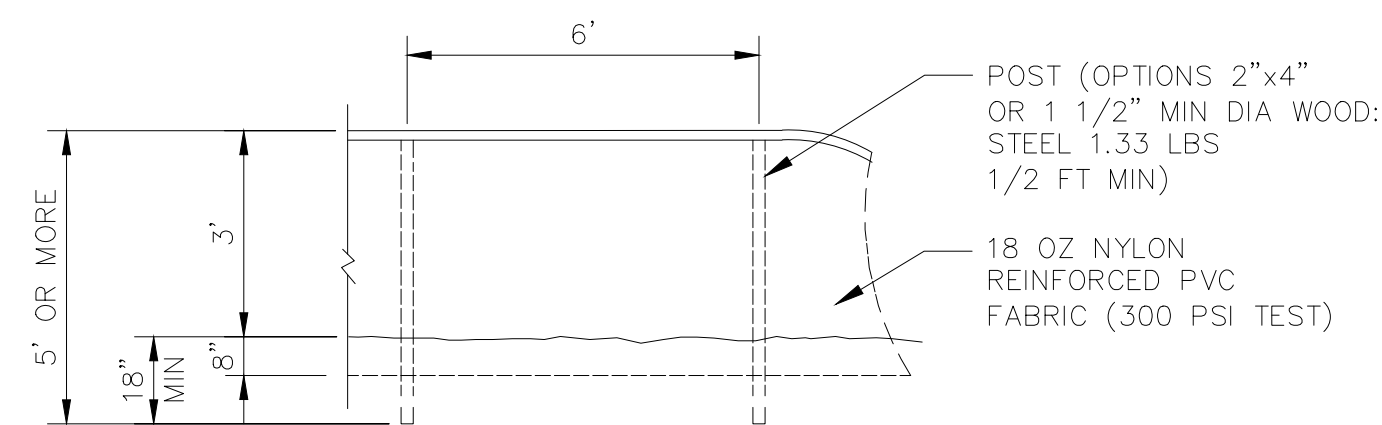


LEGEND

- PILE LOCATIONS
- ▨ DREDGE OR FILL AREA
- MOORING BUOY W/ANCHOR
- ANCHOR
- BARRIER MOVEMENT DUE TO CURRENT ACTION

TURBIDITY BARRIER APPLICATIONS

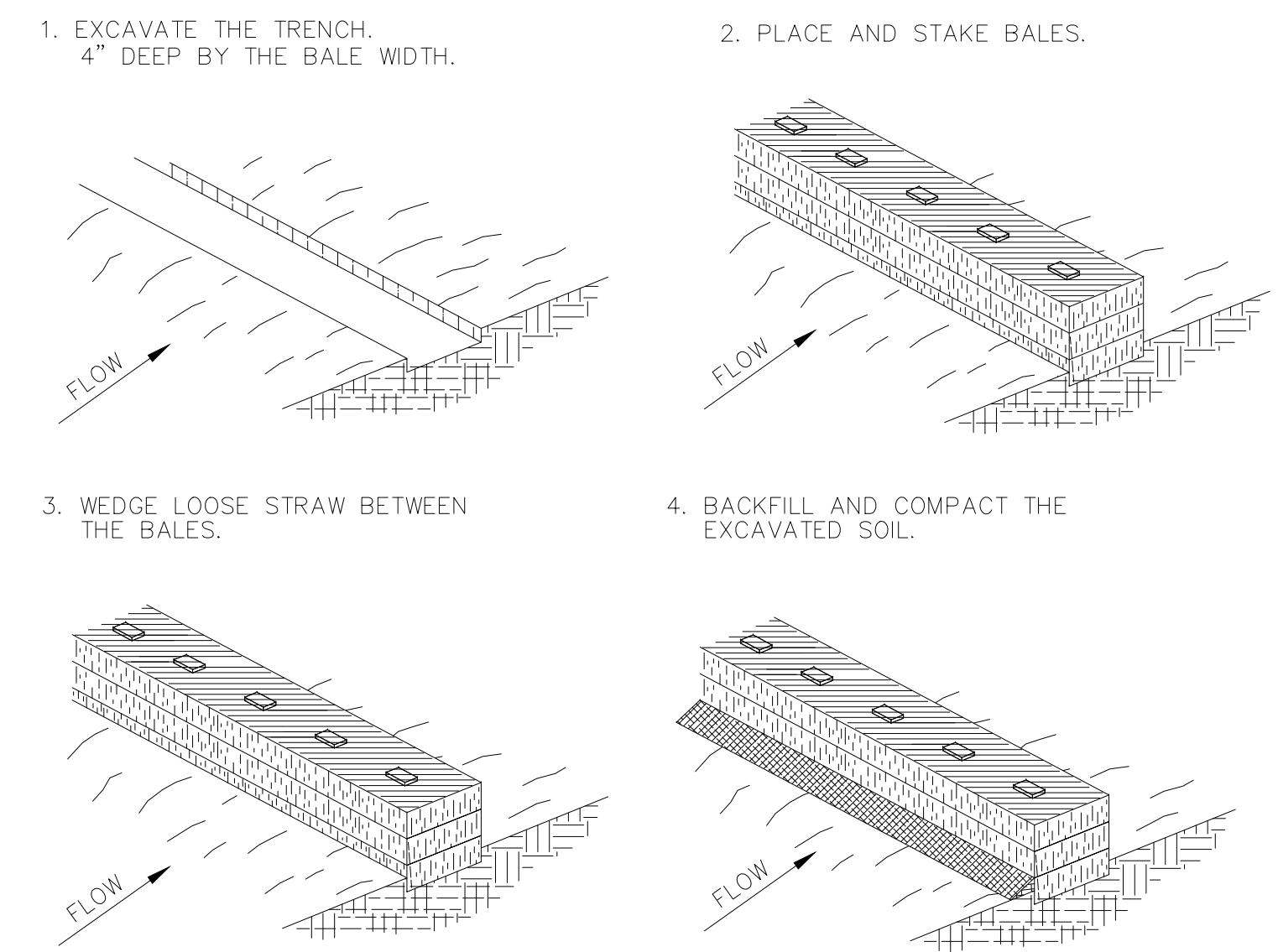
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3 STAKED TURBIDITY BARRIER
 NOT TO SCALE

NOTES:

TURBIDITY BARRIERS FOR FLOWING STREAMS AND TIDAL CREEKS MAY BE EITHER FLOATING, OR STAKED TYPES OR ANY COMBINATIONS OF TYPES THAT WILL SUIT SITE CONDITIONS AND MEET EROSION CONTROL AND WATER QUALITY REQUIREMENTS. THE BARRIER TYPE(S) WILL BE AT THE CONTRACTORS OPTIONS UNLESS OTHERWISE SPECIFIED IN THE PLANS, HOWEVER PAYMENT WILL BE UNDER THE PAY ITEM(S) ESTABLISHED IN THE PLANS FOR FLOATING TURBIDITY BARRIERS TO BE INSTALLED IN VERTICAL POSITION UNLESS OTHERWISE DIRECTED BY THE DISTRICT.



NOTES

- INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
- BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

2 HAY BARRIER
 NOT TO SCALE

EROSION AND SEDIMENT CONTROL NOTES:

- THE CONTRACTOR IS RESPONSIBLE FOR REMOVING SILT FROM SITE IF NOT REUSABLE ON-SITE AND ASSURING PLAN ALIGNMENT AND GRADE IN ALL WORK AT COMPLETION OF CONSTRUCTION.
- ON-SITE PROTECTION ADDITION TO THE ABOVE MUST BE PROVIDED THAT WILL NOT PERMIT SILT TO LEAVE THE PROJECT CONFINES DE TO UNSEEN CONDITIONS OR ACCIDENTS.
- THE FILTER BARRIER SHALL BE ENTRENCHED AND BACKFILLED. A TRENCH SHALL BE EXCAVATED TO A MINIMUM DEPTH OF 8 INCHES. THE EXCAVATED SOIL SHALL BE BACKFILLED AND COMPACTED AGAINST THE FILTER BARRIER.
- FILTER BARRIERS AND SILT FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
- SHOULD THE FABRIC ON A SILT FENCE OR FILTER BARRIER DECOMPOSE OR BECOME INEFFECTIVE PRIOR TO THE END THE EXPECTED USABLE LIFE AND THE BARRIER STILL BE NECESSARY, THE FABRIC SHALL BE REPLACED IMMEDIATELY.
- ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE SILT FENCE BARRIER IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM WITH THE EXISTING GRADE, PREPARED AND GRASSED.
- THE CONTRACTOR IS RESPONSIBLE FOR THE BEST EROSION AND SEDIMENT CONTROL PRACTICES AS OUTLINED IN THE PLANS, SPECIFICATIONS, PERMITS, AND ST. JOHNS RIVER WATER MANAGEMENT DISTRICT CRITERIA.
- FOR ADDITIONAL INFORMATION ON SEDIMENT AND EROSION CONTROL REFER TO THE FLORIDA DEVELOPMENT MANUAL - A GUIDE TO SOUND LAND AND WATER MANAGEMENT FROM THE STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (F.D.E.P.) CHAPTER 6, LATEST EDITION
- ALL DISTRIBUTED AREAS SHALL BE GRASSED, FERTILIZED, WATERED AND MAINTAINED UNTIL VA PERMANENT VEGETATIVE COVER IS ESTABLISHED. GRASSING SHALL CONFORM TO THE REQUIREMENTS OF SECTIONS 570 AND 981 THRU 933 OF THE FLORIDA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATION FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITIONS. NOTE THAT OTHER GRASSING ALTERNATIVES MAY BE USED WITH PRIOR DISTRICT APPROVAL.

STEVE DUCHARNE LOCATION: R/A 19-1010 LAKE APOPKA X/CD5 100 PERCENT DWS

Signature: Michael R. King, P.E.
 FL Professional Eng. # 71640
 Date:

REV	NO	DATE	DESCRIPTION
1	1		
2	2		
3	3		
4	4		
5	5		
6	6		

LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION
CONSTRUCTION DETAILS
 LAKE APOPKA, FLORIDA

DESIGN	DATE	ISSUE	ISSUE
MIRK	19-10-10	AUGUST 2020	100%

FOUR WATERS ENGINEERING
 324 6th AVENUE N. JACKSONVILLE BEACH, FLORIDA 32250
 904-444-2460 C.O.# 31101 WWW.FWENG.COM

DESIGN SPECIFICATIONS:

1. BUILDING CODE AND REFERENCES:

- 1.1 2017 FLORIDA BUILDING CODE (FBC) SIXTH EDITION.
- 1.2 REINFORCED CONCRETE: ACI 318-14 "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE".
- 1.3 STRUCTURAL STEEL: AISC 14 EDITION, "MANUAL OF STEEL CONSTRUCTION".
- 1.4 ASCE 7-10, MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

2. DESIGN LOADS:

2.1 LIVE LOADS:

PLATFORM:.....	100 PSF
ROOF:.....	20 PSF

GUARDRAILS: THE MOST STRINGENT LOAD CONDITION SHALL CONTROL:

- UNIFORM LOAD..... 50 PLF
- CONCENTRATED FORCE APPLIED AT TOP OF RAILING POST.....200 LBS

2.2 DEAD LOADS:

PLATFORM:.....	15 PSF
GUARDRAILS:.....	15 PLF

2.3 WIND DESIGN CRITERIA

- RISK CATEGORY:..... III
 WIND EXPOSURE:..... C
 ULTIMATE WIND SPEED, 142 MPH
 NOMINAL WIND SPEED, 110 MPH
 MEAN HEIGHT, h
- PUMP STATION:..... 19 FEET
 - CANOPY:..... 10 FEET
- ENCLOSURE:
- PUMP SUPPORT: N/A.....WIND ON OTHER STRUCTURES
 - CANOPY:.....OPEN BUILDING

2.4 PUMP

WEIGHT OF PUMP AND MOTOR.....	3,200 LBS
WEIGHT OF WATER IN PUMP ABOVE LOW WATER LEVEL.....	3,500 LBS
HORIZONTAL FORCE BASED ON MAXIMUM TDH AT NORMAL WATER LEVEL.....	2,666 LBS

GENERAL NOTES:

1. ALL DESIGN CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH APPLICABLE CODES AND AUTHORITIES HAVING JURISDICTION OVER THE WORK.
2. ALL STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH THE MECHANICAL, CIVIL, ELECTRICAL, AND SHOP DRAWINGS AND SPECIFICATIONS.
3. THE CONTRACTOR SHALL REVIEW AND VERIFY DIMENSIONS SHOWN IN ALL PLANS AND REVIEW ALL FIELD CONDITIONS THAT MAY AFFECT THE WORK DEPICTED ON THE DRAWINGS. SHOULD DISCREPANCIES APPEAR, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN WRITING TO OBTAIN ENGINEER'S CLARIFICATION BEFORE COMMENCING WITH THE WORK.
4. THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO PROTECT EXISTING STRUCTURES FROM DAMAGE WHEN WORKING IN AND AROUND EXISTING STRUCTURES PERFORMING WORK SUCH AS DEMOLITION, FOUNDATION EXCAVATIONS, AND OTHERS.
5. SIZE AND LOCATION OF EQUIPMENT PADS AND ANCHOR BOLTS SHALL BE PER EQUIPMENT MANUFACTURER'S REQUIREMENTS.
6. ANY CONSTRUCTION EQUIPMENT THAT MAY INDUCE VIBRATION TO THE STRUCTURE SHALL BE ADEQUATELY ISOLATED FROM THE STRUCTURE.
7. ALL DETAILS AND SECTIONS SHOWN ON THE DRAWINGS ARE INTENDED TO BE TYPICAL AND SHALL BE CONSTRUED TO APPLY TO ANY SIMILAR SITUATION ELSEWHERE ON THE PROJECT, EXCEPT WHERE A DIFFERENT DETAIL IS SHOWN.

FOUNDATION

SOILS: GEOTECHNICAL EXPLORATION AND EVALUATION REPORT

1. REFER TO: "REPORT OF GEOTECHNICAL EXPLORATION, AND EVALUATION REPORT, LAKE APOPKA INTERCONNECT PUMP STATION, APOPKA, FLORIDA", CSI GEO PROJECT No. 71-19-310-08, DATED APRIL 22, 2020, PREPARED BY CSI GEO, INC.
2. SOIL PREPARATIONS NOTED IN SAID REPORT SHALL BE FOLLOWED UNLESS MORE STRINGENT DESIGN IS SPECIFIED WITHIN THESE PLANS. THE FILL BELOW THE FOUNDATION SHOULD BE FREE OF DEBRIS, ORGANIC MATERIAL, COHESIVE SOILS OR ANY OTHER DELETERIOUS MATERIAL. SOIL MUST BE COMPACTED TO 95% MODIFIED PROCTOR MAXIMUM DRY DENSITY.
3. FOOTINGS AND FOUNDATIONS SHALL BE IN ACCORDANCE WITH FBC AND AS NOTED IN THESE PLANS.

FOUNDATION DESIGN:

1. CONCRETE SUMP PUMP: ALLOWABLE NET BEARING PRESSURE.....	1000 PSF
2. DIVIDER WALL.....	1500 PSF
3. PIPE BEDDING AND PIPE SUPPORT.....	3000 PSF
4. PUMP PLATFORM DRIVEN PILES (H12x53):	
4.1 PILE ALLOWABLE COMPRESSIVE CAPACITY.....	25 KIPS
4.2 PILE ALLOWABLE TENSION CAPACITY.....	14 KIPS
4.3 PILE ALLOWABLE LATERAL CAPACITY.....	4 KIPS

CONCRETE:

1. CONCRETE SHALL BE IN ACCORDANCE WITH FBC & ACI.
2. CAST-IN-PLACE CONCRETE SHALL HAVE A 28 DAY MINIMUM COMPRESSIVE STRENGTH OF:

FOUNDATIONS/PILE CAPS/PIPE SUPPORT.....	4,000 PSI
SLAB-ON-GRADE.....	4,000 PSI
RETAINING WALLS.....	4,000 PSI
3. NO WATER SHALL BE ADDED TO THE CONCRETE, AFTER THE TRUCK HAS LEFT THE BATCH PLANT WITHOUT AUTHORIZATION FROM THE ENGINEER-OF-RECORD (EOR), UNLESS THE DELIVERY TICKET INDICATES AN AMOUNT OF WATER THAT IS ALLOWED TO BE ADDED AT THE JOB SITE, AFTER AUTHORIZATION BY THE TESTING LAB REPRESENTATIVE.
4. CONCRETE MIX DESIGN SHALL BE SUBMITTED TO THE STRUCTURAL EOR FOR REVIEW & APPROVAL. SUBMITTALS SHALL INCLUDE CERTIFICATES FROM AGGREGATES, ADDITIVES AND CEMENTITIOUS MATERIALS.
5. CONCRETE ADMIXTURES SHALL NOT CONTAIN ANY CALCIUM-CHLORIDE.
6. CONCRETE SHALL BE NORMAL WEIGHT (±145) CONCRETE WITH A MINIMUM OF 2% AIR ENTRAINMENT.
7. FLY ASH (ASTM C618) OR SLAG CEMENT (ASTM C989) MAY BE SUBSTITUTED FOR UP TO 40% OF THE PORTLAND CEMENT (ASTM C150; TYPE I/II). FLY ASH SHALL NOT EXCEED 25% OF CEMENTITIOUS MATERIALS.
8. MAXIMUM WATER TO CEMENT (W/C) RATIO SHALL BE 0.51 (±0.03).
9. SJRWMD WILL ENGAGE A QUALIFIED TESTING & INSPECTING AGENCY TO PERFORM FIELD TEST, INSPECTIONS AND PREPARE TEST/INSPECTION REPORTS.
 - 9.1. THE CONTRACTOR SHALL ASSIST IN THE SAMPLING OF MATERIALS. THE METHODS OF TESTING SHALL COMPLY IN DETAIL WITH APPLICABLE ASTM STANDARDS.
10. TESTING AGENCY SHALL OBTAIN THE FOLLOWING PER ASTM C172:
 - 10.1. SLUMP, PER ASTM C143, FOR EACH TRUCK LOAD.
 - 10.2. AIR CONTENT, PER ASTM C213, FOR THE FIRST AND EACH FIFTH TRUCK AFTER THAT.
 - 10.3. TEMPERATURE, PER ASTM C1064, FOR EACH TRUCK.
 - 10.4. STRENGTH, PER ASTM C31, FOR EACH MIX DESIGN THAT DAY & FOR EVERY 50 CYD OF CONCRETE PLACED EACH DAY.

CONCRETE REINFORCEMENT:

1. STEEL REINFORCEMENT SHALL BE IN ACCORDANCE WITH FBC, ACI 318 AND AS NOTED IN THESE PLANS.
2. STEEL REINFORCEMENT SHALL BE ASTM A615, GRADE 60
3. CONCRETE COVER:
 - 3.1. PUMP STATION:
 - 3.1.1. EXTERNAL CONCRETE SURFACES CAST AGAINST EARTH AND SURFACES IN CONTACT WITH WATER..... 4 ½"
 - 3.1.2. EXTERIOR FORMED CONCRETE SURFACES AND TOP OF FOOTINGS NOT IN CONTACT WITH WATER..... 4"
 - 3.1.3. RETAINING WALLS..... 3"
 - 3.2. CANOPY:
 - 3.2.1. CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH 3"
 - 3.2.2. CONCRETE EXPOSED TO WEATHER OR IN CONTACT WITH GROUND..... 2"
 - 3.2.3. CONCRETE NOT EXPOSED TO WEATHER OR NOT IN CONTACT WITH GROUND..... 1 ½"

4. VERTICAL AND HORIZONTAL REINFORCEMENT WILL BE LAPPED FOR 36 BAR DIAMETERS OR 24", WHICHEVER IS GREATER. CORNER REINFORCEMENT SHALL BE LAPPED 30".
5. ALL REINFORCING STEEL SHALL BE PLACED IN ACCORDANCE WITH THE TYPICAL BENDING DIAGRAMS AND PLACING DETAILS OF ACI STANDARDS.
6. ALL REINFORCING STEEL SHALL BE HELD SECURELY IN POSITION WITH STANDARD ACCESSORIES DURING PLACING OF CONCRETE.

STRUCTURAL STEEL:

1. ALL STEEL CONSTRUCTION SHALL BE IN ACCORDANCE WITH IBC, AISC & AWS.
2. ALL ANGLES, PLATES AND MISC STEEL SHOWN ON THESE DRAWINGS SHALL BE ASTM A36 MATERIAL.
3. ALL STRUCTURAL STEEL SHALL BE ASTM A992-GR50.
4. ALL FILLET WELDS SHALL CONFORM TO SECTION J2.2B OF AISC SPECIFICATIONS, EVEN WHEN SHOWN OTHERWISE ON ARCHITECTURAL OR STRUCTURAL DRAWINGS.
5. ALL WELDS ALONG THE LENGTH OF MEMBERS INDICATED ON ARCHITECTURAL OR STRUCTURAL DRAWINGS, BUT NOT SIZED SHALL BE MINIMUM OF ¼" FILLET, 2" EACH END AND 2" AT 12" OC BOTH SIDES.
6. ALL WELDS MADE TO PRIMARY MEMBERS SHALL BE MADE WITH E70XX ELECTRODES.
7. BOLTED AND WELDED SHEAR CONNECTIONS SHALL BE DESIGNED PER AISC STANDARDS & ALLOWABLE LOAD TABLES.
8. AN AISC CERTIFIED FABRICATION PLANT SHALL BE USED TO DETAIL & FABRICATE THE STRUCTURAL STEEL. IN LIEU OF USING AN AISC CERTIFIED PLANT SHEAR CONNECTIONS SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER & CALCULATIONS SHALL BE SUBMITTED TO THE EOR FOR REVIEW.
9. ALL BOLTED CONNECTIONS SHALL USE A325 BOLTS, A563 & F436 WASHERS, AND SHALL BE TIGHTENED BY THE TURN-OF-THE-BUT METHOD.
10. BASE PLATE GROUT SHALL COMPLY WITH ASTM C1107 AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 5KSI.
11. ALL STEEL SHALL RECEIVE ONE COAT OF THE STANDARD SHOP PRIMER. APPLY COAL TAR-EPOXY COATINGS TO THE EXPOSED SIDES OF PILES FROM THE TOP OF THE PILES TO A DEPTH OF FIVE FEET BELOW THE LOWER OF THE DESIGN GROUND SURFACE OR THE DESIGN SCOUR DEPTH. REFER TO SJRWMD SPECS FOR H-PILE PILES COATING REQUIREMENTS.
12. DO NOT USE THERMAL CUTTING DURING ERECTION. DO NOT ENLARGE UNFAIR HOLES IN MEMBER BY BURNING OR USING DRIFT PINS.
13. SJRWMD WILL ENGAGE A QUALIFIED TESTING AGENCY SELECTED BY SJRWMD TO PERFORM VISUAL INSPECTIONS OF THE BOLTED & WELDED CONNECTIONS.
 - 13.1. THE CONTRACTOR SHALL ASSIST IN THE SAMPLING OF MATERIALS. THE METHODS OF TESTING SHALL COMPLY IN DETAIL WITH THE APPLICABLE ASTM STANDARDS.
14. CONTRACTOR/ERECTOR SHALL COMPLY WITH ALL OSHA & LOCAL REQUIREMENTS FOR THE ERECTION OF STRUCTURAL STEEL.
15. THE CONTRACTOR/ERECTOR IS RESPONSIBLE FOR TEMPORARY BRACING & STABILITY OF THE STRUCTURAL FRAME SYSTEM.

ALUMINUM:

1. ALUMINUM WORK SHALL CONFORM TO THE ALUMINUM DESIGN MANUAL, ALUMINUM ASSOCIATION LATEST EDITION.
2. CONNECTIONS:
 - 2.1. ALL WELDING SHALL CONFORM TO AWS D1.2.
 - 2.2. WELDING ROD SHALL BE 5356 ALLOY (WELDING 6061-T6 TO 6061-T6)
 - 2.3. BOLTED CONNECTIONS:
 - 2.3.1. BOLTS.....ASTM A193 GRADE B8 CLASS 1
 - 2.3.2. NUTS.....ASTM A194 GRADE 8 HEAVY HEX
 - 2.3.3. WASHERS.....SS304 (PER ASME B18.2.1 TOLERANCES)
 - 2.4. ALL BOLT HOLES SHALL BE BOLT DIAMETER +¼" TYPICAL. ENSURE MIN EDGE DISTANCE, SPACING BETWEEN BOLTS, MAX EDGE DISTANCES, ETC. ARE OBSERVED PER GOVERNING SPEC.
 - 2.5. MATERIAL SHALL CONFORM TO THE FOLLOWING AS NOTED:
 - 2.5.1. ALL PLATE= 5052-H34 OR 6061-T6
 - 2.5.2. ALL OTHER MEMBERS= 6061-T6

EPOXY ANCHORS:

1. POST INSTALLED ANCHORS HAVE BEEN DESIGNED WITH HILTI ANCHORS (NOTED BELOW) AS THE BASIS OF DESIGN. PROVIDE ANY APPROPRIATE ANCHOR WITH SIZE AND FINISH AS NOTED AND EQUIVALENT SHEAR AND TENSION CAPACITIES AFTER MODIFICATION DUE TO EMBEDMENT, SPACING AND EDGE DISTANCES. OTHER AVAILABLE MANUFACTURER INCLUDES SIMPSON STRONG-TIE CO. INSTALL ANCHOR PER THE MANUFACTURER'S INSTRUCTIONS/RECOMMENDATIONS. (OR APPROVED EQUALS)
 - 1.1. ADHESIVE ANCHORS: HIT HY-200 (CONCRETE)
 - 1.2. EXPANSION ANCHORS: KWIK BOLT 3
 - 1.3. SLEEVE ANCHORS: HLC SLEEVE ANCHOR
 - 1.4. SCREEN TUBE ANCHORS: HIT HY-70
2. THREADED RODS SHALL BE IN ACCORDANCE WITH ASTM A36 OR ASTM F1554 GRADE 36.
3. WASHERS SHALL BE IN ACCORDANCE WITH ASTM F436 GRADE 36.
4. NUTS SHALL BE IN ACCORDANCE WITH ASTM A563 GRADE A HEX.
5. INSTALLATION OF ANCHORS SHALL COMPLY WITH MANUFACTURER'S RECOMMENDATIONS FOR DRILLING OF HOLES, CLEANING OF HOLES AND INSTALLING OF EPOXY AND ANCHORS.

PRE-ENGINEERED STEEL CANOPY:

1. DESIGN, FABRICATION AND ERECTION OF STEEL CANOPY SHALL CONFORM TO THE IBC, AISC & ASTM REQUIREMENTS & RECOMMENDATIONS.
2. CONTRACTOR SHALL OBTAIN A "SPECIALTY ENGINEER" TO PROVIDE CANOPY DESIGN & DETAILING.
3. SIGNED AND SEALED SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER-OF-RECORD (EOR) FOR REVIEW & APPROVAL, PRIOR TO FABRICATION AND ERECTION OF THE CANOPY SYSTEM.
4. DESIGN CALCULATIONS SHALL SHOW COMPLIANCE WITH ROOF LIVE AND WIND LOADS.

SHOP DRAWING SUBMITTALS:

THE GENERAL CONTRACTOR SHALL SUBMIT, FOR APPROVAL, THE FOLLOWING ITEMS PRIOR TO THE START OF FABRICATION OR COMMENCEMENT OF WORK PER THE PROJECT SPECIFICATIONS:

- CONCRETE MIX DESIGNS
- REBAR LAYOUT DRAWINGS
- STRUCTURAL STEEL ERECTION DRAWINGS
- CANOPY SHOP & ERECTION DRAWINGS

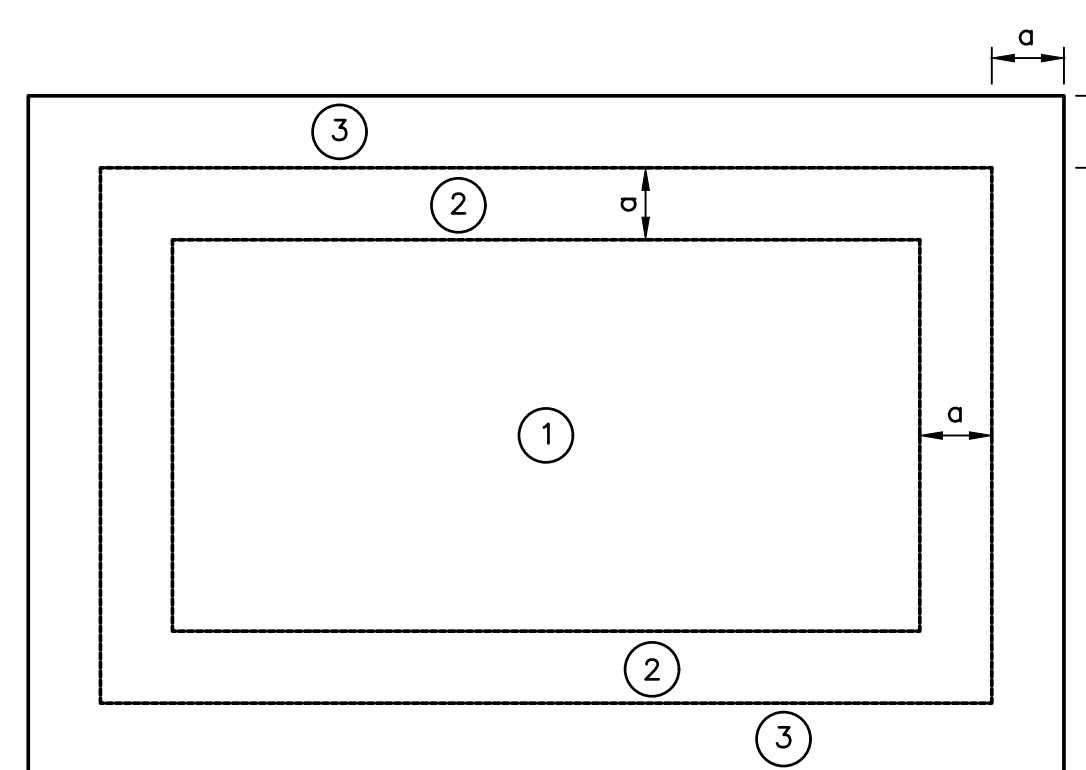
DRAWING LIST:

- S-0 GENERAL NOTES, DESIGN CRITERIA
 S-1 PROJECT PLAN VIEW
 S-2 PLATFORM FOUNDATION & FRAMING PLANS
 S-3 PUMP STATION SECTION & DETAILS
 S-4 PUMP STATION PLATFORM SECTIONS & DETAILS
 S-5 SECTIONS & DETAILS
 S-6 CONTROL PANEL CANOPY FRAMING PLAN, SECTION & DETAILS

COMPONENT & CLADDING DESIGN FOR CANOPY			
WIND PRESSURES (PSF)			
ROOF			
NEGATIVE ZONE	AREA		
	9SF	< SF <	36 SF
1	-40.9	-40.9	-40.9
2	-61.9	-61.9	-40.9
3	-122.6	-61.9	-40.9
POSITIVE ZONE			
1	+46.0	+46.0	+46.0
2	+69.1	+69.1	+46.0
3	+92.1	+69.1	+46.0

NOTES:
 1) TABLE PRESSURES ARE FOR THE SQUARE FOOT (SF) TRIBUTARY AREA SHOWN. FOR OTHER TRIBUTARY AREAS, LINEARLY INTERPOLATE BETWEEN VALUES SHOWN ABOVE.
 2) POSITIVE PRESSURES ACT TOWARD THE BUILDING. NEGATIVE PRESSURES ACT AWAY FROM THE BUILDING.
 3) SEE DIAGRAMS FOR ZONE LOCATIONS.
 4) ALL PRESSURES SHOWN IN ARE ULTIMATE PRESSURES.
 5) TO OBTAIN ALLOWABLE WIND PRESSURE VALUES, MULTIPLY VALUES SHOWN ON TABLE x 0.6
 WIND_{ALLW} = 0.6 WIND_{ULT}.

a = 3.0 ft



ROOF PLAN (GENERIC BUILDING SHOWN)

BAR DESIGNATION	MINIMUM CLASS "B" LAP SPLICES OF REINFORCING BARS IN TENSION (PER ACI 318)					
	TOP BARS		OTHER BARS		CENTER TO CENTER BAR SPACING	
	LESS THAN 4 db	4 db OR MORE	LESS THAN 4 db	4 db OR MORE	x 4 db	
#3	18	18	16	16	1 1/2"	
#4	26	24	20	19	2"	
#5	40	30	31	23	2 1/2"	
#6	57	36	44	28	3"	
#7	77	42	59	33	3 1/2"	
#8	102	51	78	39	4"	
#9	129	64	99	50	4 1/2"	
#10	163	82	126	63	5"	
#11	200	100	159	77	5 5/8"	

NOTES:

1. YIELD STRENGTH OF REINFORCEMENT, (F_y) IS 60 ksi (LAP SPLICE LENGTH IS IN INCHES).
2. CONCRETE IS NORMAL WEIGHT 145 pcf.
3. TOP BAR INDICATES HORIZONTAL REINFORCEMENT WHICH IS PLACED ABOVE 12" OR MORE OF FRESH CONCRETE.
4. UNLESS NOTED OTHERWISE, COLUMNS & PIERS UTILIZE TENSION LAP SPLICES.
5. STRAIGHT DEVELOPMENT LENGTH OF AN UNLAPPED BAR IS EQUAL TO VALUE FROM TABLE DIVIDED BY 1.3.
6. CATEGORY FOR BARS SPACED LESS THAN 4d, OR MORE ON CENTER TO CORRESPOND TO CRSI CATEGORY 5.
7. FOR LIGHTWEIGHT CONCRETE: MULTIPLY THE ABOVE LAP SPLICE VALUES BY 1.3 UNO.
8. FOR EPOXY COATED REINFORCEMENT: MULTIPLY THE ABOVE LAP SPLICE VALUES BY 1.5.

STANDARD HOOKS IN TENSION PER (ACI 318)	
HOOK DEVELOPMENT LENGTH (REQUIRED EMBEDMENT) L _{dh} (INCHES)	
BAR SIZE	F'c (4000 PSI)
#3	7"
#4	10"
#5	12"
#6	15"
#7	17"
#8	19"
#9	22"
#10	24"
#11	27"

NOTES:
 1. CONCRETE IS NORMAL WEIGHT CONCRETE.
 2. BAR YIELD STRENGTH, F_y = 60 ksi.
 3. SIDE COVER REQUIREMENT OF ACI SECTION 12.5.3.2 ARE ASSUMED TO NOT BE MET.
 4. THE OR STIRRUP REQUIREMENTS OF ACI SECTION 12.5.3.2 ARE ASSUMED TO NOT BE MET.
 5. REDUCTION FOR EXCESS REINFORCEMENT IS NOT TAKEN.
 6. HOOK DEVELOPMENT LENGTH IS VALID FOR 180° HOOKS ALSO.



219 N. Newnan Street, 2nd Floor, Jacksonville FL 32202
 p 904 356 8520 f 904 559 2678 bakerdesign.build
 C.A. No. 32489

Signature: _____
 Elicio Urquiza, P.E.
 FL Professional Eng. # 80630
 Date: _____

REV#	DATE	BY	DESCRIPTION
1			
2			
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6			

GENERAL NOTES AND DESIGN CRITERIA

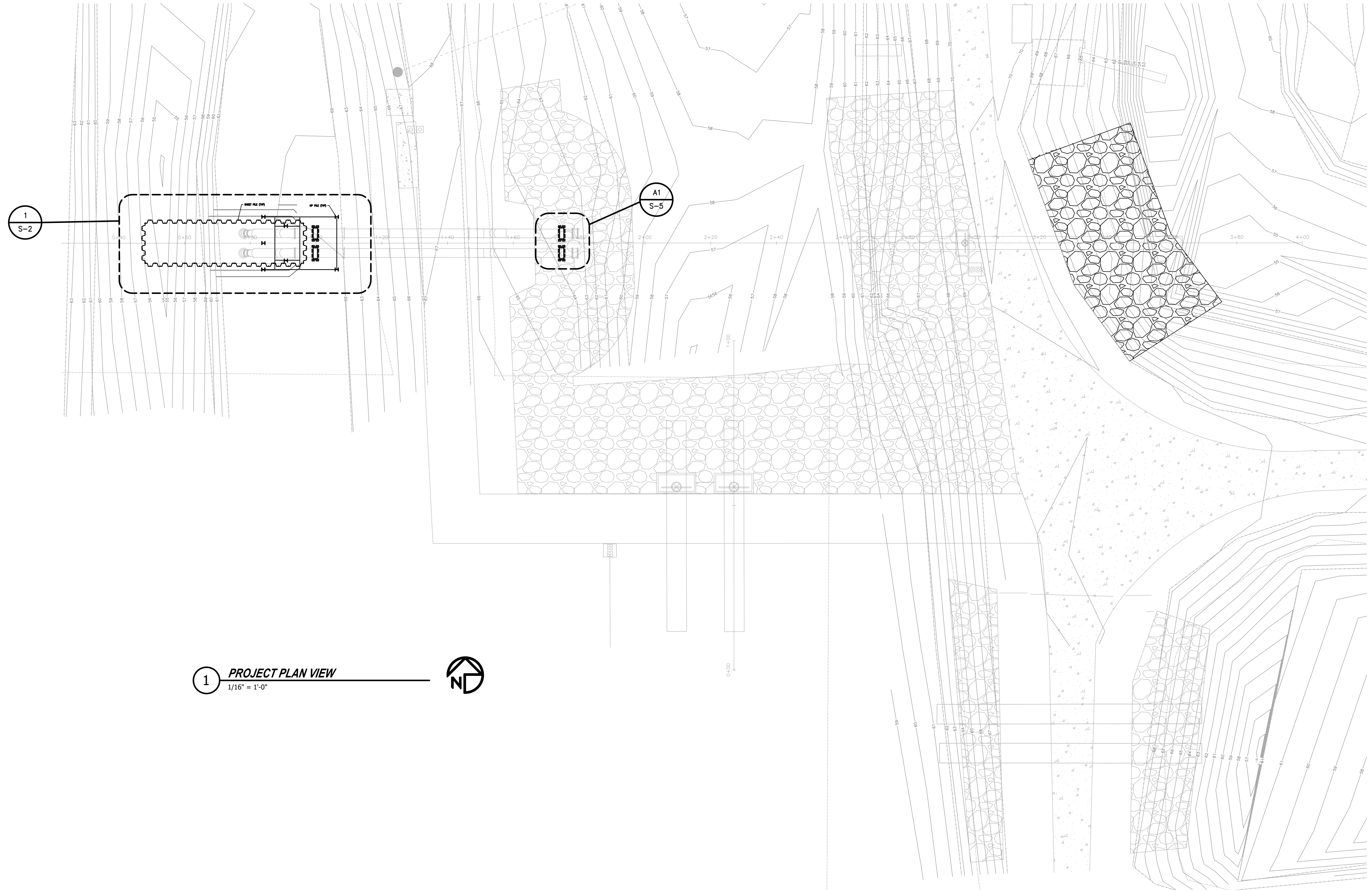
DESIGN: DRAWN: C.J.R.
 FDU: 19-0313
 JOB NUMBER: 19-0313
 ISSUE: AUGUST 2020
 DATE: 2020
 ISSUE: 100%
FOUR WATERS ENGINEERING
 324 6th AVE N. JACKSONVILLE BEACH, FLORIDA 32250
 C.O.A.# 31101 WWW.AWENG.COM
 LAKE APOPKA, FLORIDA
 LAKE APOPKA, FLORIDA

STRUCTURAL DESIGN BASED ON
CONSTRUCTION PLANS PROVIDED BY:
FOUR WATERS ENGINEERING, INC.
DATED: 01.30.2020

BAKER
Design Build

219 N. Newnan Street, 2nd Floor, Jacksonville FL 32202
p 904 356 8520 f 904 559 2678 bakerdesign.build
C.A. No. 32489

Signature
Faleto Urquian, P.E.
FL Professional Eng. # 66630
Date



1 PROJECT PLAN VIEW
1/16" = 1'-0"



LOCATION: P:\ENGINEERING\PROJECTS\FOUR WATERS ENGINEERING\19-0313 LAKE APOPKA INTERCONNECT\6-STRUCTURAL\100% SUBMITTAL\DWG\S1.0 PLANS_19-0313_100%.DWG

LAKE APOPKA PUMPSTATION
PROJECT PLAN VIEW
LAKE APOPKA, FLORIDA

DESIGN	DRAWN	CUR
FDU		
NUMBER	19-0313	
ISSUE	AUGUST	
DATE	2020	
ISSUE		100%

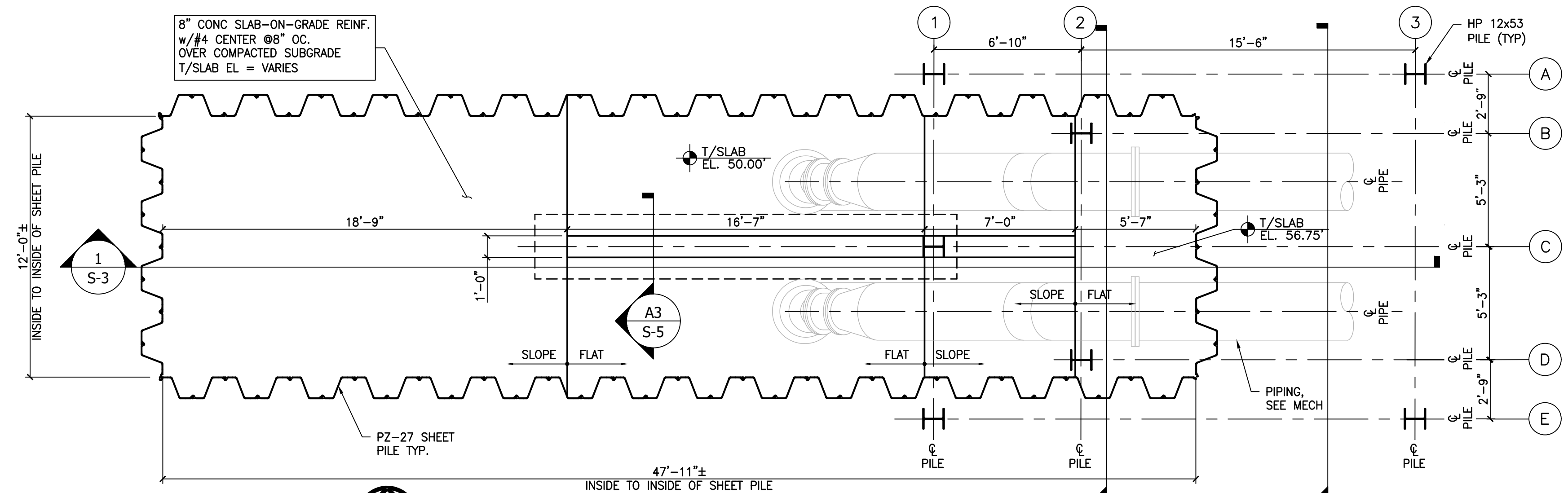
FOUR WATERS
ENGINEERING
324 6th Ave N, Jacksonville Beach, FL 32260
904-444-2460 C.O.A.# 31101 WWW.FWENG.COM

DRAWING NUMBER
S-1

REV	NO	DATE	BY	CHKD	DESCRIPTION
1					
2					
3					
4					
5					
6					

STRUCTURAL DESIGN BASED ON CONSTRUCTION PLANS PROVIDED BY: FOUR WATERS ENGINEERING, INC. DATED: 01.30.2020

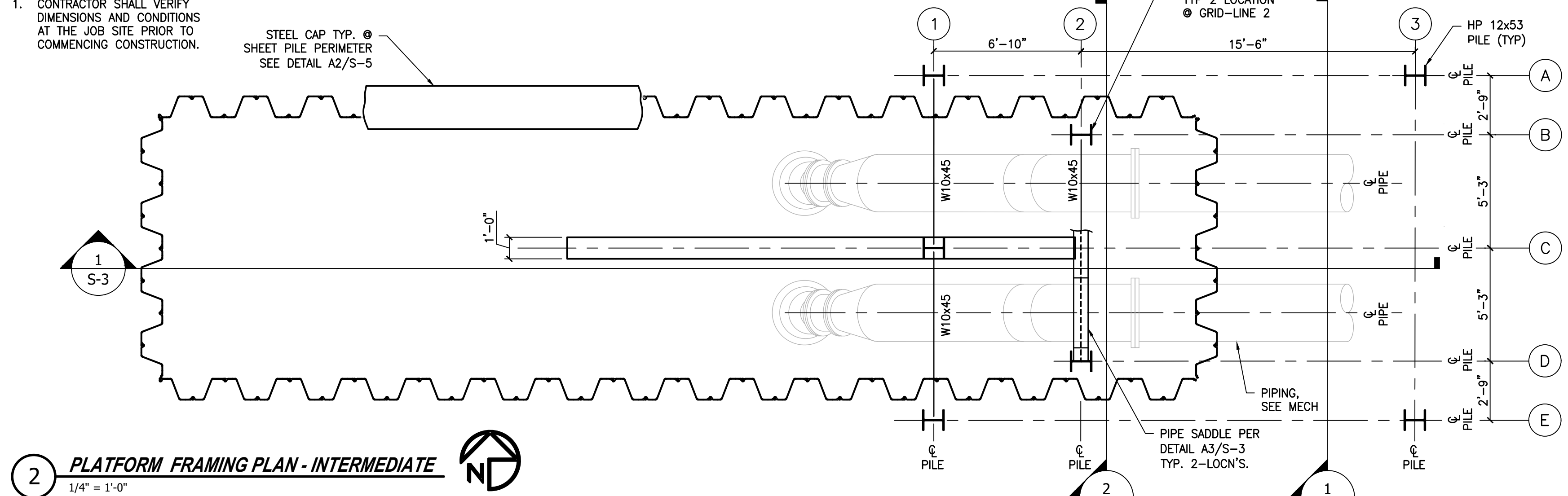
8" CONC SLAB-ON-GRADE REINF. w/#4 CENTER @8" OC. OVER COMPACTED SUBGRADE T/SLAB EL. = VARIES



1 LOWER FRAMING PLAN & FDN.
1/4" = 1'-0"

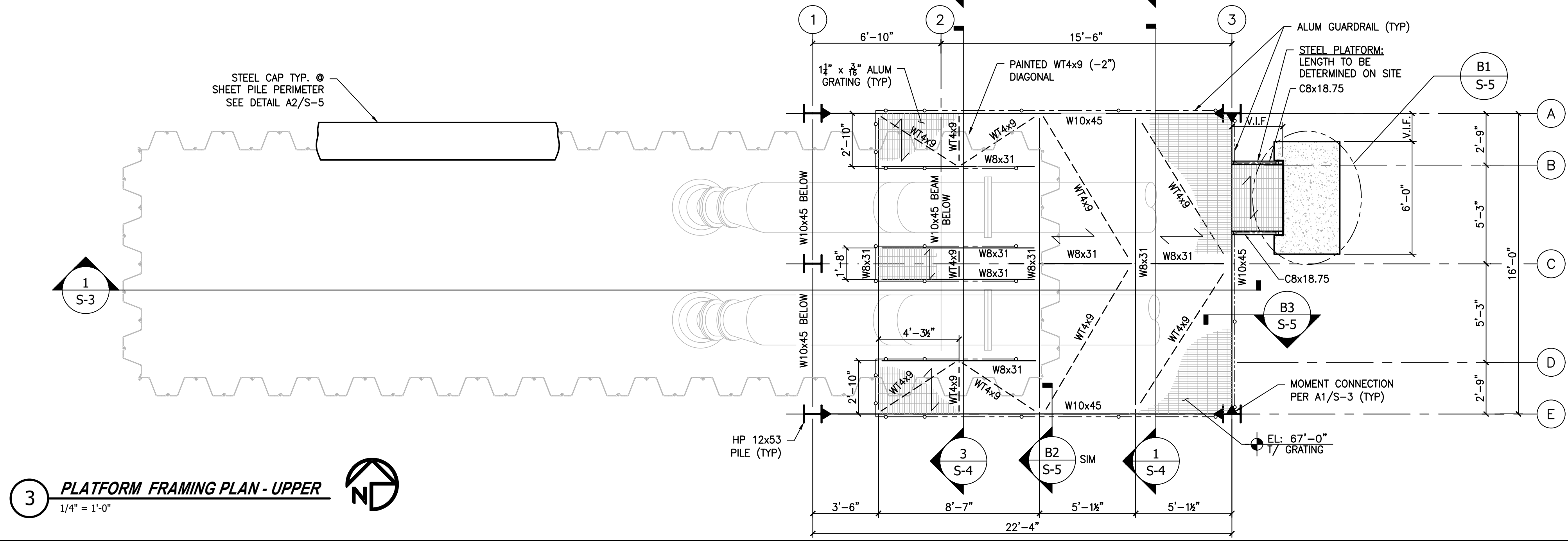
PLAN NOTES:
1. CONTRACTOR SHALL VERIFY DIMENSIONS AND CONDITIONS AT THE JOB SITE PRIOR TO COMMENCING CONSTRUCTION.

STEEL CAP TYP. @ SHEET PILE PERIMETER SEE DETAIL A2/S-5



2 PLATFORM FRAMING PLAN - INTERMEDIATE
1/4" = 1'-0"

STEEL CAP TYP. @ SHEET PILE PERIMETER SEE DETAIL A2/S-5



3 PLATFORM FRAMING PLAN - UPPER
1/4" = 1'-0"



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p 904 356 8520 f 904 559 2678 bakerdesign.build
C.A. No. 32489

Signature:
Freddy Urquien, P.E.
FL Professional Eng. # 80630
Date:

REV	DATE	DRWN	CHKD	BY	DESCRIPTION
1					
2					
3					
4					
5					
6					

PUMP STATION PLATFORM PLANS

LAKE APOPKA PUMPSTATION
LAKE APOPKA, FLORIDA

DESIGN	DRAWN	FOU	CHKD	ISSUE	DATE	ISSUE	DATE	ISSUE	DATE	ISSUE	DATE
					19-03-13		AUGUST		2020		

FOUR WATERS ENGINEERING
324 6th AVE N. JACKSONVILLE BEACH, FLORIDA 32250
904-414-2400 C.O.A.# 31101 WWW.FWENG.COM

DRAWING NUMBER

S-2

LOCATION: P:\ENGINEERING\PROJECTS\FOUR WATERS ENGINEERING\19-0313 LAKE APOPKA INTERCONNECT\6-STRUCTURAL\100% SUBMITTAL_DWG\S1.0 PLANS_19-0313 - 100% DWG

STRUCTURAL DESIGN BASED ON CONSTRUCTION PLANS PROVIDED BY: FOUR WATERS ENGINEERING, INC. DATED: 01.30.2020

219 N. Newnan Street, 2nd Floor, Jacksonville FL 32202
p 904 356 8520 f 904 559 2678 bakerdesign.build
C.A. No. 32489

Signature
Freddo Urquien, P.E.
FL Professional Eng. # 68630
Date

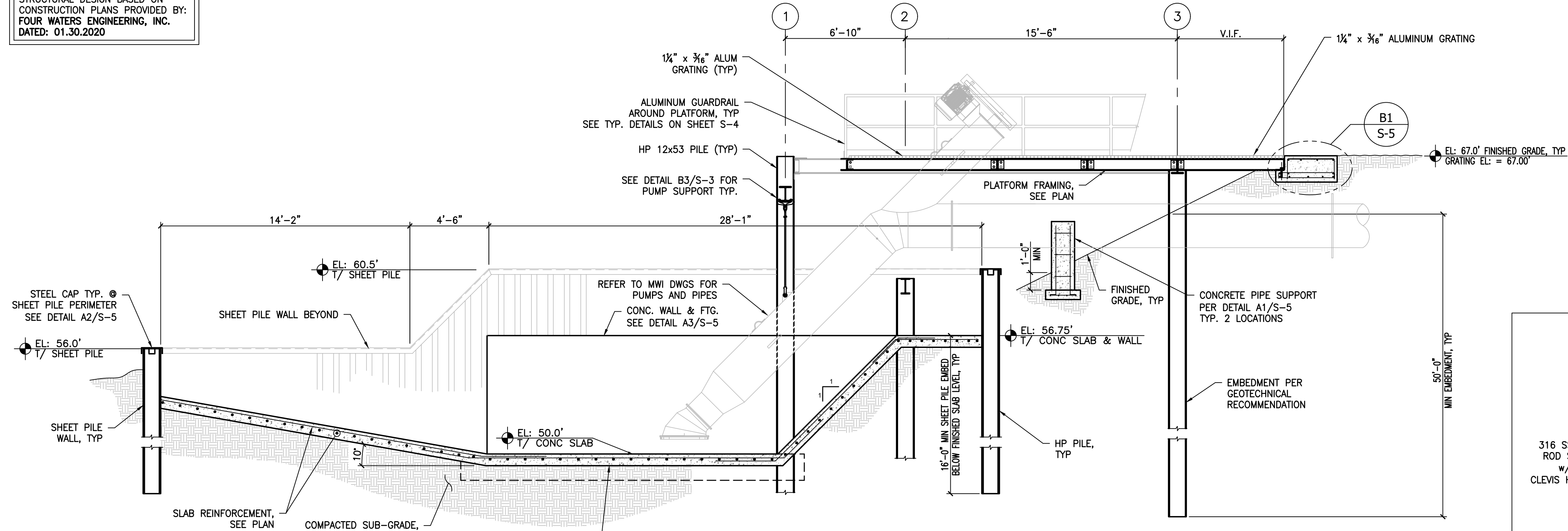
REV	NO	DATE	DRAWN (BY)	BY	DESCRIPTION
1	1				
2	2				
3	3				
4	4				
5	5				
6	6				

PUMP STATION SECTION & DETAILS

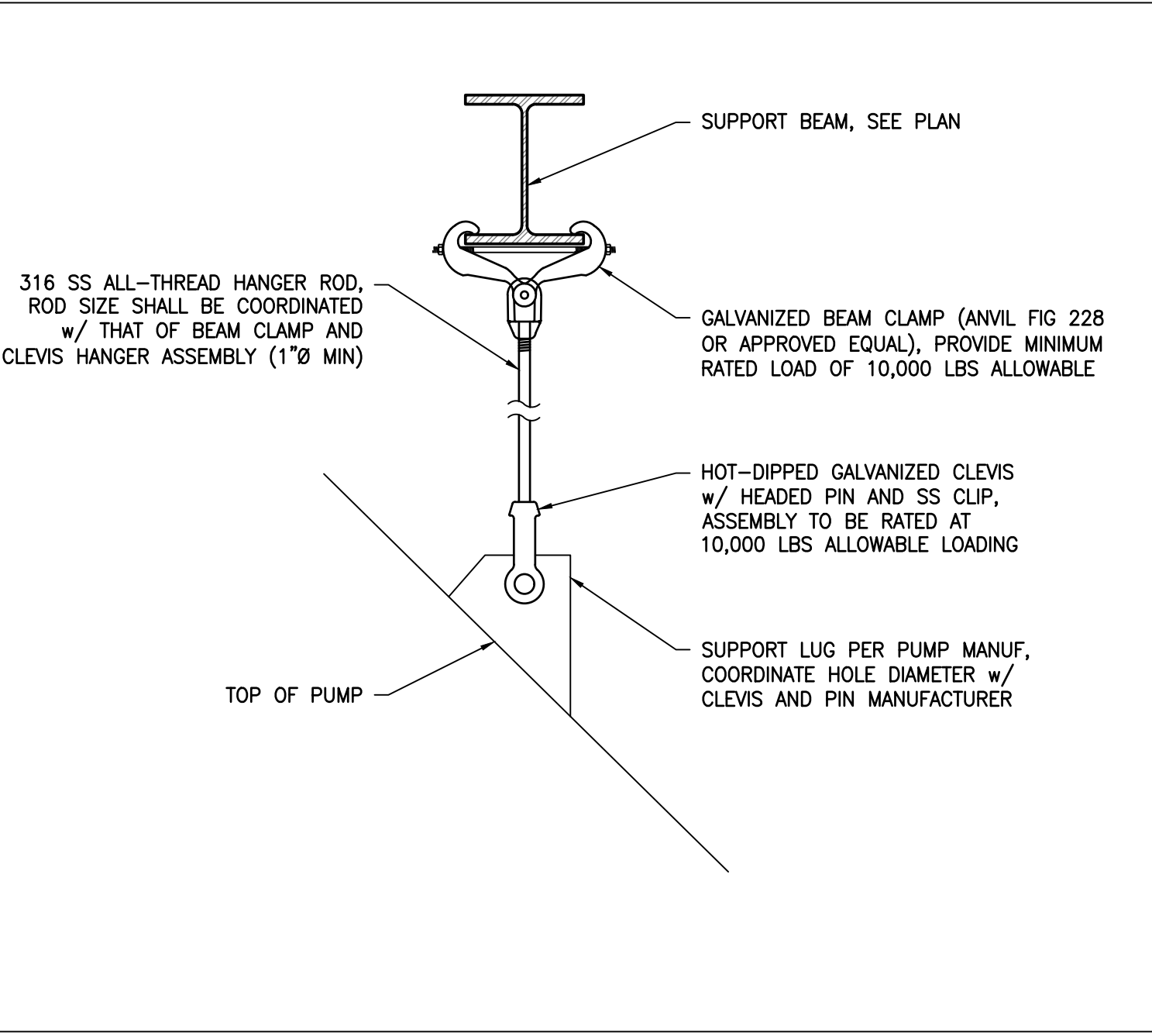
DESIGN	DRAWN	FOR	CHK
NUMBER	19-0313	NUMBER	19-0313
ISSUE	AUGUST 2020	ISSUE	AUGUST 2020
ISSUE	100%	ISSUE	100%

FOUR WATERS ENGINEERING
324 6th Avenue N. Jacksonville Beach, Florida 32250
904-414-2400 C.O.A.# 31101 WWW.FWENGS.COM

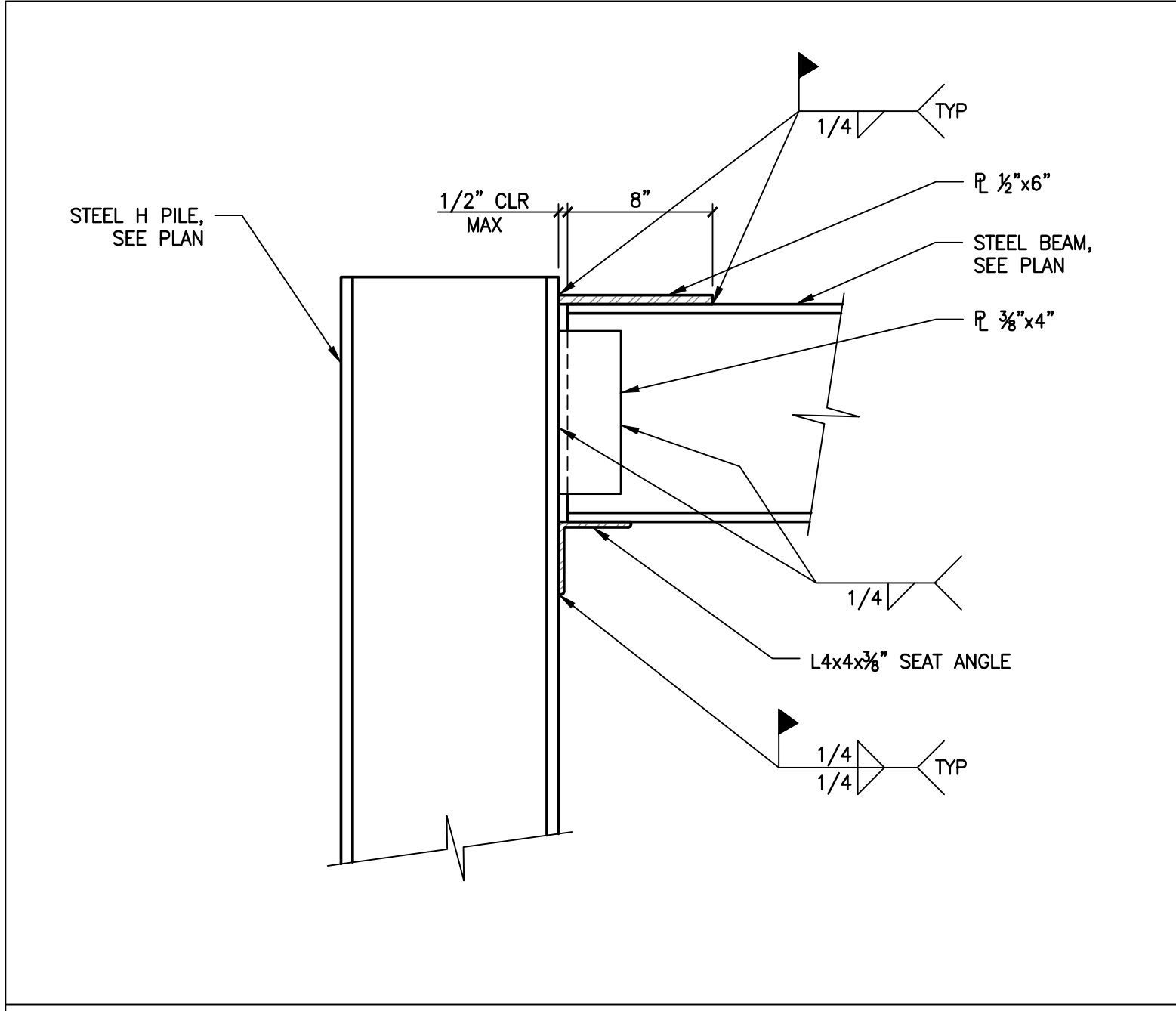
DRAWING NUMBER
S-3



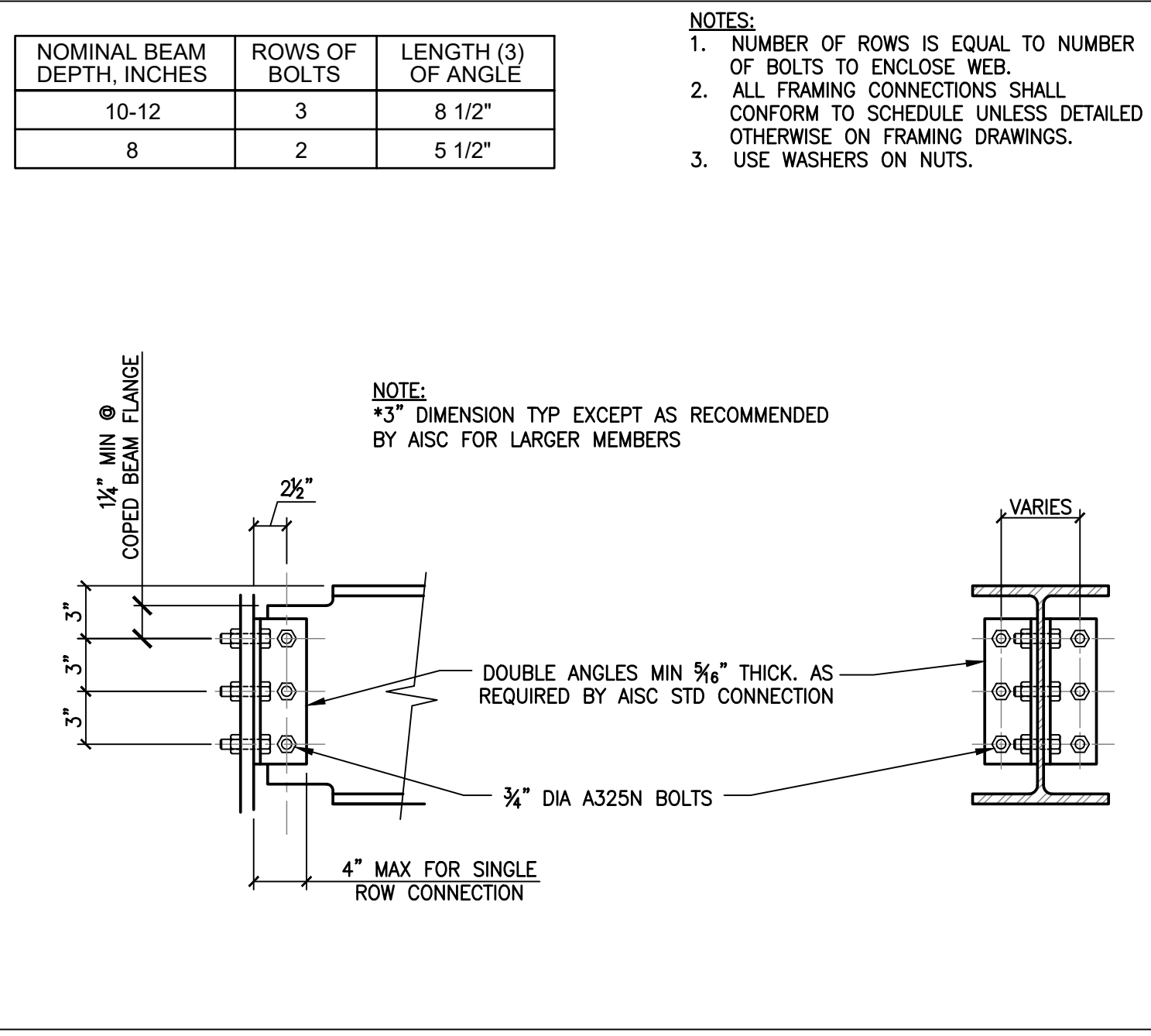
1 ELEVATION / SECTION VIEW
1/4" = 1'-0"



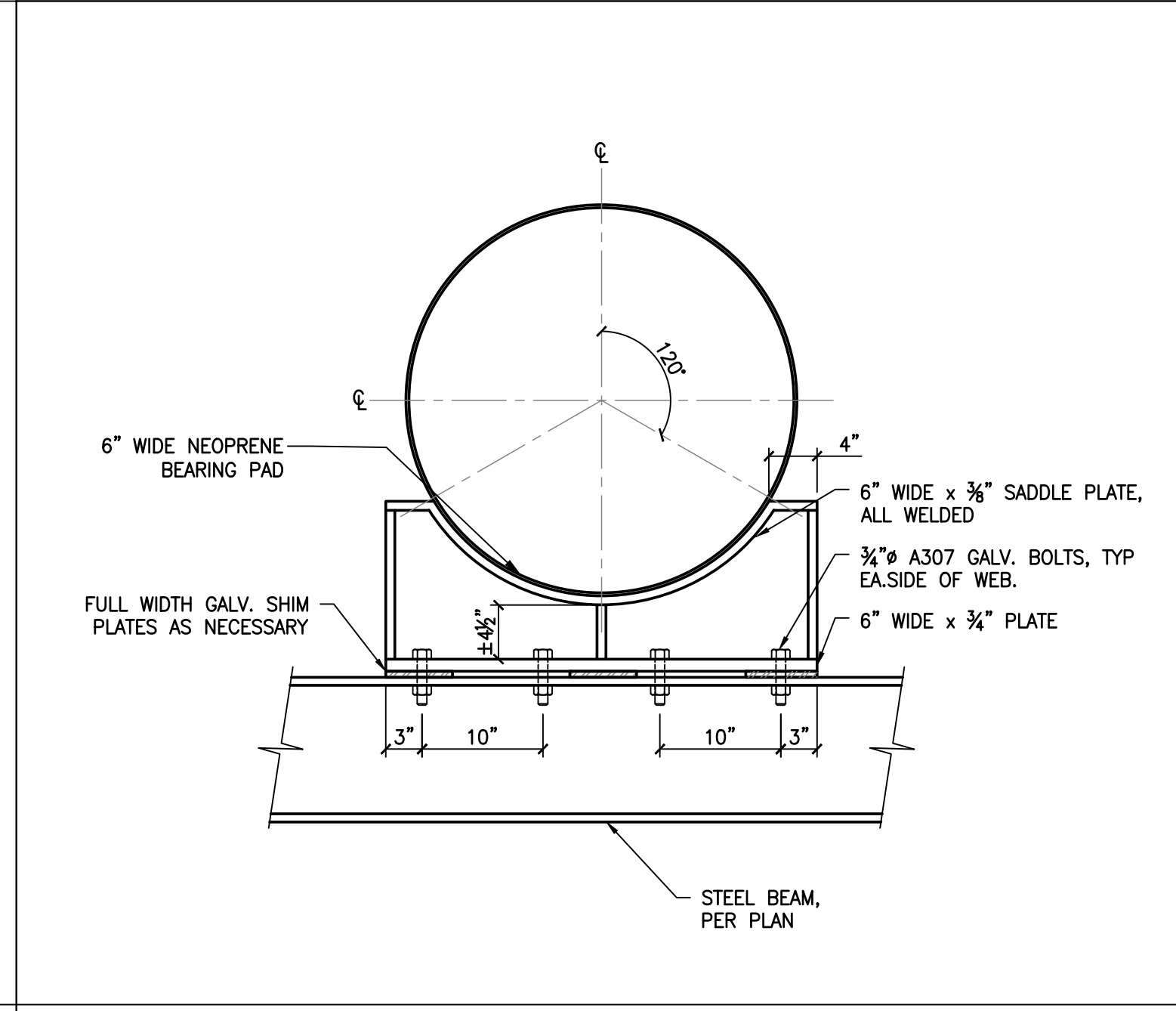
B3 PUMP SUPPORT @ PUMP STATION
SCALE: 1"=1'-0"



A1 STEEL BEAM MOMENT CONNECTION
SCALE: 1-1/2"=1'-0"



A2 TYPICAL FRAMING CONNECTION
SCALE: 1"=1'-0"



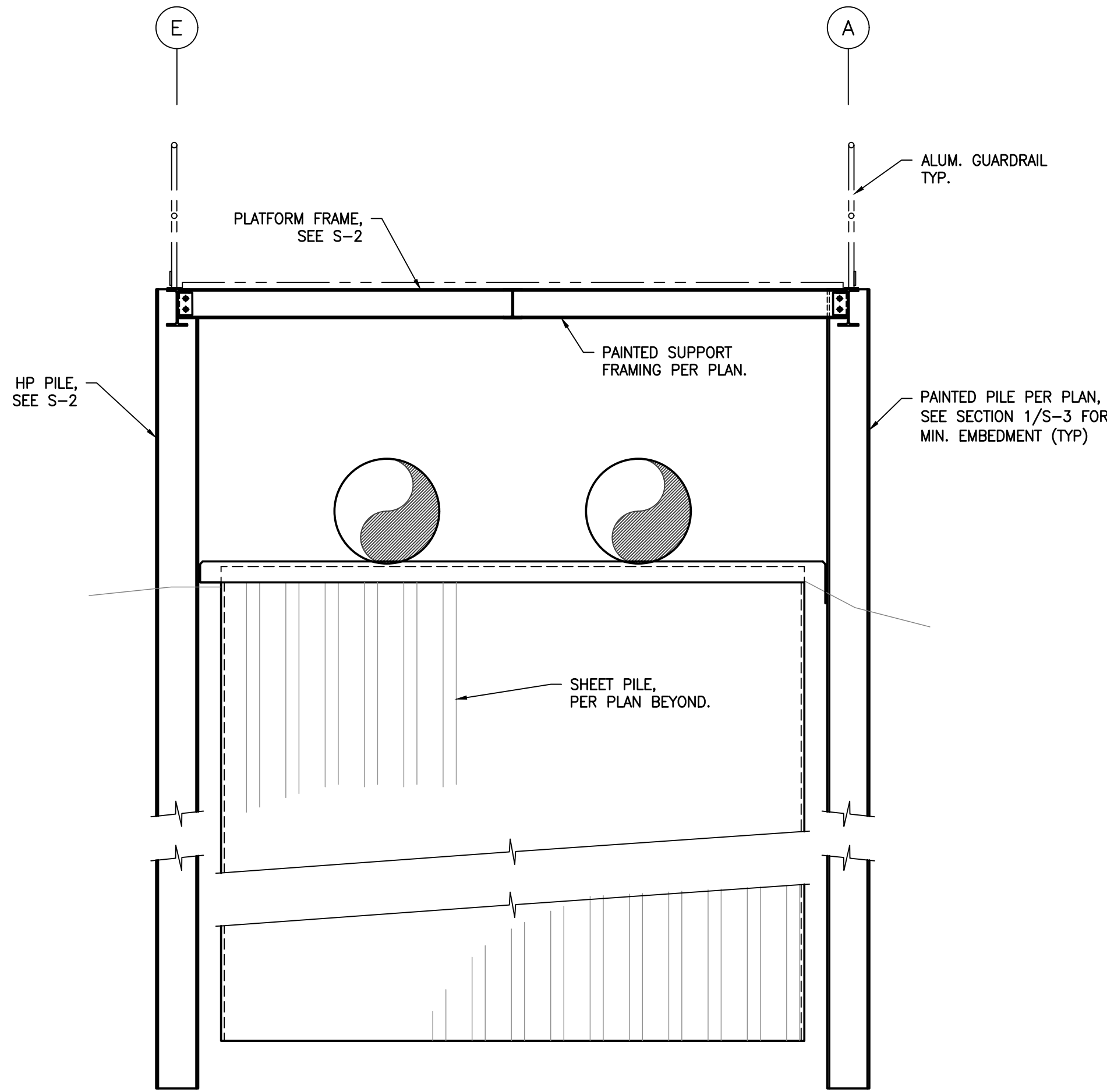
A3 PIPE SADDLE
SCALE: 1"=1'-0"

LOCATION: PA. ENGINEERING PROJECTS/FOUR WATERS ENGINEERING/19-0313 LAKE APOPKA INTERCONNECT/6-STRUCTURAL/DWG/S1.0 PLANS/19-0313 - 1002.DWG

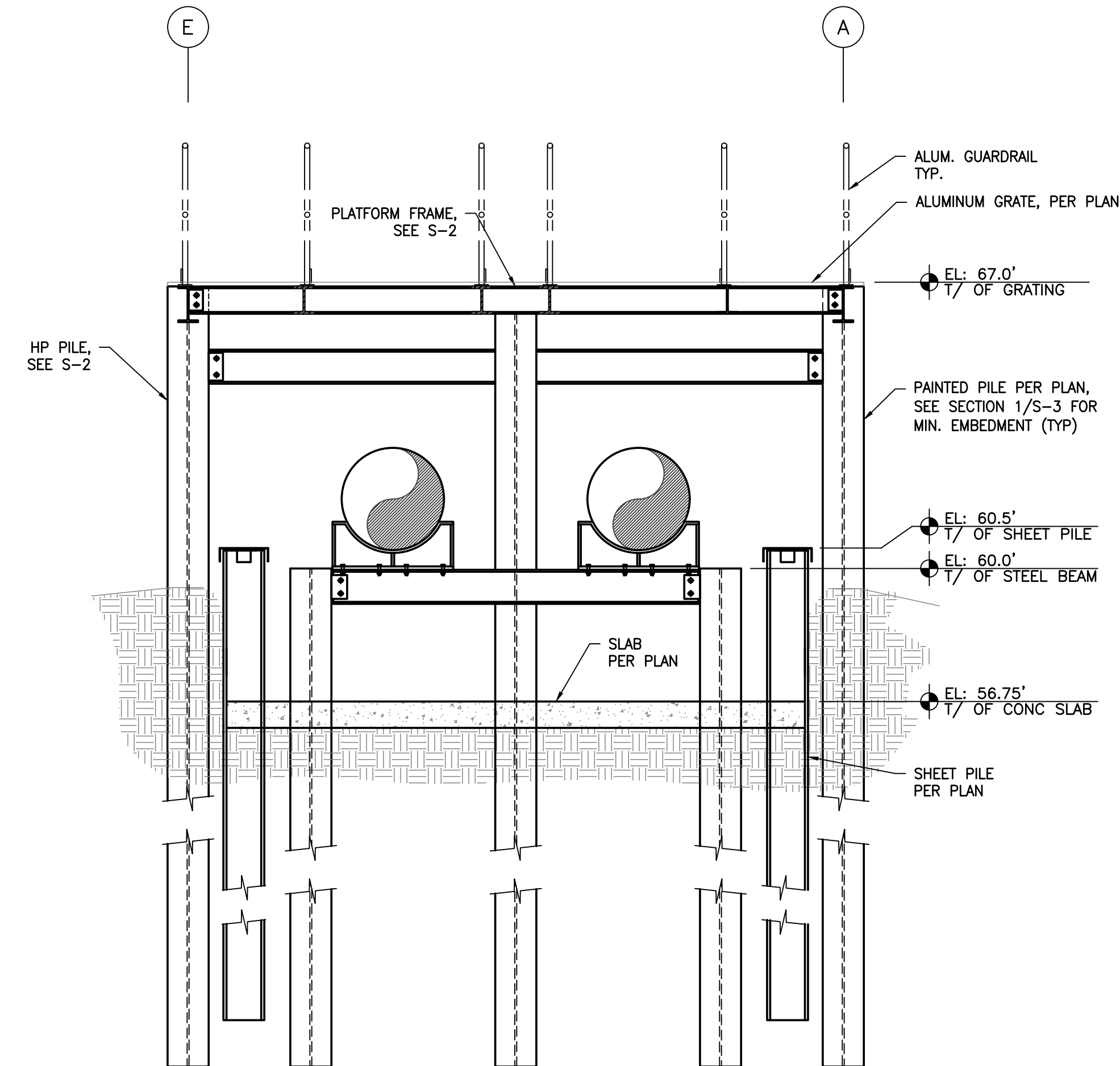
STRUCTURAL DESIGN BASED ON CONSTRUCTION PLANS PROVIDED BY: **FOUR WATERS ENGINEERING, INC.** DATED: 01.30.2020

219 N. Newnan Street, 2nd Floor, Jacksonville FL 32202
p 904 356 8520 f 904 559 2678 bakerdesign.build
C.A. No. 32489

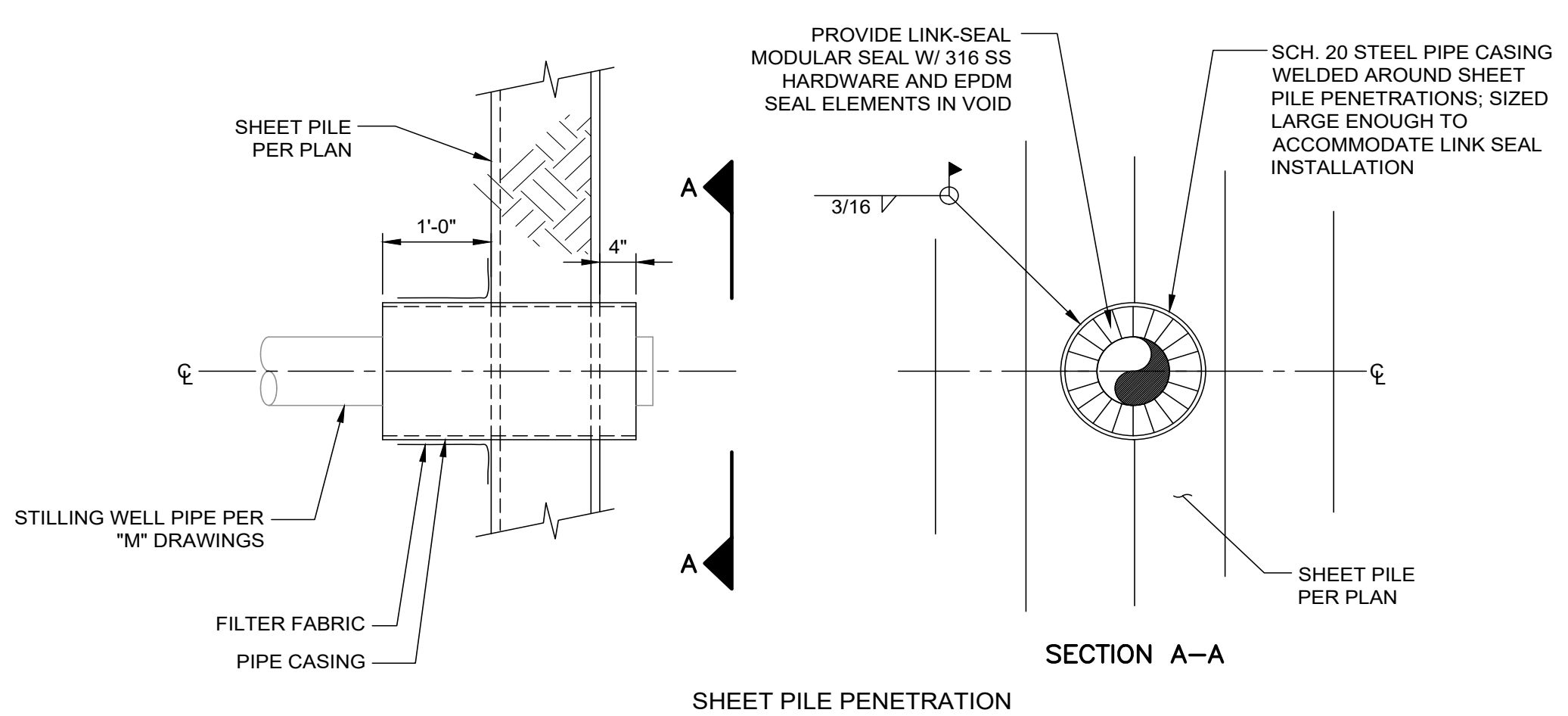
Signature
Freddo Urquien, P.E.
FL Professional Eng. # 68630
Date



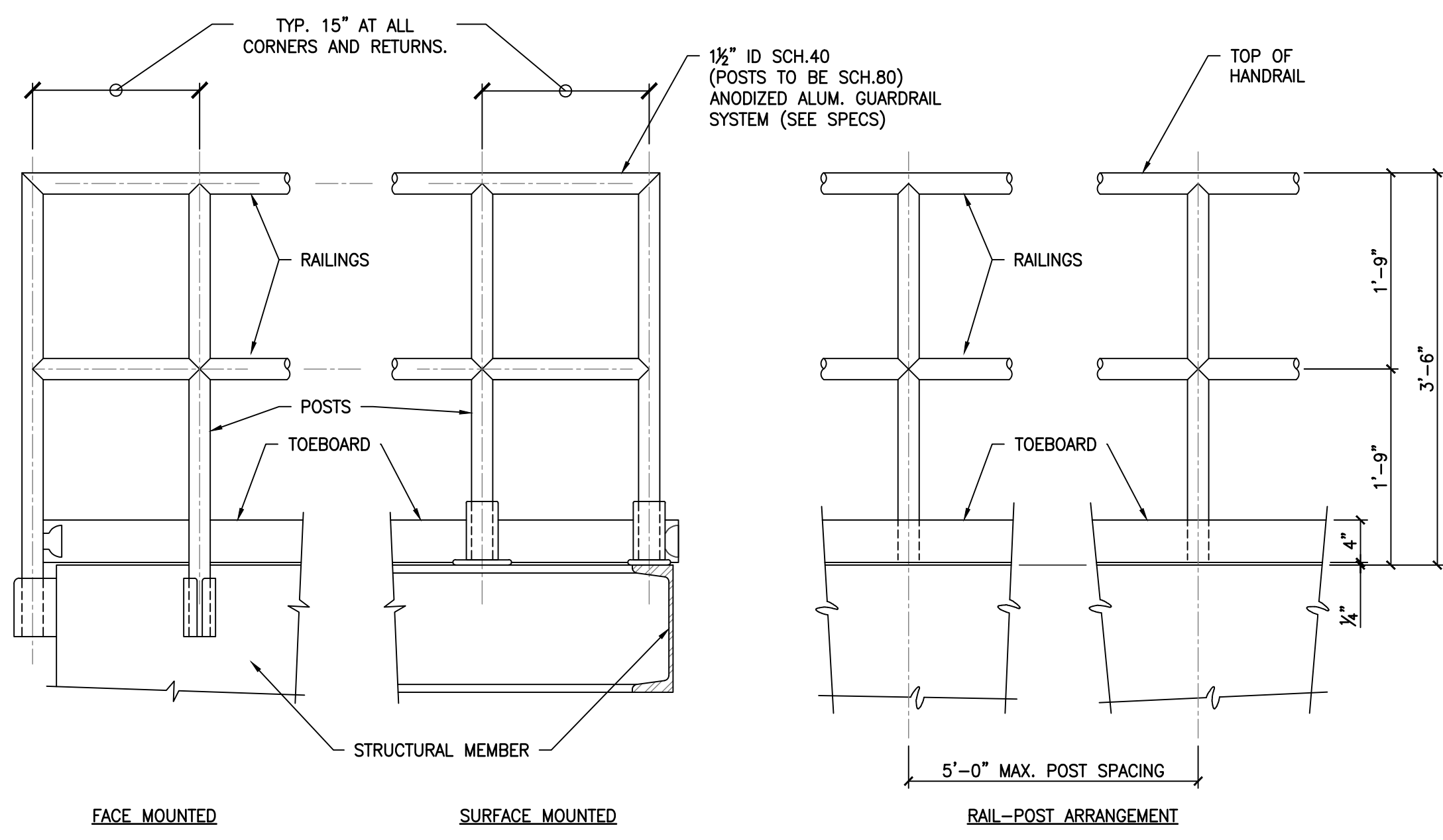
1 FRAMING SECTION
3/8" = 1'-0"



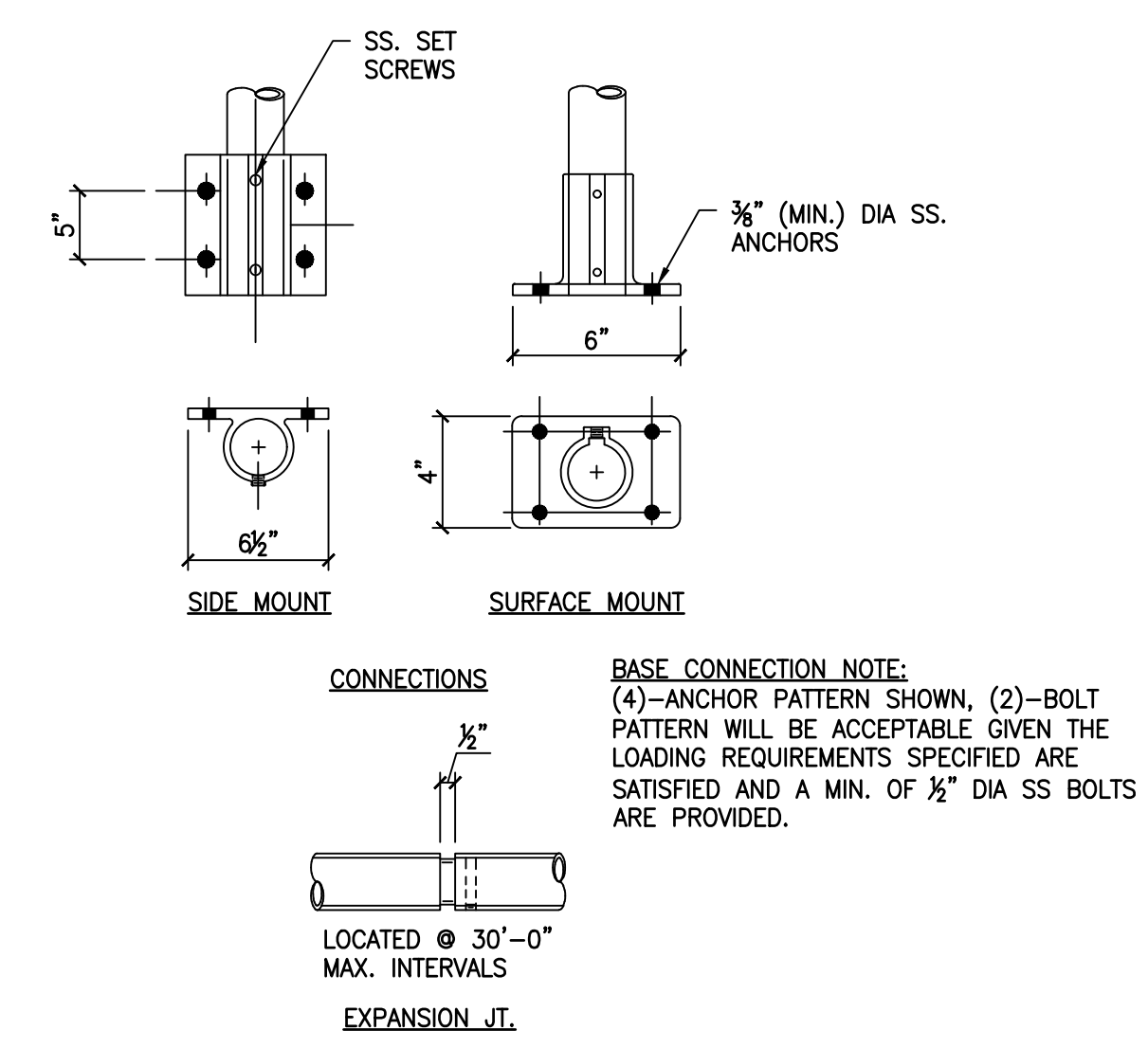
2 FRAMING SECTION
3/8" = 1'-0"



3 SHEET PILE PENETRATION SECTION & DETAIL
3/8" = 1'-0"



4 TYPICAL GUARDRAIL DETAILS
1/2" = 1'-0"



NOTE:
1. PROVIDE NEOPRENE ISOLATION PAD BELOW GUARDRAIL BASE PLATES WHERE IN CONTACT W/STEEL FRAMING.

STRUCTURAL DESIGN BASED ON CONSTRUCTION PLANS PROVIDED BY: **FOUR WATERS ENGINEERING, INC.** DATED: 08.23.2019

LAKE APOPKA PUMPSTATION
PUMP STATION PLATFORM SECTIONS AND DETAILS
LAKE APOPKA, FLORIDA

REV	NO	DATE	DRWN (CHD)	BY	DESCRIPTION
1	1				
2	2				
3	3				
4	4				
5	5				
6	6				

FOUR WATERS ENGINEERING
324 6th AVE. N. JACKSONVILLE BEACH, FLORIDA 32250
904-414-2400 C.O.# 31101 WWW.4WENGS.COM

DRAWING NUMBER
S-4

LOCATION: PA. ENGINEERING PROJECTS/FOUR WATERS ENGINEERING/19-0313 LAKE APOPKA INTERCONNECT/6-STRUCTURAL/100% SUBMITTAL DWG/S31.0 PLANS_19-0313 - 100% DWG

STRUCTURAL DESIGN BASED ON CONSTRUCTION PLANS PROVIDED BY: FOUR WATERS ENGINEERING, INC. DATED: 01.30.2020

Signature
Freddo Urquien, P.E.
FL Professional Eng. # 68630
Date

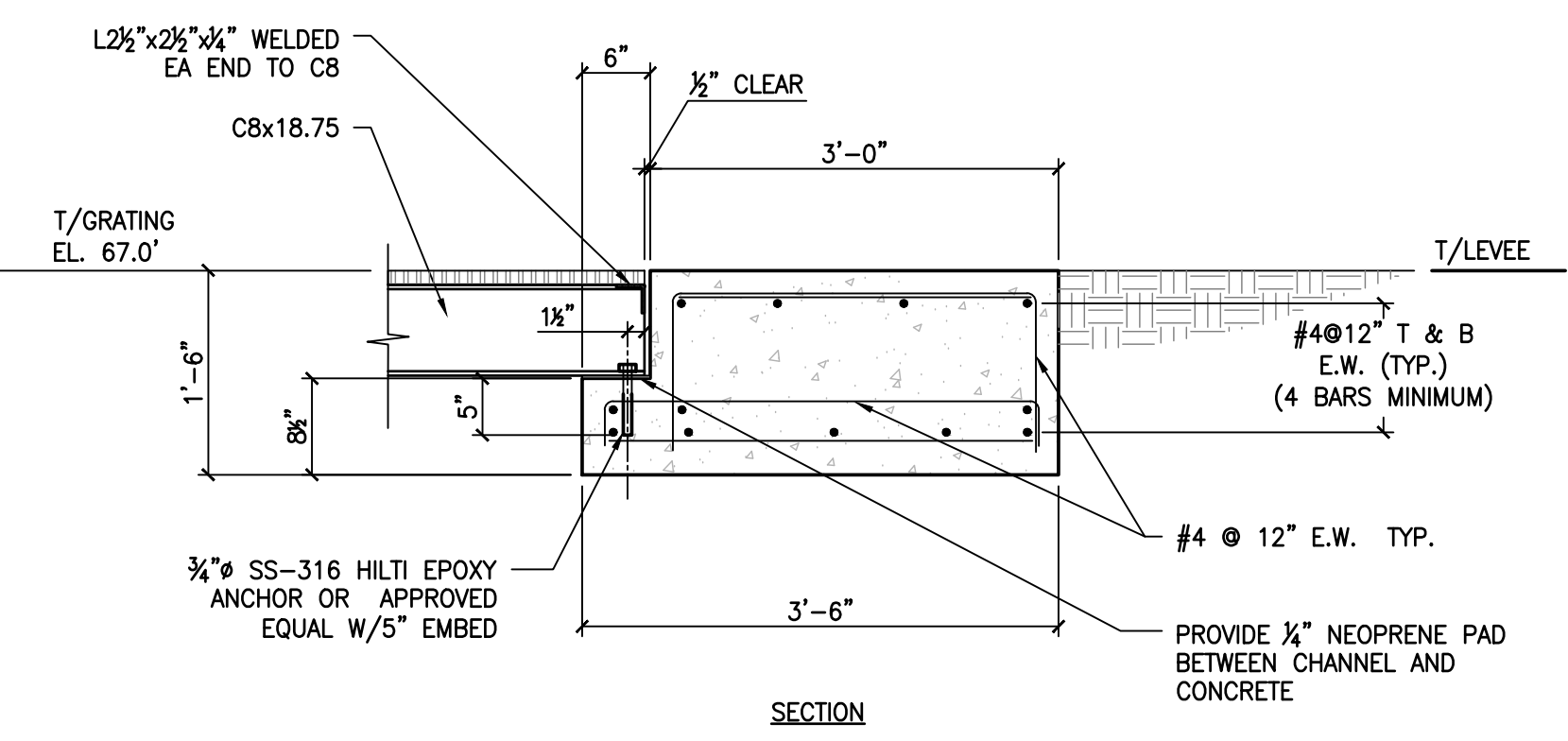
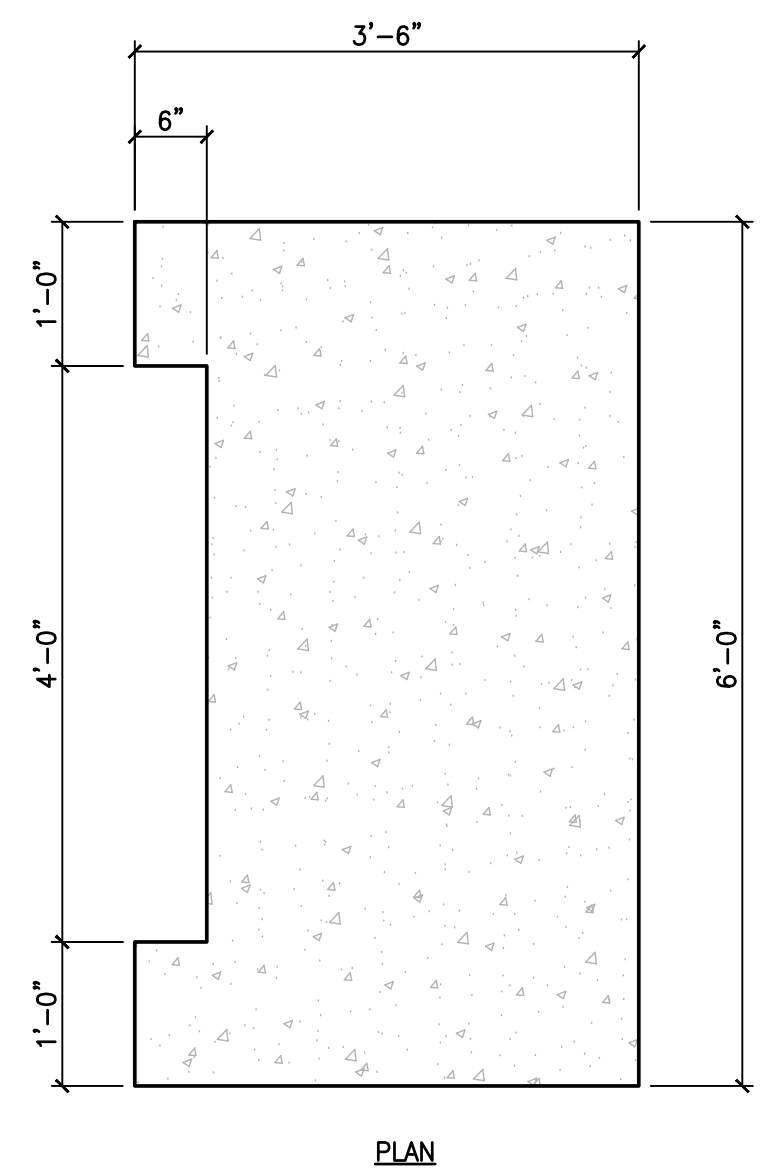
REV. NO.	DATE	BY	DESCRIPTION
1			
2			
3			
4			
5			
6			

LAKE APOPKA PUMPSTATION
SECTIONS & DETAILS
LAKE APOPKA, FLORIDA

DESIGN	DRAWN	CHKD	DATE	ISSUE	100%
19-0313	19-0313	19-0313	AUGUST 2020		

FOUR WATERS ENGINEERING
324 6th AVE. N. JACKSONVILLE BEACH, FLORIDA 32250
904-414-2400 C.O.# 31101 WWW.4WENGS.COM

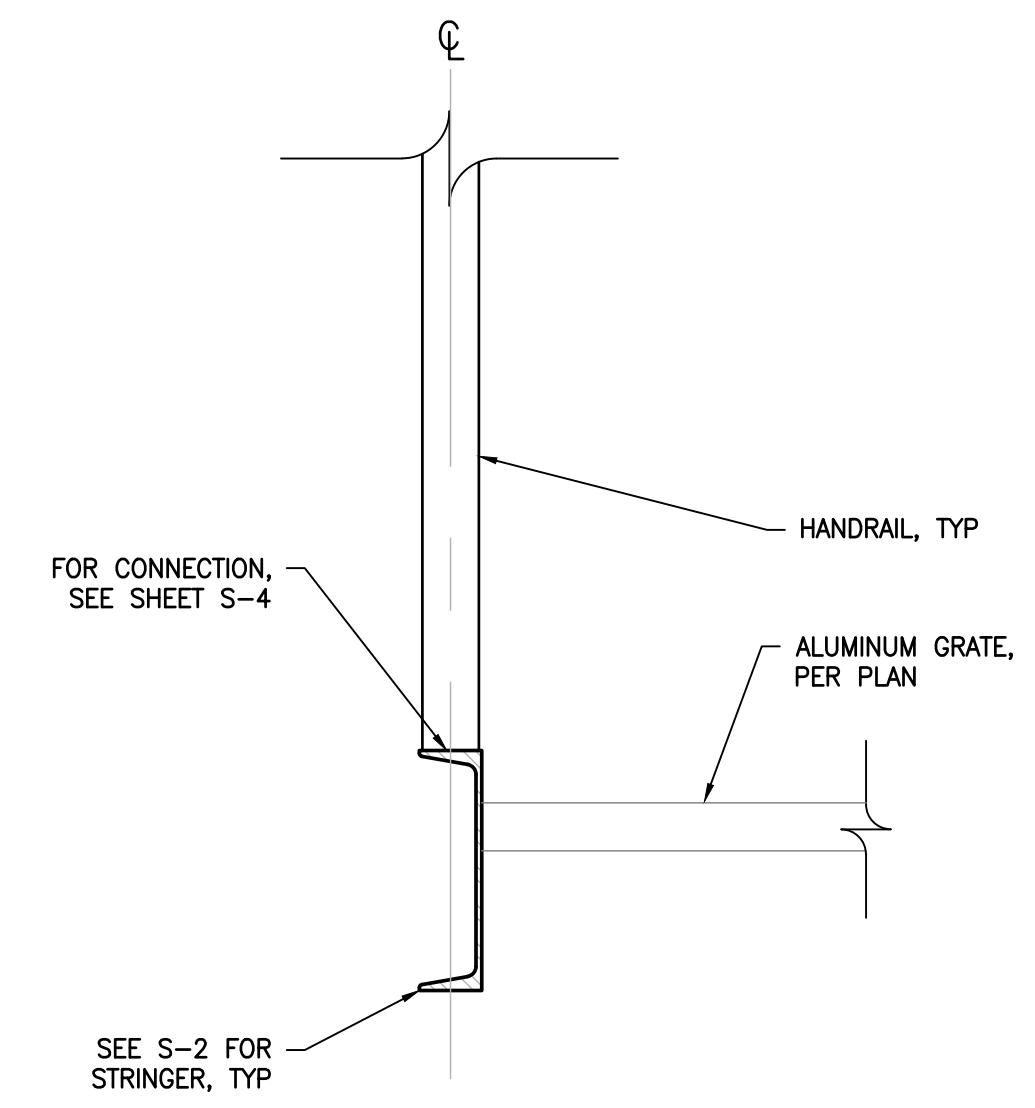
DRAWING NUMBER
S-5



WALKWAY FOOTING DETAIL

SCALE: 3/4" = 1'-0"

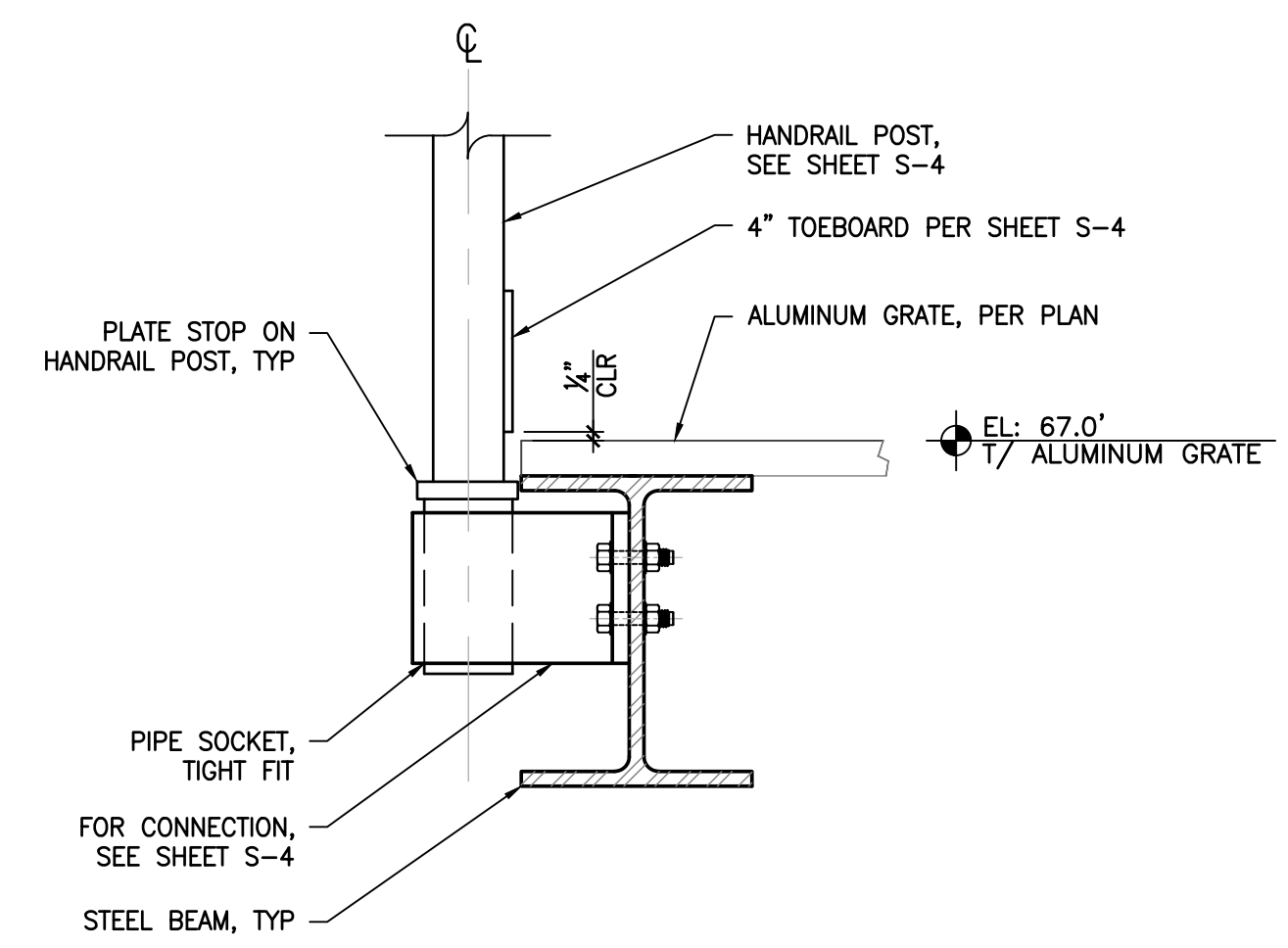
B1



HANDRAIL CONNECTION @ STRINGER DETAIL

SCALE: 1-1/2" = 1'-0"

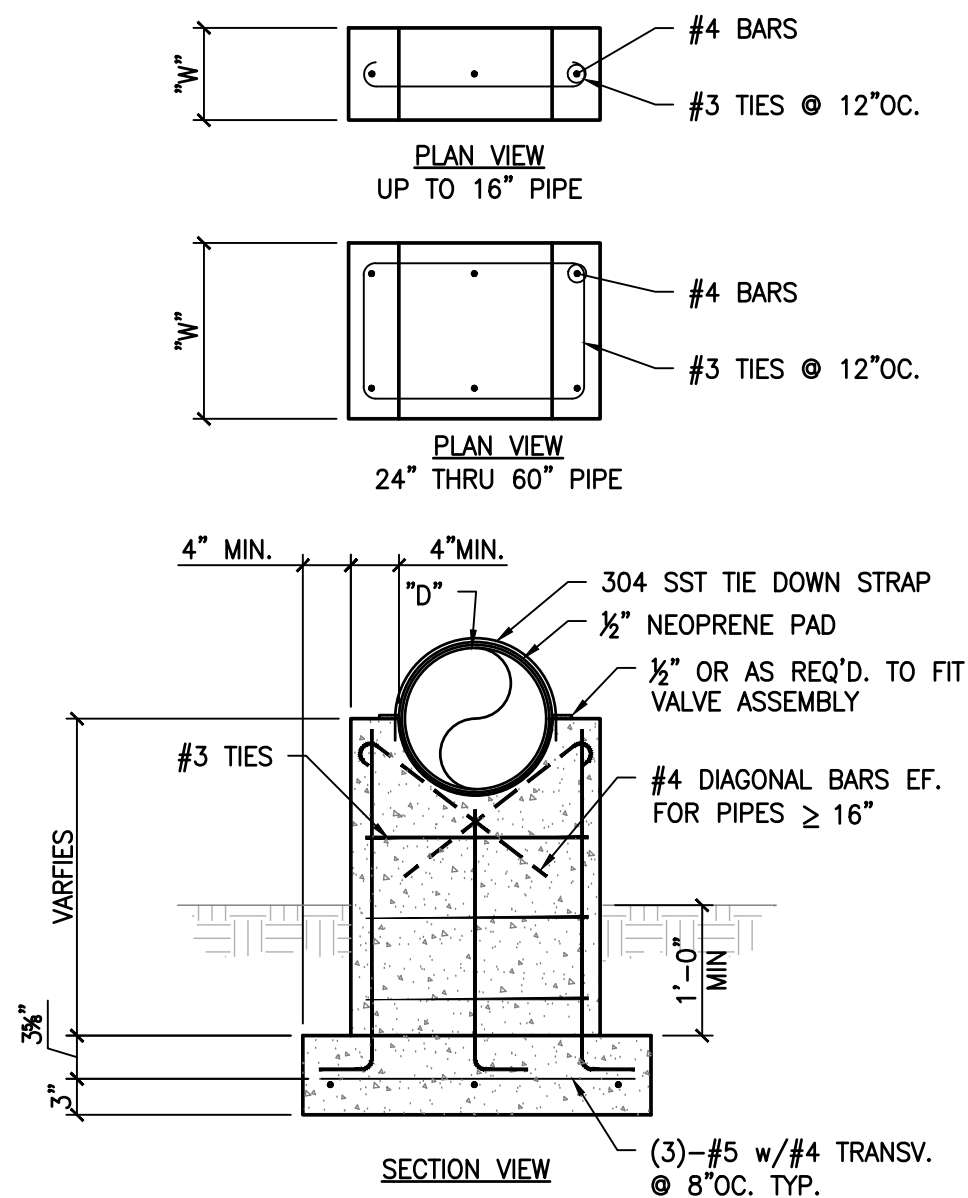
B2



HANDRAIL CONNECTION @ W-BEAM / PLATFORM

SCALE: 3/4" = 1'-0"

B3



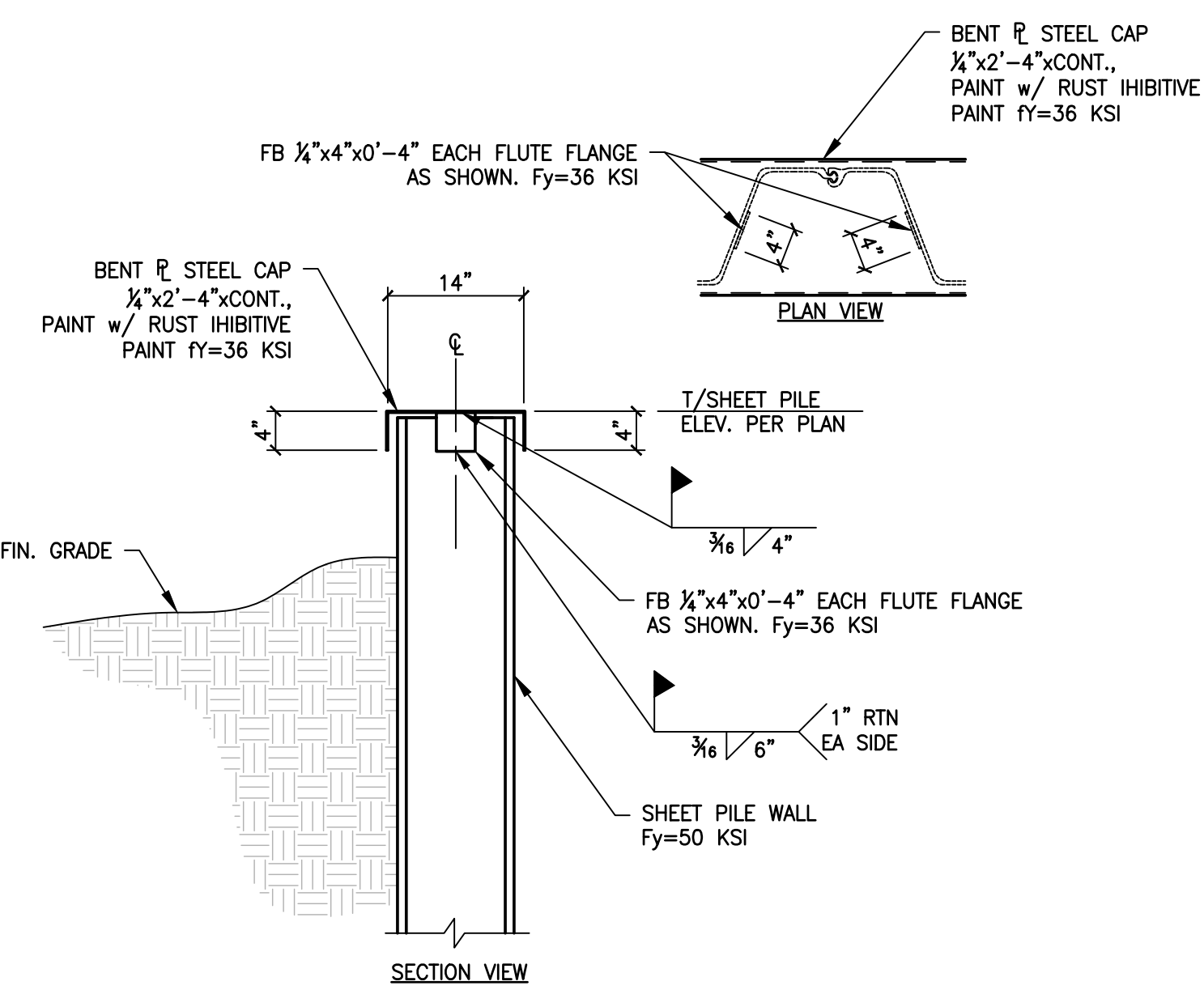
NOTES:
1. PROVIDE CONCRETE FOOTING BELOW GRADE FOR ALL FINISHED GRADE APPLICATIONS.
2. THE DRAWINGS INDICATE SUPPORTS FOR DEPICTION ONLY. ALL SUPPORT SPACING & TYPE SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS. SUPPORT SPACING SHOWN ON THE DRAWINGS SHALL NOT RELIEVE THE CONTRACTOR OF SUPPLYING AND INSTALLING ADEQUATE SUPPORTS PER THE SPECIFICATIONS.

PIPE DIAMETER "D" (INCHES)	MIN. SUPPORT WIDTH "W" (INCHES)
30, 36, & 42	16

CONCRETE PIPE SUPPORT

SCALE: 3/4" = 1'-0"

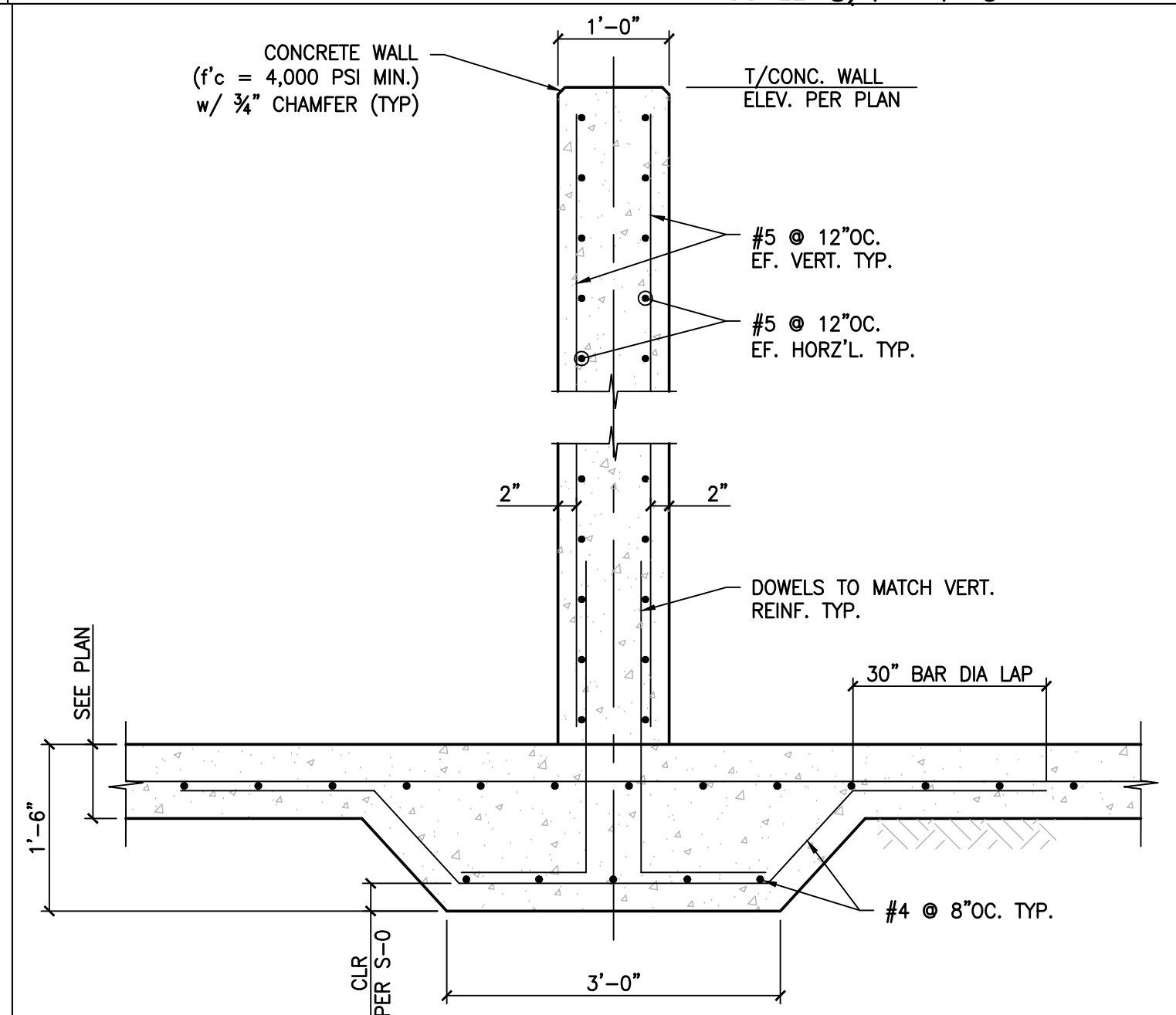
A1



SHEET PILE CONCRETE CAP

SCALE: 3/4" = 1'-0"

A2



CONCRETE WALL @ SUMP

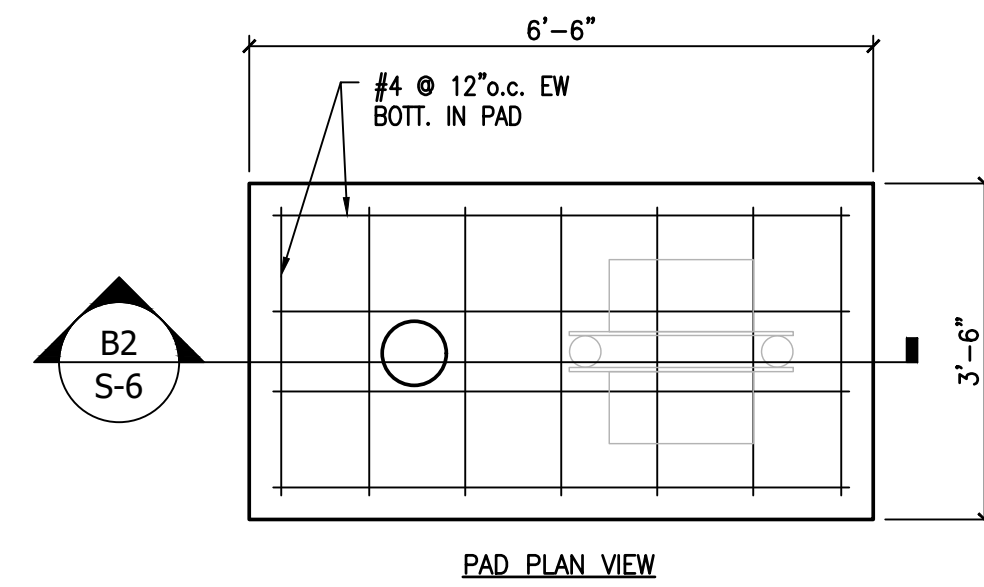
SCALE: 3/4" = 1'-0"

A3

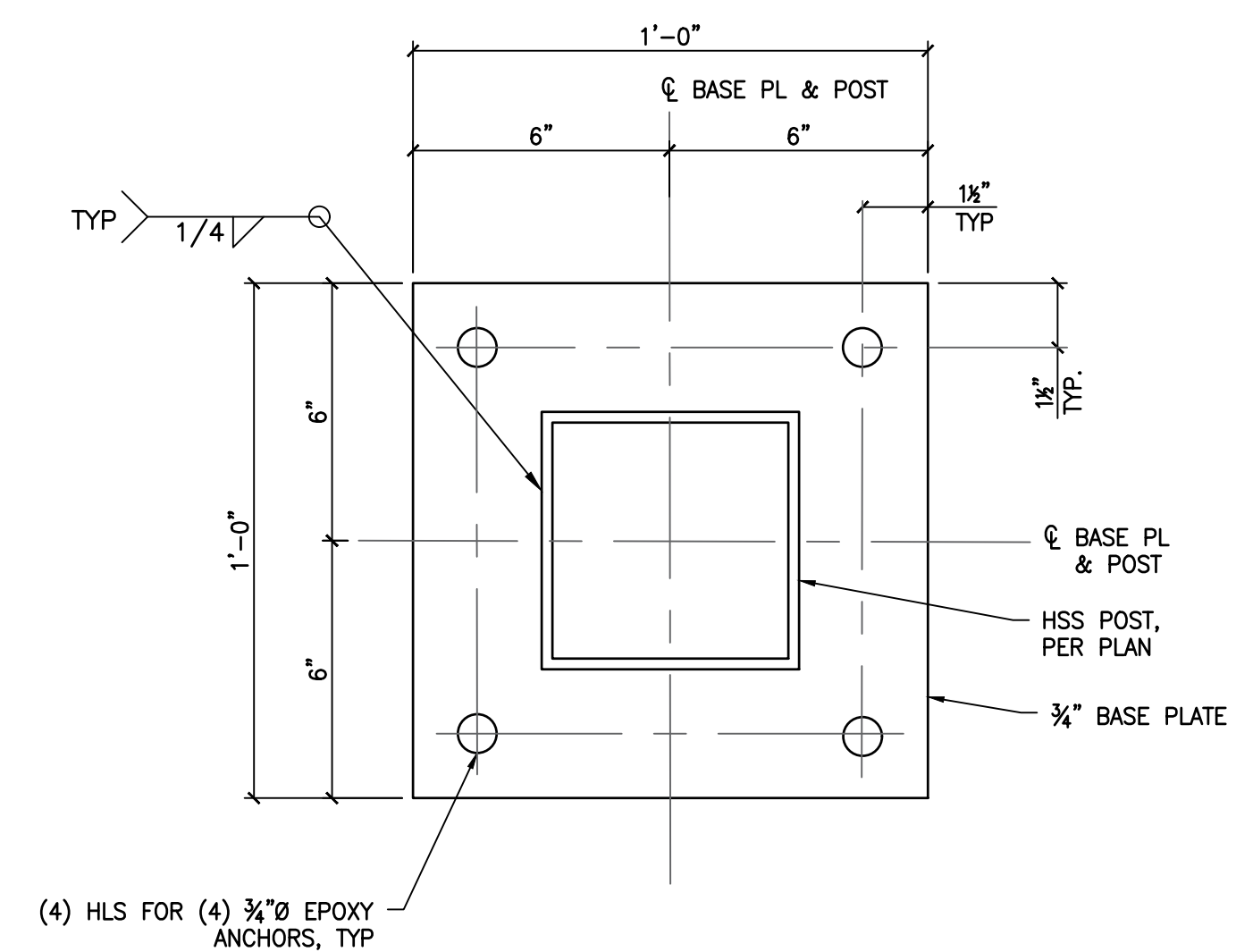
LOCATION: PA. ENGINEERING PROJECTS/FOUR WATERS ENGINEERING/19-0313 LAKE APOPKA INTERCONNECT/6-STRUCTURAL/100% SUBMITTAL DWG/S-5.10 PLANS-19-0313 - 100% DWG

STRUCTURAL DESIGN BASED ON CONSTRUCTION PLANS PROVIDED BY: FOUR WATERS ENGINEERING, INC. DATED: 01.30.2020

Signature
Freddo Urquien, P.E.
FL Professional Eng. # 68630
Date



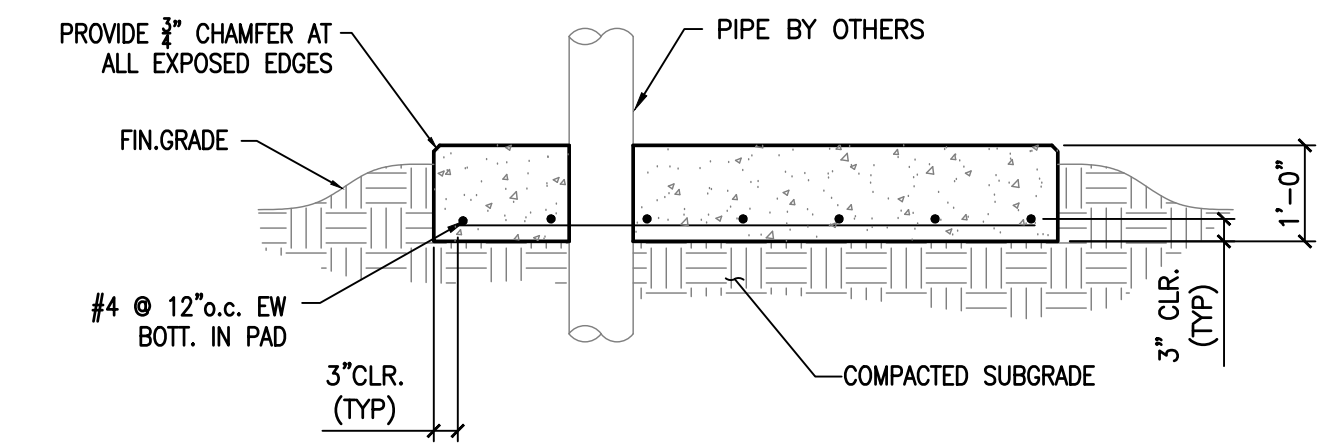
2 STILLING WELL CONCRETE PAD
1/2" = 1'-0"



BASE PLATE SCHEDULE

SCALE: 3" = 1'-0"

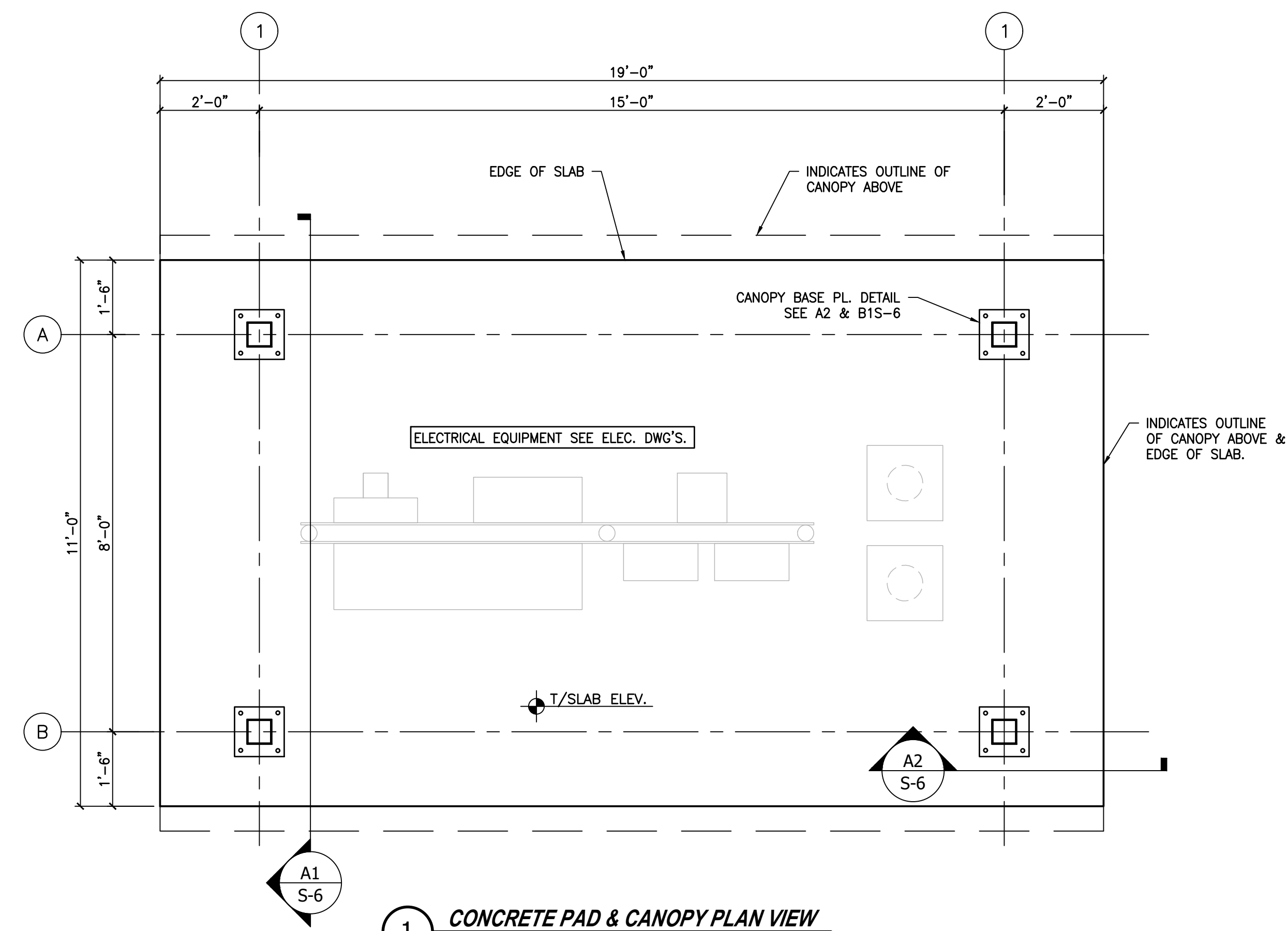
B1



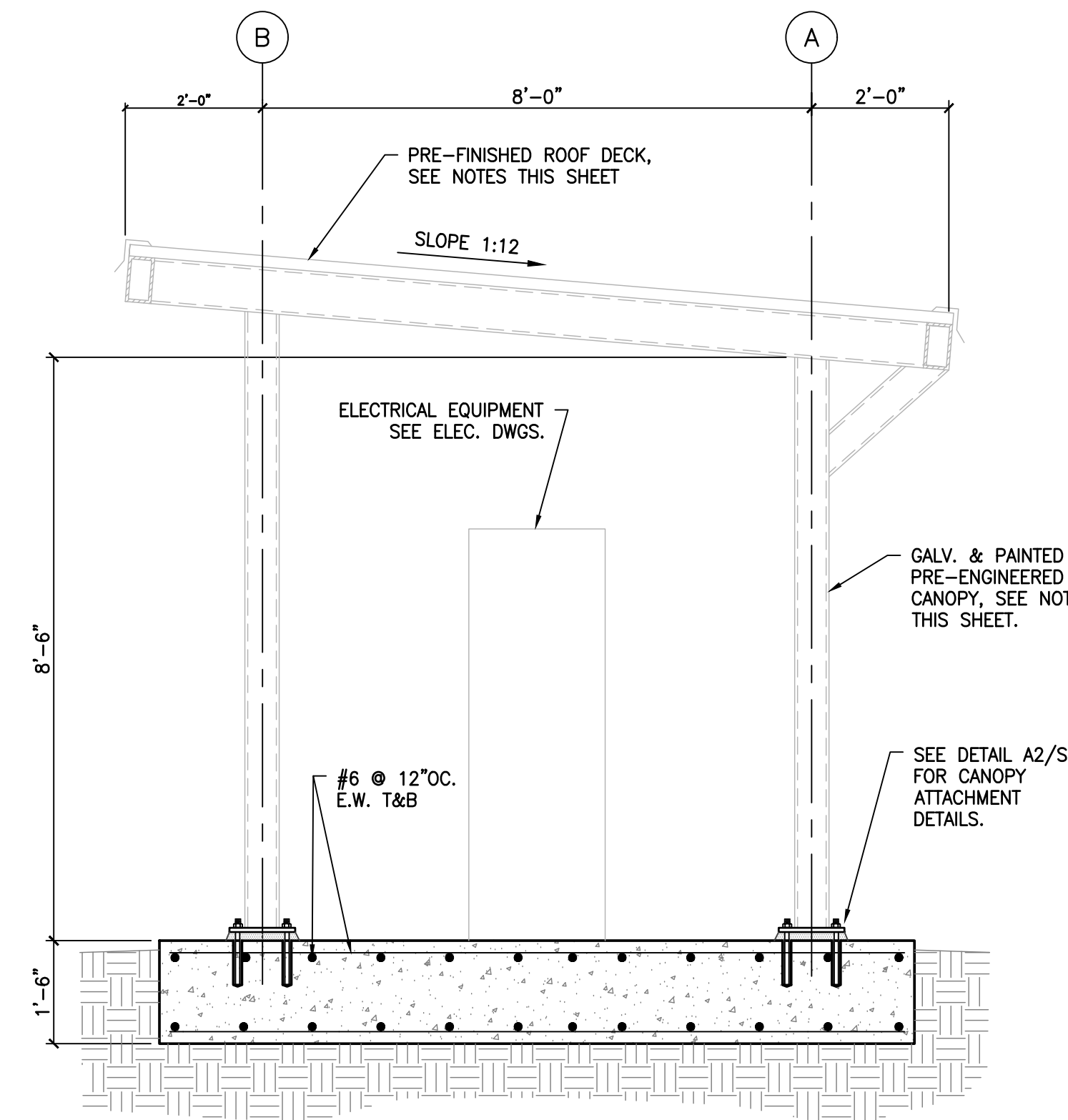
FOUNDATION SECTION @ STILLING WELL CONCRETE PAD

SCALE: 1/2" = 1'-0"

B2



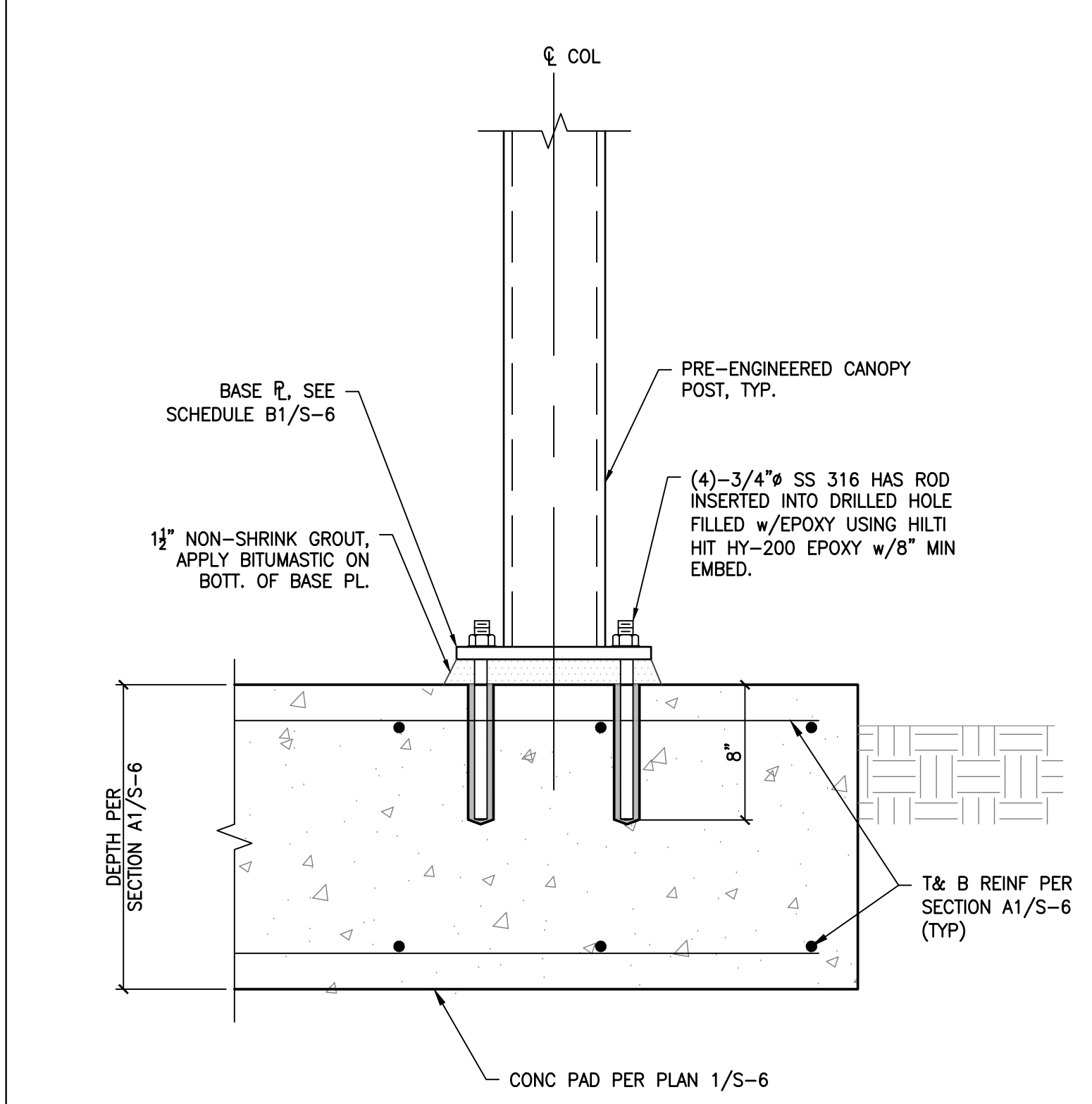
1 CONCRETE PAD & CANOPY PLAN VIEW
1/2" = 1'-0"



CANOPY SECTION

SCALE: 1/2" = 1'-0"

A1



CONNECTION DETAIL POST TO CONC PAD

SCALE: 1-1/2" = 1'-0"

A2

REV	NO	DATE	DRWN (CHD)	BY	DESCRIPTION
1					
2					
3					
4					
5					
6					

STILLING WELL CONCRETE PADS AND CANOPY & DETAILS

LAKE APOPKA PUMPSTATION
LAKE APOPKA, FLORIDA

DESIGN	DRAWN	CHK	ISSUE
19-0313	19-0313	AUGUST 2020	100%

FOUR WATERS ENGINEERING
324 6th AVE. N. JACKSONVILLE BEACH, FLORIDA 32250
904-414-2400 C.O.A.# 31101 WWW.FWENGS.COM

DRAWING NUMBER
S-6

LOCATION: PA ENGINEERING PROJECTS/FOUR WATERS ENGINEERING/19-0313 LAKE APOPKA INTERCONNECT/6-STRUCTURAL/DWGSS/S1.0 PLANS/19-0313 - 100% DWG

NOTES:

- 1. DESIGN DRAWINGS ARE DIAGRAMMATIC AND INTENDED TO SHOW THE GENERAL REQUIREMENTS. THE STANDARD DRAWINGS SHALL BE USED BY THE ENGINEER OF RECORD AS REFERENCE ONLY TO REPRESENT ST. JOHNS RIVER WATER MANAGEMENT DISTRICT STANDARDS AND SPECIFICATIONS.
2. ALL MATERIAL SHALL BE NEW AND SHALL CONFORM WITH THE STANDARDS OF THE UNDERWRITERS' LABORATORIES, INC., AMERICAN NATIONAL STANDARDS INSTITUTE, NATIONAL ELECTRICAL MANUFACTURERS' ASSOCIATION, INSULATED POWER CABLE ENGINEERS ASSOCIATION, AND INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS, IN EVERY CASE WHERE SUCH A STANDARD HAS BEEN ESTABLISHED FOR THE PARTICULAR TYPE OF MATERIALS IN QUESTION.
3. THE INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE REGULATIONS OF THE LATEST EDITIONS OF THE NATIONAL ELECTRICAL CODE, NATIONAL ELECTRICAL SAFETY CODE, APPLICABLE CITY, STATE, AND LOCAL CODES AND REGULATIONS AND OTHER APPLICABLE CODES, INCLUDING UTILITY COMPANY CODES.
4. ALL PERMITS REQUIRED BY STATE OR LOCAL ORDINANCES SHALL BE OBTAINED, AND AFTER COMPLETION OF THE WORK, A CERTIFICATE OF FINAL INSPECTION AND APPROVAL FROM THE ELECTRICAL INSPECTOR SHALL BE FURNISHED TO THE OWNER. ALL PERMITS FOR INSTALLATION, INSPECTIONS, CONNECTIONS, ETC., SHALL BE TAKEN OUT AND PAID FOR BY THE CONTRACTOR AS PART OF THE WORK UNDER THIS SECTION.
5. ALL MATERIALS AND WORKMANSHIP SHALL BE GUARANTEED TO BE FREE FROM DEFECTS. ANY PART OF THE SYSTEM CONSIDERED DEFECTIVE BY THE ENGINEER WITHIN THE GUARANTEE PERIOD SHALL BE IMMEDIATELY REPLACED OR CORRECTED TO THE ENGINEER'S SATISFACTION WITHOUT FURTHER EXPENSE TO THE OWNER.
6. THE PROJECTS GROUNDING SYSTEM SHALL CONSIST OF A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH NEC SPECIFICATIONS, BONDED TO A MAIN GROUND BUS INTERCONNECTING ALL POWER DISTRIBUTION EQUIPMENT. GROUND ROD SECTIONS SHALL BE COUPLED AND DRIVEN TO ESTABLISH A MAXIMUM RESISTANCE TO GROUND OF 5 OHMS THROUGHOUT THE GROUNDING SYSTEM.
7. UNLESS OTHERWISE INDICATED, ELECTRICAL EQUIPMENT ENCLOSURES SHALL BE NEMA 4X TYPE 316 STAINLESS STEEL; CONDUCTORS SHALL BE STRANDED AWG TYPE XHHW-2 COPPER; UNDERGROUND CONDUIT SHALL BE SCH 40 PVC; EXPOSED CONDUIT SHALL BE RIGID ALUMINUM; SUPPORT CHANNEL AND MOUNTING STRUT SHALL BE MINIMUM 1.5" x 1.5" x 0.25" THICK ALUMINUM. ALL MOUNTING HARDWARE SHALL BE 316 STAINLESS STEEL, INCLUDING BUT NOT LIMITED TO NUTS, BOLTS, WASHERS, BRACKETS, ETC. ANTI-SEIZE COMPOUND SHALL BE USED FOR ALL NUTS AND BOLTS. SCREWS ARE NOT ALLOWED. ALL MATERIALS AND INSTALLATION SHALL BE SUITABLE FOR "CORROSIVE ATMOSPHERES".
8. DUCT SEAL IS REQUIRED AT ALL CONDUIT CONNECTIONS IN AND OUT OF EACH EQUIPMENT ENCLOSURE.

ELECTRICAL LEGEND

- MCP 100: CIRCUIT BREAKER (FRAME SIZE/TRIP RATING - "MCP" MOTOR CIRCUIT PROTECTOR) MAGNETIC TYPE COMBINATION MOTOR STARTER, NEMA
SSRV SIZE 3: SIZE AS INDICATED ("FV" FULL VOLTAGE, "RV" SOLID STATE REDUCED VOLTAGE, "NR" NON-REVERSING, "R" REVERSING, "2S" TWO SPEED, "1W" SINGLE WINDING "2W" TWO WINDING, "LC" LIGHTING CONTACTOR)
75: MOTOR (NUMERAL INDICATES HORSEPOWER - "H" SPACE HEATER, "T" WINDING THERMOSTAT, "M" MOISTURE DETECTOR)
POTENTIAL TRANSFORMER; CURRENT TRANSFORMER
R: PILOT LIGHT ("A" AMBER, "B" BLUE, "C" CLEAR, "G" GREEN, "R" RED, "W" WHITE)
HOA: ASSOCIATED DEVICE "REMOTE" FROM MOTOR CONTROL CENTER OR CONTROL PANEL
ES: HAND/OFF/AUTOMATIC SELECTOR SWITCH CONTROL STATION WITH LOCKING DEVICE
ETM: EMERGENCY STOP CONTROL STATION WITH LOCKING DEVICE
ETM: ELAPSED TIME METER (HOURS OF OPERATION)

LOCAL OPERATIONAL READINESS TESTING:

- 1. ELECTRICAL SERVICE:
a. MEASURE AND MAKE A RECORD OF THE LINE TO LINE VOLTAGES.
b. MEASURE AND MAKE A RECORD OF THE LINE TO PHASE VOLTAGES.
c. CONFIRM THAT THE MEASUREMENTS MATCH THE READINGS DISPLAYED ON THE CONTROL PANEL ELECTRONIC POWER METER.
2. MOTOR INTERLOCKS:
a. CONFIRM THAT THE THREE PHASE POWER MONITOR RELAY IS ENERGIZED.
b. CONFIRM THAT THE MOTOR WINDING THERMOSTAT IS CLOSED.
c. CONFIRM THAT THE MOTOR E-STOP IS CLOSED.
d. CONFIRM THAT THE SSRV MOTOR STARTER IS NOT IN FAULT.
e. CONFIRM THAT THE PUMP READY RELAY IS ENERGIZED.
f. REPEAT FOR EACH PUMP.
3. HAND MODE TEST:
a. CONFIRM PUMP RUNS WHEN THE HOA IS PLACED IN THE HAND POSITION.
b. CONFIRM E-STOP SHUTS DOWN THE PUMP WHEN OPERATED IN HAND.
c. CONFIRM THAT OPENING THE MOTOR WINDING THERMOSTAT CIRCUIT SHUTS DOWN THE PUMP WHEN OPERATED IN HAND.
d. CONFIRM THAT DE-ENERGIZING THE THREE PHASE POWER MONITOR SHUTS DOWN THE PUMP WHEN OPERATED IN HAND.
e. CONFIRM MOTOR RUNNING RELAY ENERGIZES WHEN RUNNING IN HAND.
f. REPEAT FOR EACH PUMP.
4. AUTO MODE TEST:
a. INSTALL A TEMPORARY TOGGLE SWITCH ACROSS THE REMOTE CALL TO RUN TERMINALS.
b. PLACE THE HOA SWITCH IN AUTO.
c. CONFIRM THAT THE PUMP RUNS IN RESPONSE TO THE TOGGLE SWITCH.
d. CONFIRM THAT THE E-STOPS SHUTS DOWN THE PUMP WHEN OPERATED IN AUTO.
e. CONFIRM THAT OPENING THE MOTOR WINDING THERMOSTAT CIRCUIT SHUTS DOWN THE PUMP WHEN OPERATED IN AUTO.
f. CONFIRM THAT DE-ENERGIZING THE THREE PHASE POWER MONITOR SHUTS DOWN THE PUMP WHEN OPERATED IN AUTO.
g. CONFIRM MOTOR RUNNING RELAY ENERGIZES WHEN RUNNING IN AUTO.
h. REPEAT FOR EACH PUMP.
5. MOTOR CURRENT TEST:
a. CONNECT A CLAMP-ON AMMETER TO THE SAME LEG AS THE MOTOR CURRENT TRANSDUCER.
b. CONNECT A 4-20 MA TEST METER TO THE MOTOR CURRENT TRANSDUCER OUTPUT SIGNAL.
c. RUN THE PUMP IN HAND AND MAKE A RECORD OF THE CURRENT MEASUREMENT AMPS FROM THE CURRENT TRANSDUCER AND THE CLAMP-ON AMMETER.
d. COMPARE THE CURRENT TRANSDUCER MEASUREMENT TO THE AMMETER MEASUREMENT.
e. COMPARE THE CURRENT MEASUREMENTS TO THE MOTOR NAMEPLATE AMPS. REPORT IF CURRENT MEASUREMENTS EXCEED MOTOR NAMEPLATE AMPS.
f. REPEAT FOR EACH PUMP.
6. GATE LOCAL MODE TEST:
a. PLACE GATE LOCAL-REMOTE SWITCH IN LOCAL AT THE GATE.
b. CONFIRM GATE OPENS FROM THE LOCAL OPEN PUSHBUTTON.
c. CONFIRM GATE CLOSURES FROM THE LOCAL CLOSE PUSHBUTTON.
d. REPEAT FOR EACH GATE.
7. GATE REMOTE MODE TEST:
a. PLACE GATE LOCAL-REMOTE SWITCH IN REMOTE AT THE GATE.
b. CONFIRM GATE OPENS FROM THE CONTROL PANEL OPEN SELECTOR SWITCH.
c. CONFIRM GATE CLOSURES FROM THE CONTROL PANEL CLOSE SELECTOR SWITCH.
d. REPEAT FOR EACH GATE.
8. GATE AUTO MODE TEST:
a. INSTALL A TEMPORARY TOGGLE SWITCH ACROSS THE REMOTE CALL TO OPEN TERMINALS.
b. INSTALL A TEMPORARY TOGGLE SWITCH ACROSS THE REMOTE CALL TO CLOSE TERMINALS.
c. PLACE GATE LOCAL-REMOTE SWITCH IN REMOTE AT THE GATE.
d. PLACE GATE OPEN-CLOSE-AUTO SWITCH IN AUTO AT THE CONTROL PANEL.
e. CONFIRM THAT THE GATE OPENS IN RESPONSE TO THE OPEN TOGGLE SWITCH.
f. CONFIRM THAT THE GATE CLOSURES IN RESPONSE TO THE CLOSE TOGGLE SWITCH.
g. REPEAT FOR EACH GATE.

ELECTRICAL SYSTEMS ANALYSIS:

- 1. THE CONTRACTOR SHALL EMPLOY THE SERVICES OF AN INDEPENDENT SPECIALTY ENGINEERING FIRM TO PROVIDE A PRELIMINARY AND A FINAL SHORT CIRCUIT, DEVICE EVALUATION, PROTECTIVE DEVICE COORDINATION, AND ARC FLASH STUDY OF THE COMPLETE ELECTRICAL DISTRIBUTION SYSTEM.
2. THE CONTRACTOR SHALL PROVIDE, WITH THE SHOP DRAWING SUBMITTALS, A LISTING OF THE FOLLOWING INFORMATION FOR EACH POWER DISTRIBUTION FEEDER: CONDUIT SIZE, CONDUIT TYPE, CONDUCTOR SIZE, CONDUCTOR TYPE, CONDUCTOR LENGTH.
3. THE CONTRACTOR SHALL INSTALL APPROVED ARC FLASH LABELS ON ALL ELECTRICAL EQUIPMENT PRIOR TO STARTUP.

CONDUIT AND CABLE SCHEDULE

Table with columns: CONDUIT (NO., SIZE), CABLE (COND., AWG, TYPE, VOLT), FROM, TO, FOR. Lists various conduits and cables for pumps, control panels, and lighting panels.

NOTES: 1TSP SINGLE TWISTED SHIELDED PAIR CABLE: BELDEN 3072F
1TST SINGLE TWISTED SHIELDED TRIAD CABLE: BELDEN 8770
XHHW TYPE XHHW-2 INSULATED COPPER CONDUCTOR
XLP CROSS LINKED POLYETHYLENE INSULATION

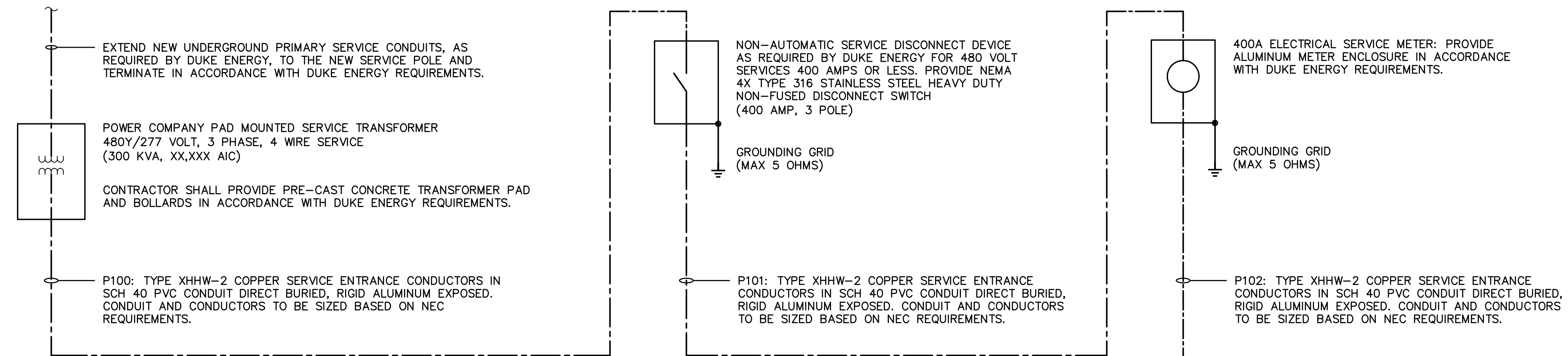
THIS STANDARD CONDUIT AND CABLE SCHEDULE IS PROVIDED FOR REFERENCE ONLY. THE ENGINEER OF RECORD SHALL DEVELOP A SITE SPECIFIC CONDUIT AND CABLE SCHEDULE BASED ON THE ACTUAL PROJECT REQUIREMENTS.

LOCATION: D:\DOCUMENTS\BUSINESS\FOUR WATERS\SURV\LAKE APOPKA\DRAWINGS\DWGS\WELL\BSP641.BSP641.DWG

Project information including: Signature of W. David Lassiter, P.E., Date, Description, Drawn/Checked/By, Date, Issue history, Project title 'ELECTRICAL LEGEND AND SCHEDULES', and company logo 'FOUR WATERS ENGINEERING'.

NOTES:

- THIS STANDARD ELECTRICAL SINGLE LINE DIAGRAM IS PROVIDED FOR REFERENCE ONLY. THE ENGINEER OF RECORD SHALL DEVELOP A SITE SPECIFIC ELECTRICAL SINGLE LINE DIAGRAM BASED ON THE ACTUAL PROJECT REQUIREMENTS.
- ELECTRICAL EQUIPMENT FOR PUMP STATIONS WITH NO MORE THAN TWO PUMPS, AND SERVICE SIZE NO GREATER THAN 400 AMPS SHALL BE CONTROL PANEL CONSTRUCTION. THE ELECTRICAL EQUIPMENT SHALL BE OUTDOOR MOUNTED ON AN ELECTRICAL EQUIPMENT RACK WITH CONCRETE EQUIPMENT PAD AND CANOPY.
- ALL ELECTRICAL EQUIPMENT SHALL HAVE A FAULT CURRENT RATING GREATER THAN THE SERVICE TRANSFORMER INFINITE BUS CALCULATION, TO BE OBTAINED FROM THE POWER COMPANY, PLUS A MOTOR CONTRIBUTION OF 10X EACH MOTOR FULL LOAD AMPS.
- PUMP CONTROL PANELS SHALL BE NEMA 12/3R TYPE 316 STAINLESS STEEL DOOR IN DOOR CONSTRUCTION WITH STAINLESS STEEL HARDWARE AND 3-POINT PADLOCKABLE LATCHING HANDLE. PUMP CONTROL PANELS SHALL BE SERVICE ENTRANCE RATED, 480 VOLT, 3 PHASE, 3 WIRE DISTRIBUTION.
- THE PUMP CONTROL PANEL SHALL BE EQUIPPED WITH AN INCOMING SERVICE ELECTRONIC POWER METER (SQUARE-D PM800) WITH A METERING CURRENT TRANSFORMER INSTALLED ON EACH PHASE OF THE INCOMING SERVICE CONDUCTORS. THE RANGE OF THE CURRENT TRANSFORMERS SHALL BE BASED ON THE PUMP CONTROL PANEL MAIN BREAKER TRIP RATING. PROVIDE SERIAL COMMUNICATIONS BETWEEN THE PM800 AND THE SCADA SYSTEM DATA LOGGER TO PROVIDE THREE PHASE VOLTAGE AND CURRENT MONITORING.
- EACH PUMP MOTOR STARTER SHALL BE EQUIPPED WITH A MOTOR FEEDER CURRENT TRANSFORMER INSTALLED ON ONE PHASE OF THE MOTOR FEEDER CONDUCTORS, AND A CURRENT TRANSDUCER MOUNTED INSIDE THE PUMP CONTROL PANEL. THE CURRENT TRANSFORMER AND CURRENT TRANSDUCER RANGE SHALL BE BASED ON THE MOTOR NAMEPLATE SERVICE FACTOR AMPS.
- CURRENT TRANSDUCERS SHALL BE OHIO SEMITRONICS CTRS-AMPS-X5. EACH CURRENT TRANSDUCER SHALL PROVIDE 0-5V dc OUTPUT TO BE MONITORED BY THE DATA LOGGER.

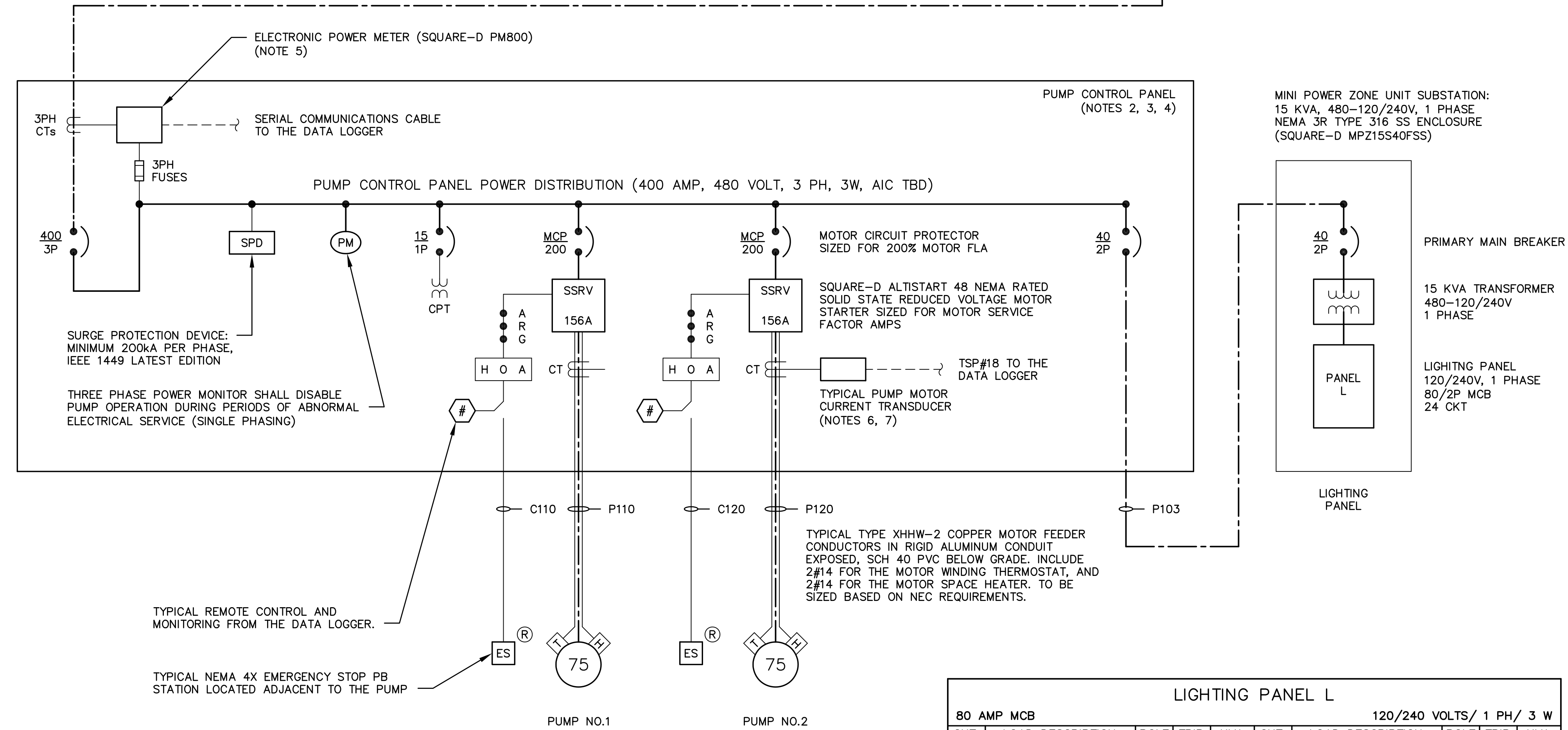


NOTE: ELECTRICAL SERVICE METERING REQUIREMENTS WILL BE DEPENDENT UPON THE POWER COMPANY REQUIREMENTS. WHERE THE POWER COMPANY PERMITS CT METERING WITH THE CTs FURNISHED AND INSTALLED BY THE POWER COMPANY WITHIN THE PAD MOUNTED TRANSFORMER, THE CONTRACTOR SHALL PROVIDE AN ALUMINUM METER ENCLOSURE, CONCRETE PEDESTAL, AND CONDUIT WITH PULL CORD FOR THE METERING CONDUCTORS, IN ACCORDANCE WITH THE POWER COMPANY REQUIREMENTS.

ELECTRICAL SERVICE LOAD CALCULATIONS

PUMP NO.1	75 HP	96 AMPS
PUMP NO.2	75 HP	96 AMPS
PANEL L	15 KVA	32 AMPS
TOTAL CONNECTED LOAD		224 AMPS
NON-COINCIDENTAL LOAD		0 AMPS
PEAK DEMAND AMPS		224 AMPS
0.25 X LARGEST MOTOR		24 AMPS
MIN SERVICE AMPACITY		248 AMPS
MIN MAIN BREAKER RATING		280 AMPS

ELECTRICAL SERVICE:
400 AMP, 480Y/277 VOLT, 3 PHASE



LIGHTING PANEL L

80 AMP MCB		120/240 VOLTS/ 1 PH/ 3 W							
CKT	LOAD DESCRIPTION	POLE	TRIP	KVA	CKT	LOAD DESCRIPTION	POLE	TRIP	KVA
1	LIGHTING	1	20	0.1	2	GATE 1 MOTOR OPER	2	20	----
3	RECEPTACLES	1	20	0.4	4	GATE 1 MOTOR OPER	---	---	----
5	SCADA PANEL	1	20	0.6	6	GATE 2 MOTOR OPER	2	20	----
7	SPARE	1	20	----	8	GATE 2 MOTOR OPER	---	---	----
9	SPARE	1	20	----	10	GATE 3 MOTOR OPER	2	20	----
11	SPARE	1	20	----	12	GATE 3 MOTOR OPER	---	---	----
13	SPACE	1	---	----	14	SPACE	1	---	----
15	SPACE	1	---	----	16	SPACE	1	---	----
17	SPACE	1	---	----	18	SPACE	1	---	----

LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION

EXISTING SINGLE LINE DIAGRAM

LAKE APOPKA, FLORIDA

DESIGN: DRAWN: SLD: 19-1010
WDL: JOB NUMBER: 19-1010
ISSUE: ISSUE DATE: AUGUST 2020
ISSUE: 100%

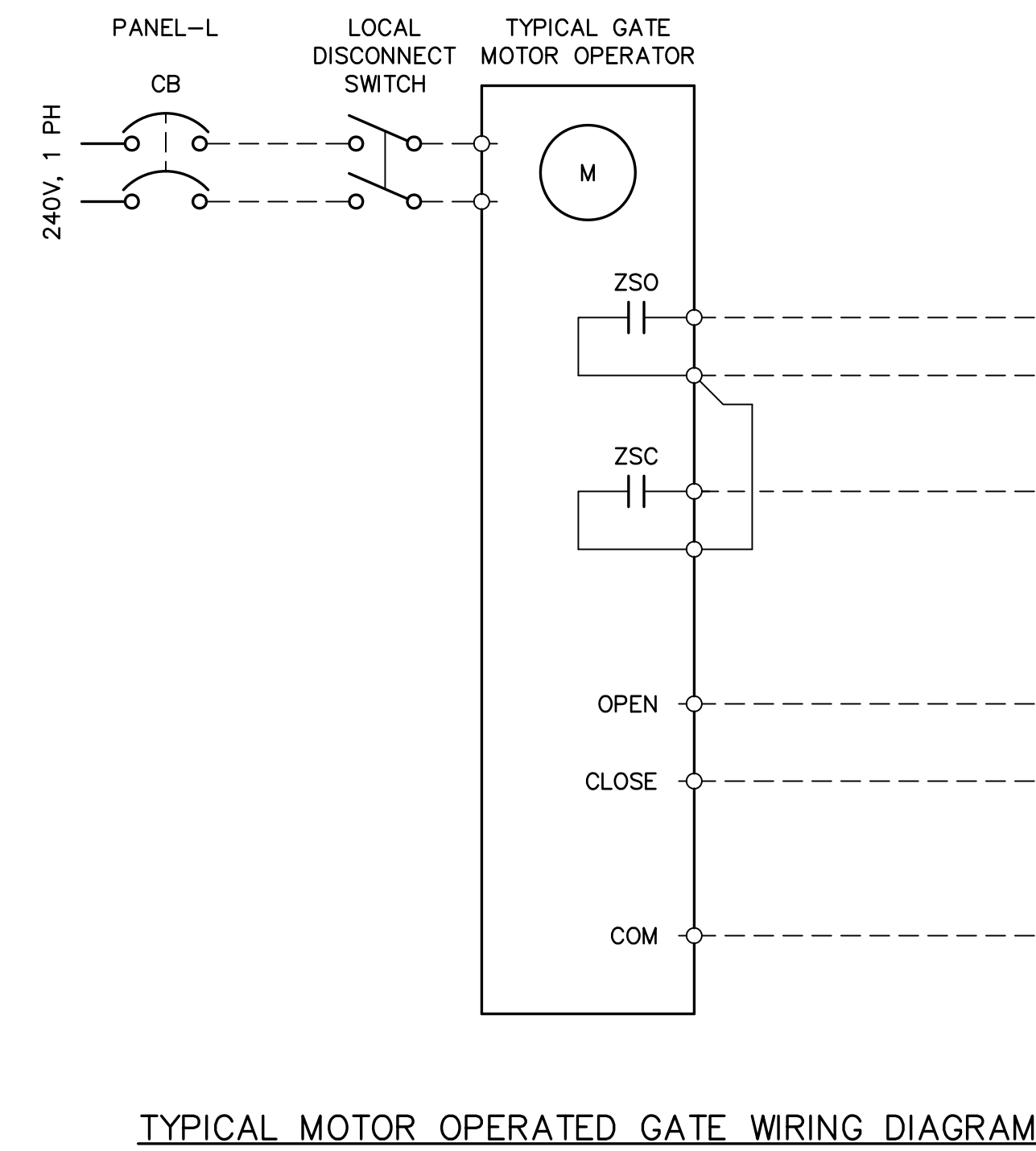
FOUR WATERS ENGINEERING
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904-414-2400 C.O.# 31101 WWW.FWENG.COM

DRAWING NUMBER: **E-2**

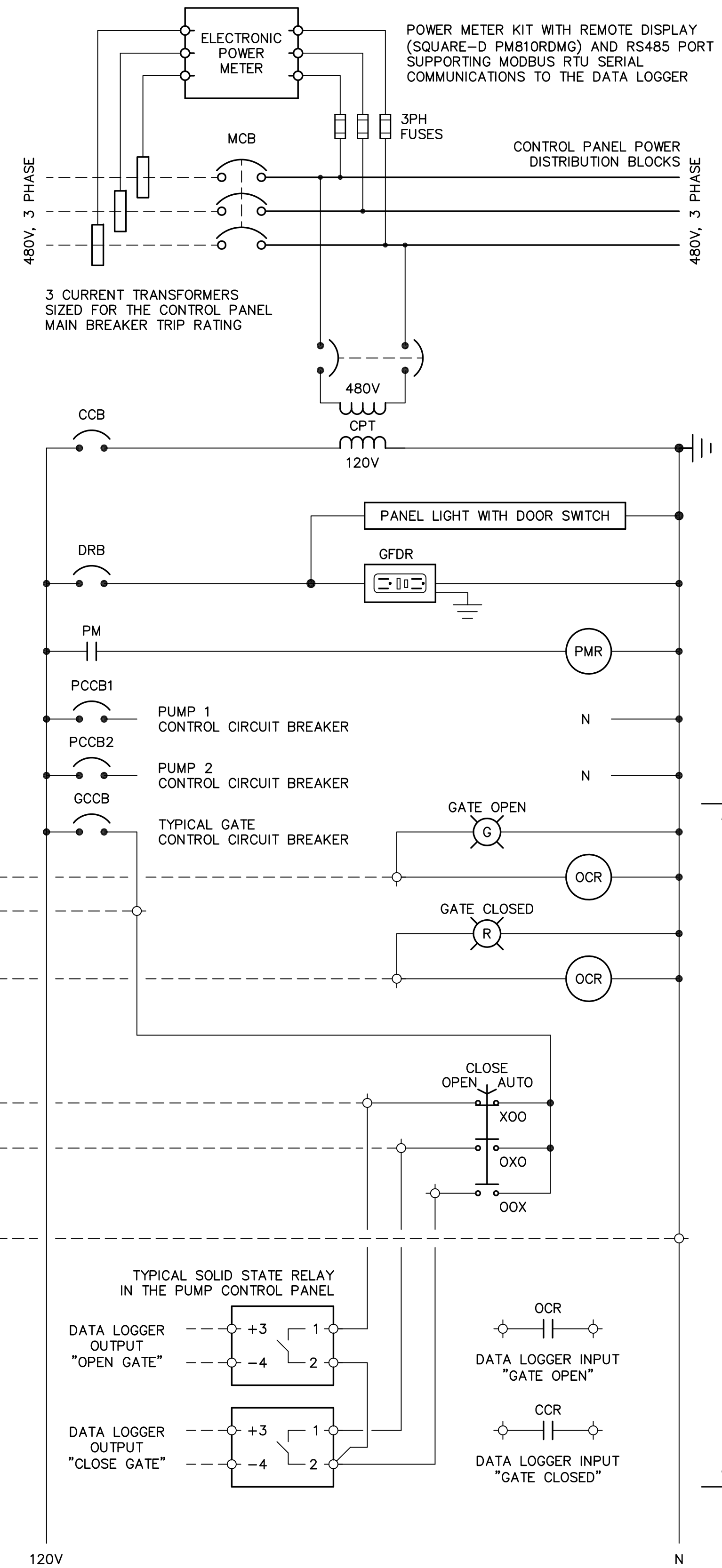
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NOTES:

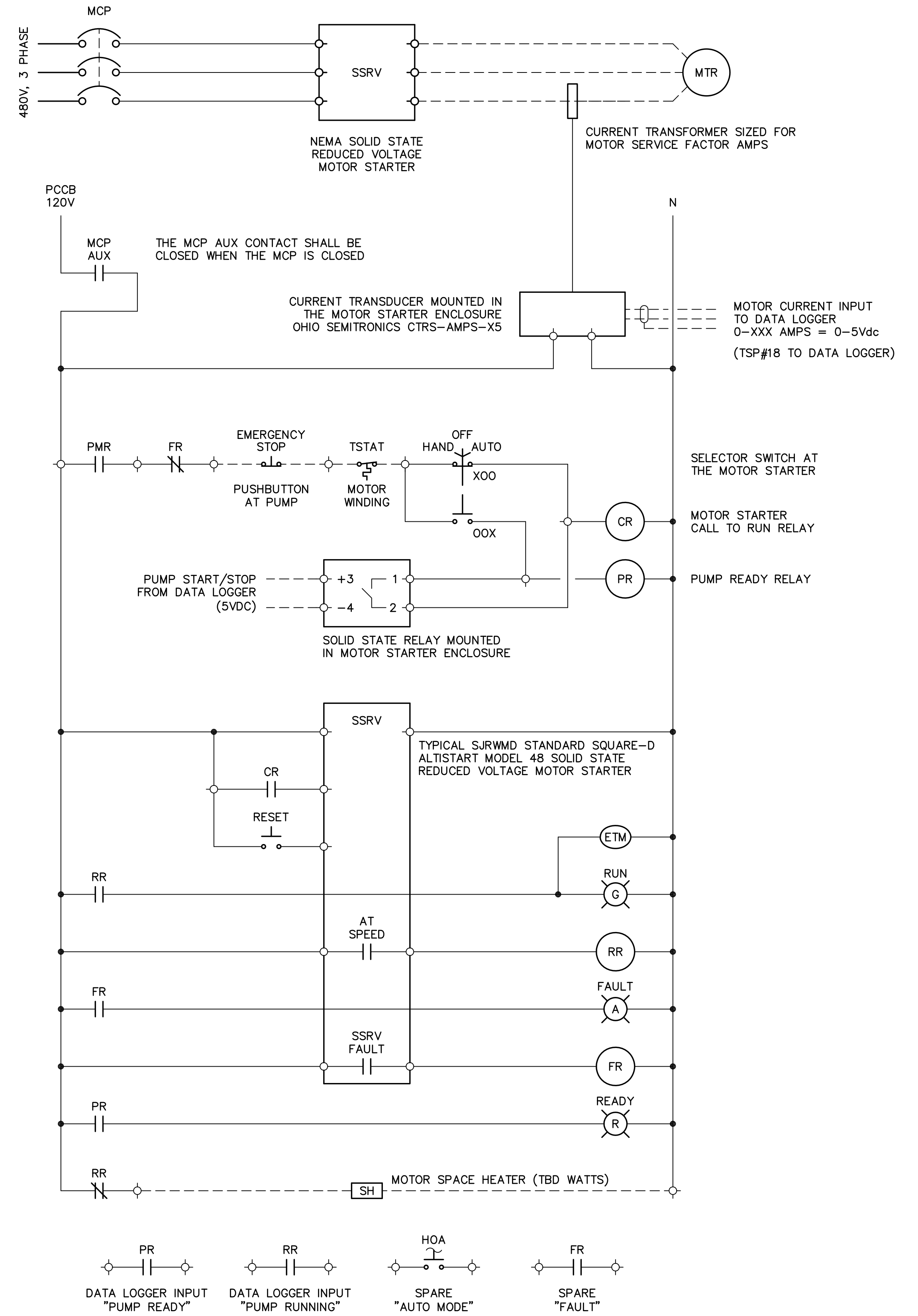
- EACH PUMP MOTOR SHALL BE EQUIPPED WITH NORMALLY CLOSED MOTOR WINDING OVERTEMP THERMOSTATS WHICH SHALL BE INTERLOCKED WITH THE PUMP MOTOR STARTER TO INHIBIT PUMP OPERATION ON OVERTEMP.
- EACH PUMP MOTOR SHALL BE EQUIPPED WITH 120V MOTOR SPACE HEATERS. THE MOTOR STARTER CONTROL POWER TRANSFORMER SHALL BE SIZED TO ACCOMMODATE THE HEATER LOAD. SPACE HEATERS SHALL BE ENERGIZED WHEN THE PUMP MOTOR IS NOT RUNNING.
- A NEMA 4X EMERGENCY STOP PUSHBUTTON CONTROL STATION SHALL BE LOCATED ADJACENT TO EACH PUMP MOTOR AND SHALL BE INTERLOCKED WITH THE PUMP MOTOR STARTER TO INHIBIT PUMP OPERATION. THE EMERGENCY STOP CONTROL STATION SHALL BE PADLOCKABLE.
- EACH PUMP MOTOR STARTER SHALL BE EQUIPPED WITH A CURRENT TRANSFORMER (CT) AND CURRENT TRANSDUCER TO MONITOR THE PUMP MOTOR AMPS AT THE DATA LOGGER. THE CT/TRANSDUCER RANGE SHALL BE BASED ON THE PUMP MOTOR NAMEPLATE SERVICE FACTOR AMPS.
- EACH PUMP MOTOR STARTER SHALL BE EQUIPPED WITH A SOLID STATE RELAY TO PROVIDE REMOTE START/STOP CONTROL FROM THE DATA LOGGER.
- EACH PUMP MOTOR STARTER SHALL BE EQUIPPED WITH A RUN RELAY WITH DRY CONTACT TO MONITOR THE RUN STATUS FROM THE DATA LOGGER (INPUT COIL 5VDC, OUTPUT CONTACT 120VAC).
- CONTROL PANEL POWER DISTRIBUTION EQUIPMENT SHALL BE SJRWMD STANDARD 600V RATED SQUARE-D, OR APPROVED EQUAL.
- CONTROL PANELS SHALL BE MANUFACTURED BY A SJRWMD APPROVED PUMP STATION CONTROL PANEL MANUFACTURER:
 - ECS CONTROL SYSTEMS, JACKSONVILLE, FL.
 - STA-CON INCORPORATED, APOPKA, FL.
 - SUN COAST HYDRAULIC ELECTRIC, JACKSONVILLE, FL.
 - SUN STATE SYSTEMS, ORANGE PARK, FL.



TYPICAL MOTOR OPERATED GATE WIRING DIAGRAM



CONTROL PANEL INCOMING ELECTRICAL SERVICE POWER MONITORING



TYPICAL SSRV PUMP MOTOR STARTER CONTROL WIRING DIAGRAM

LOCATION: D:\DOCUMENTS\BUSINESS\FOUR WATERS\SJRWMD\LAKE APOPKA\DRAWINGS\DWGS\MOL\85624\85624.DWG

Signature
W. David Lassiter, P.E.
FL Professional Eng. #37971
Date

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LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION
CONTROL WIRING DIAGRAMS
LAKE APOPKA, FLORIDA

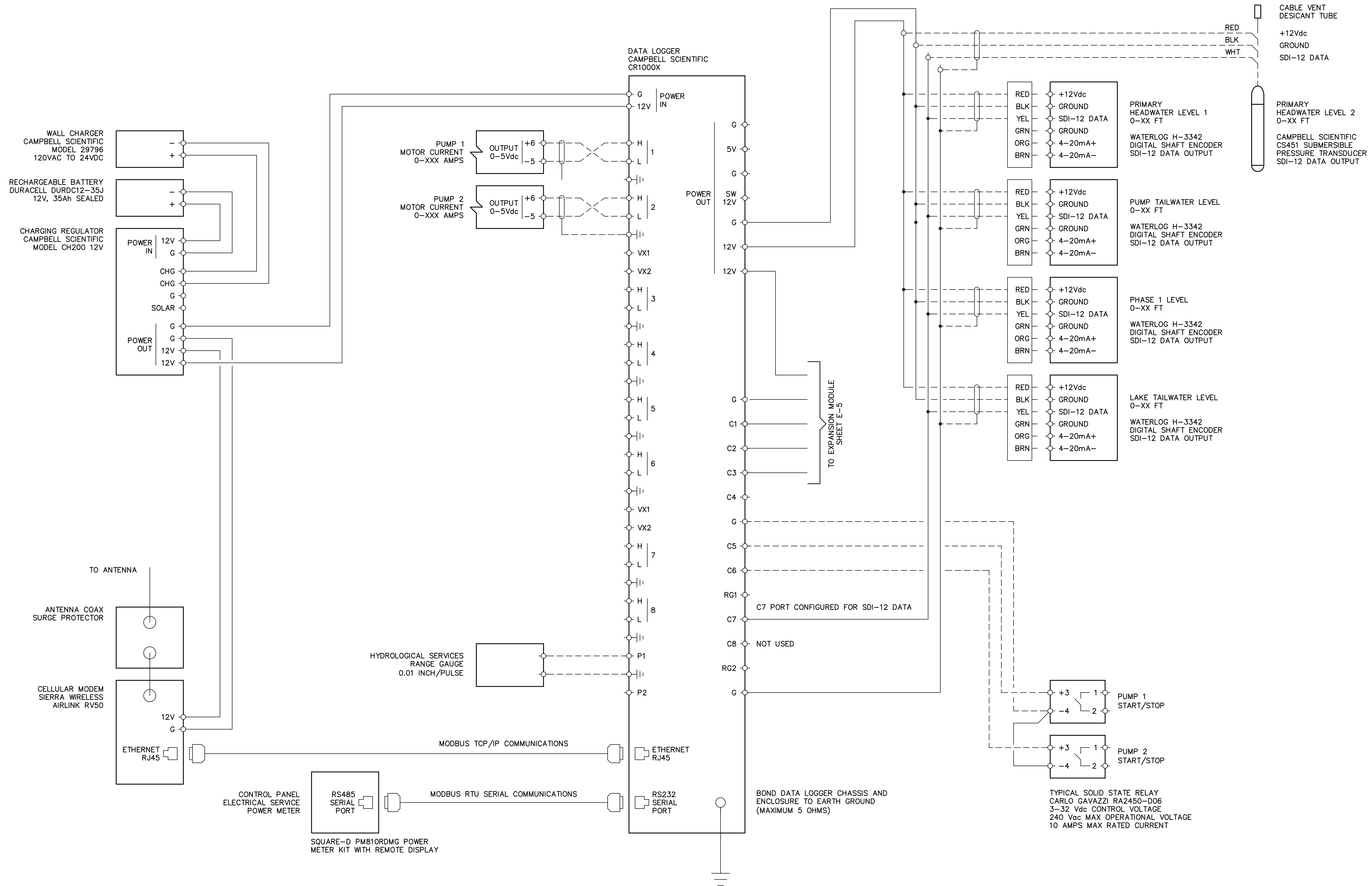
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19-1010			AUGUST 2020	100%	

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DRAWING NUMBER
E-3

NOTES:

- CONTRACTOR SHALL PROVIDE A MINIMUM OF 6' SLACK ON EACH END OF EACH SIGNAL CABLE AND CONDUCTOR.



Signature
W. David Lassiter, P.E.
FL Professional Eng. #37971
Date

REV	NO	DATE	DESCRIPTION
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LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION
SCADA SYSTEM SCHEMATIC DIAGRAM
LAKE APOPKA, FLORIDA

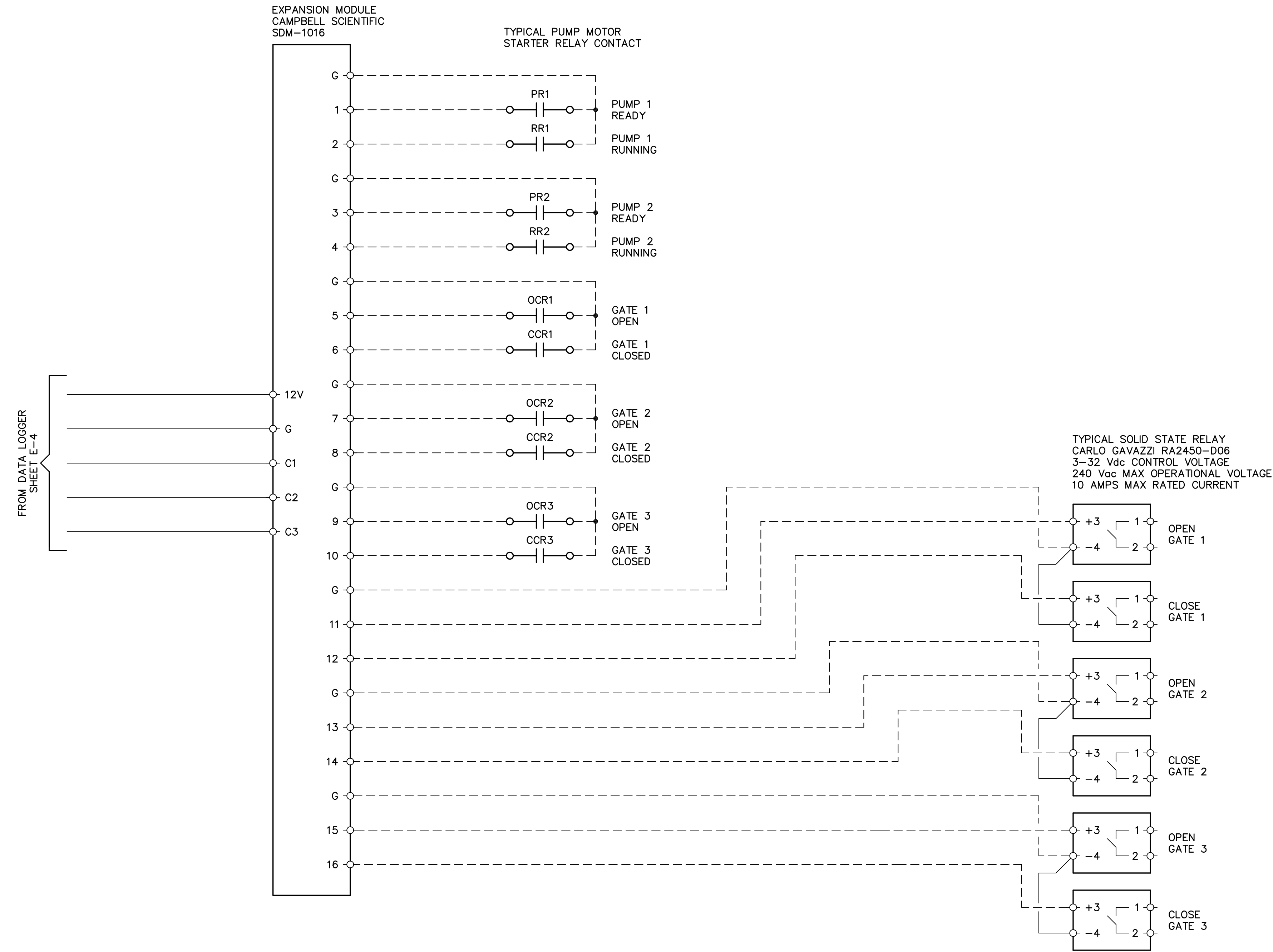
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					100%

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LOCATION: D:\DOCUMENTS\BUSINESS\FOUR WATERS\SIRWIND\LAKE APOPKA\DRAWINGS\DWGS\MOL\856641\856641.DWG

NOTES:

- CONTRACTOR SHALL PROVIDE A MINIMUM OF 6' SLACK ON EACH END OF EACH SIGNAL CABLE AND CONDUCTOR.



LOCATION: D:\DOCUMENTS\BUSINESS\FOUR WATERS\SIRWD\LAKE APOPKA\DRAWINGS\DWG WLL\856F4.DWG

Signature
W. David Lassiter, P.E.
FL Professional Eng. #37971
Date

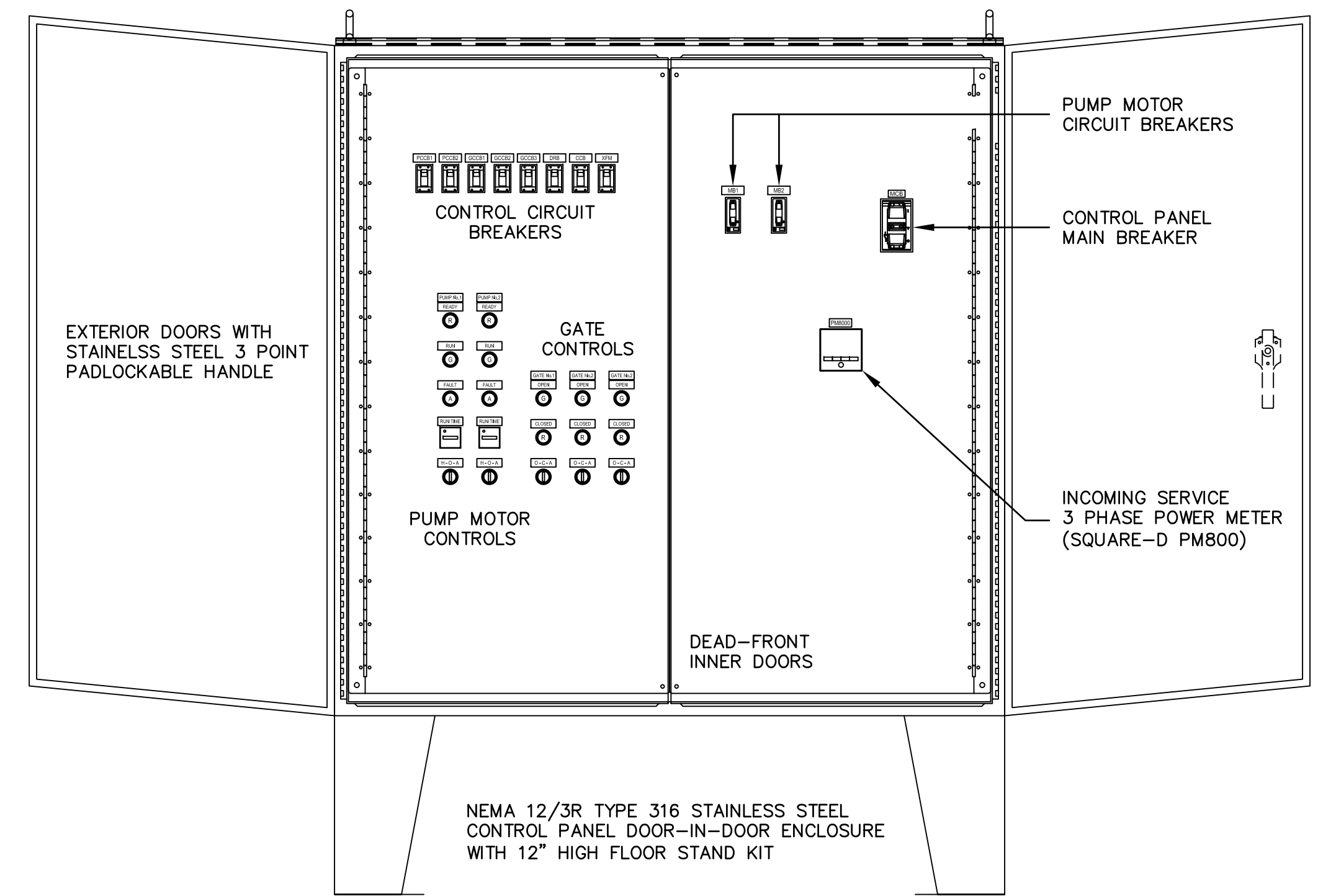
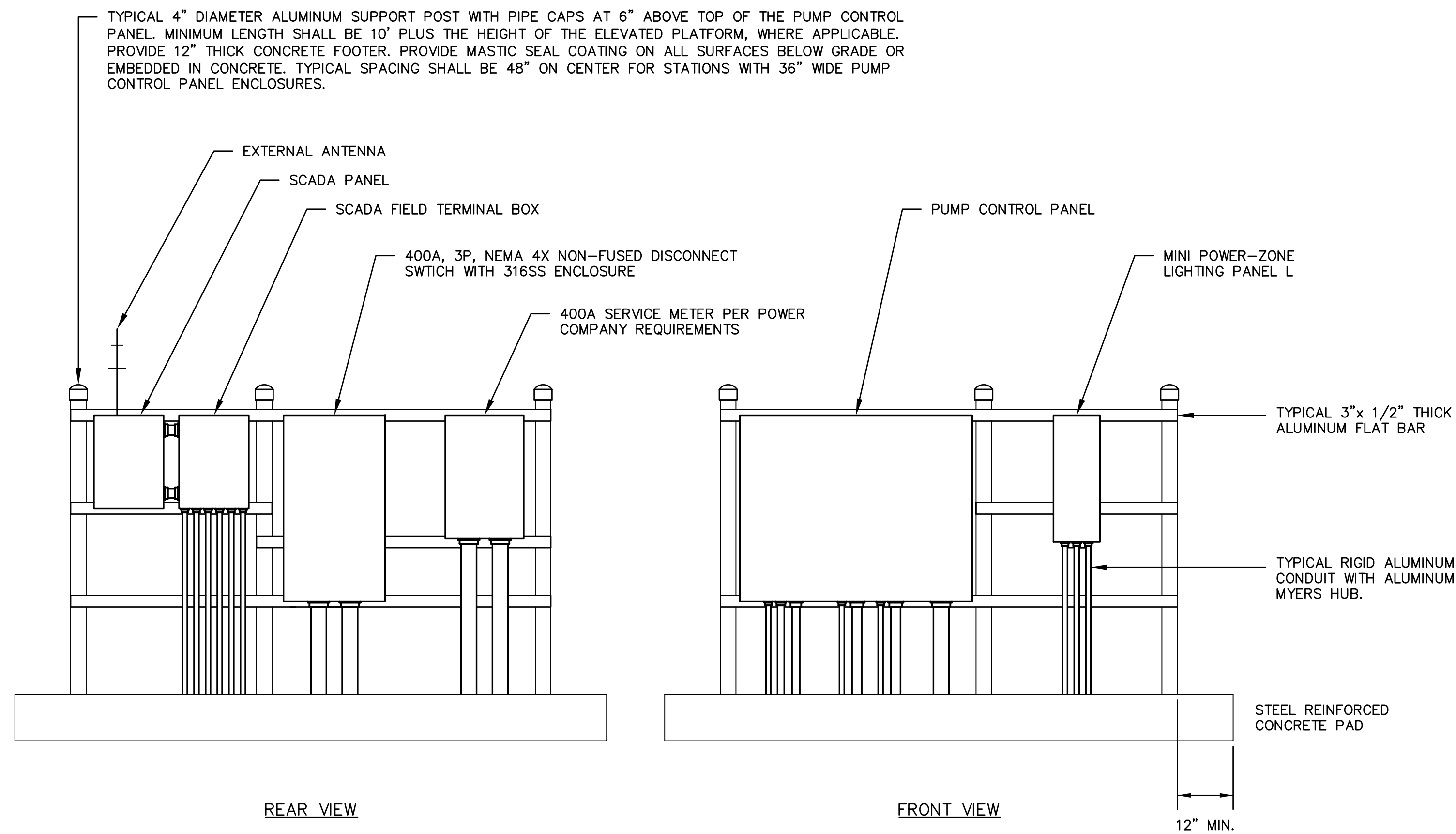
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LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION
SCADA SYSTEM SCHEMATIC DIAGRAM
LAKE APOPKA, FLORIDA

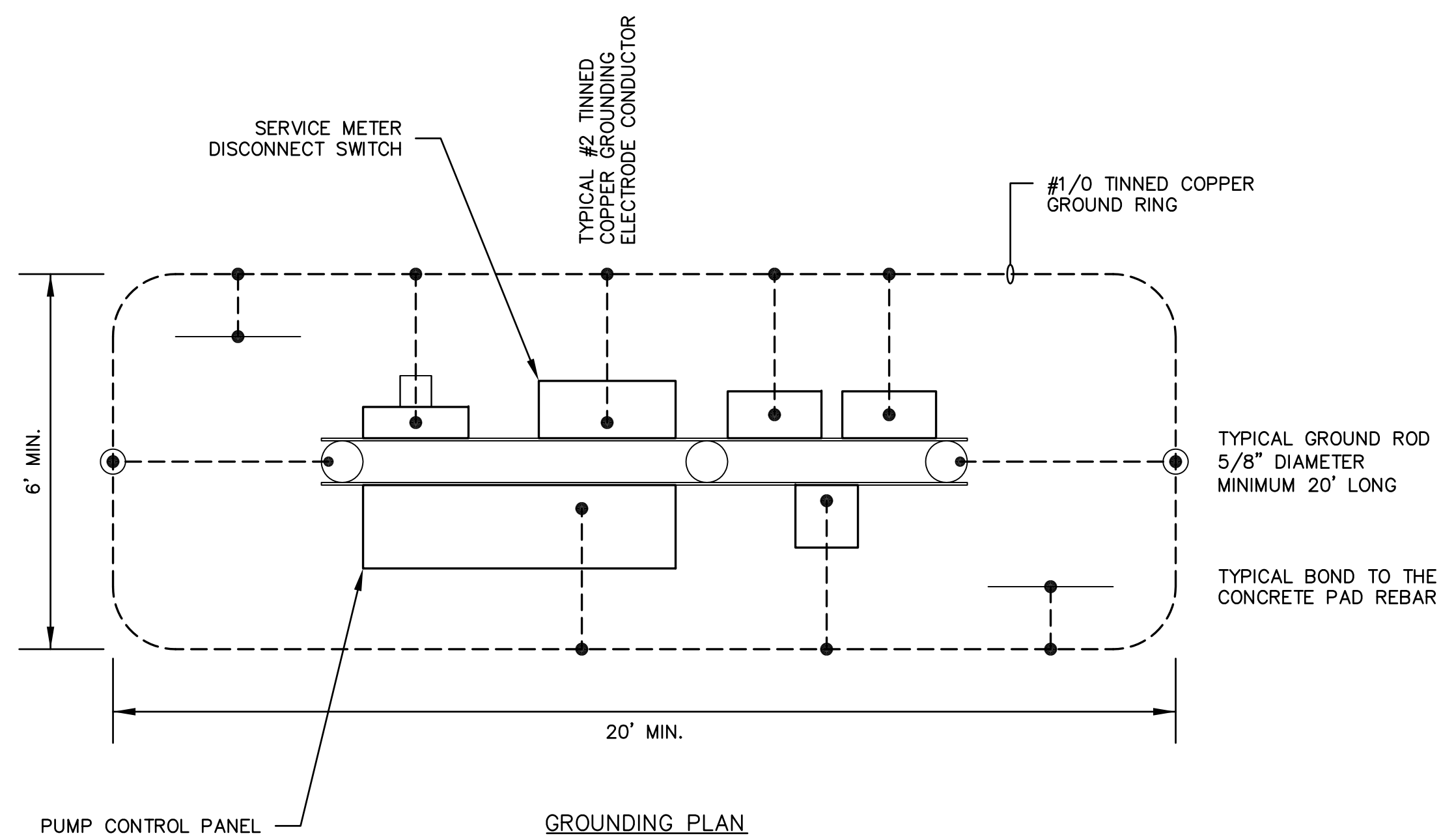
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JOB NUMBER					100%

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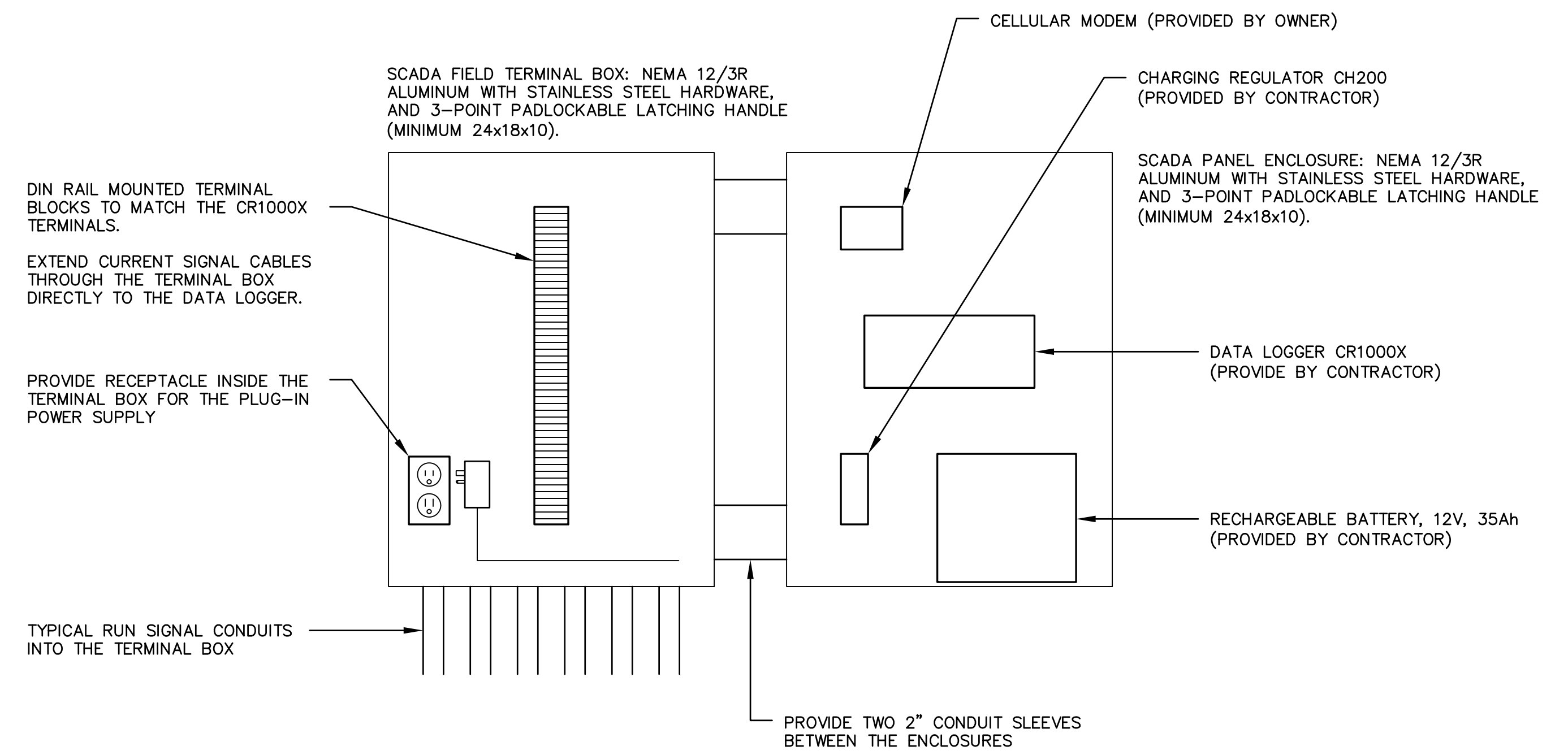
DRAWING NUMBER
E-5



TYPICAL CONTROL PANEL FRONT VIEW
NOT TO SCALE



ELECTRICAL EQUIPMENT RACK DETAILS
NOT TO SCALE



TYPICAL SCADA PANEL DETAIL
NOT TO SCALE

NOTE: UNLESS OTHERWISE INDICATED ALL EQUIPMENT AND INSTALLATION TO BE PROVIDED BY THE CONTRACTOR.

Signature
W. David Lasseter, P.E.
FL Professional Eng. #37971
Date

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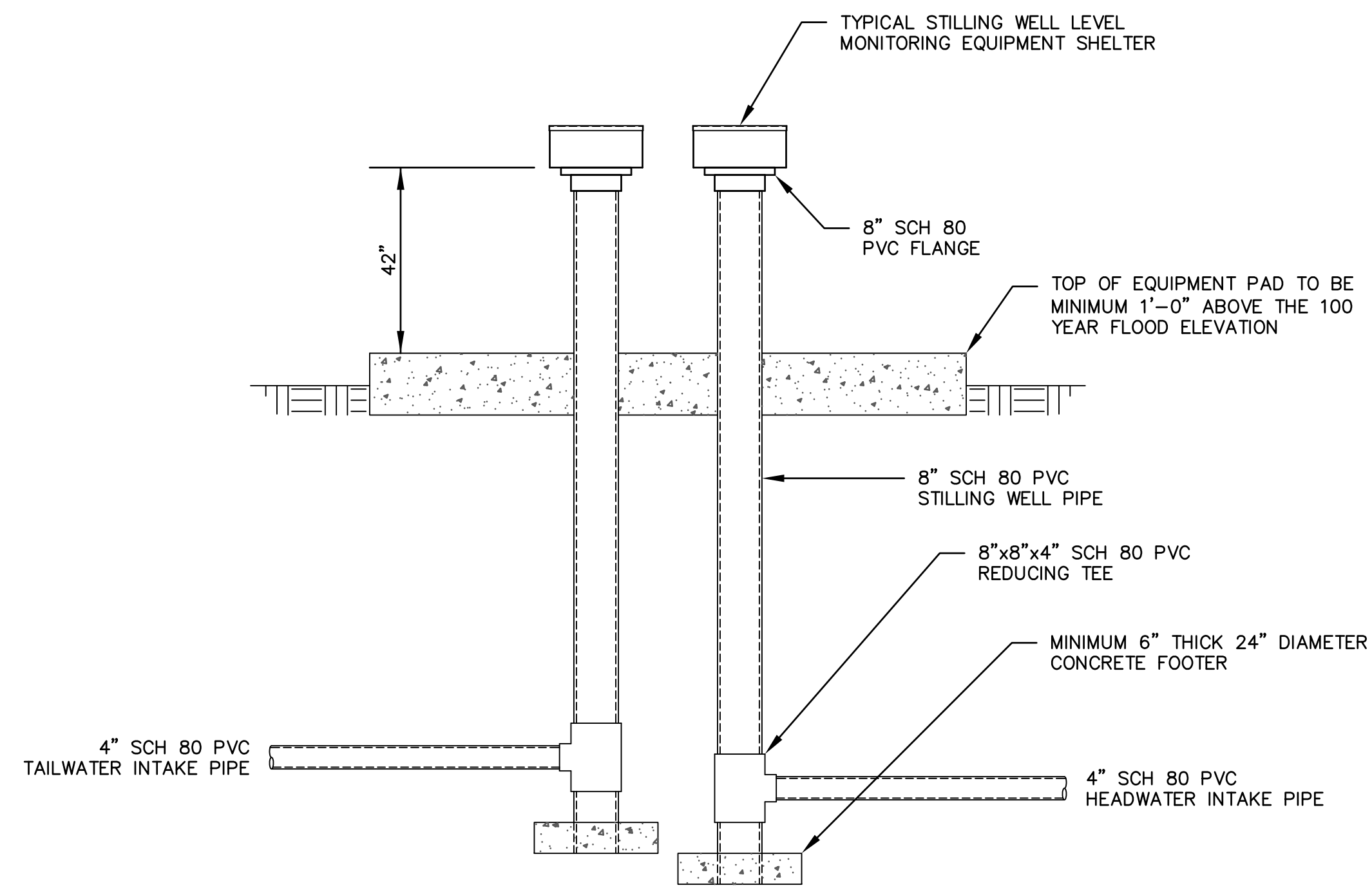
LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION

ELECTRICAL DETAILS
LAKE APOPKA
LAKE APOPKA, FLORIDA

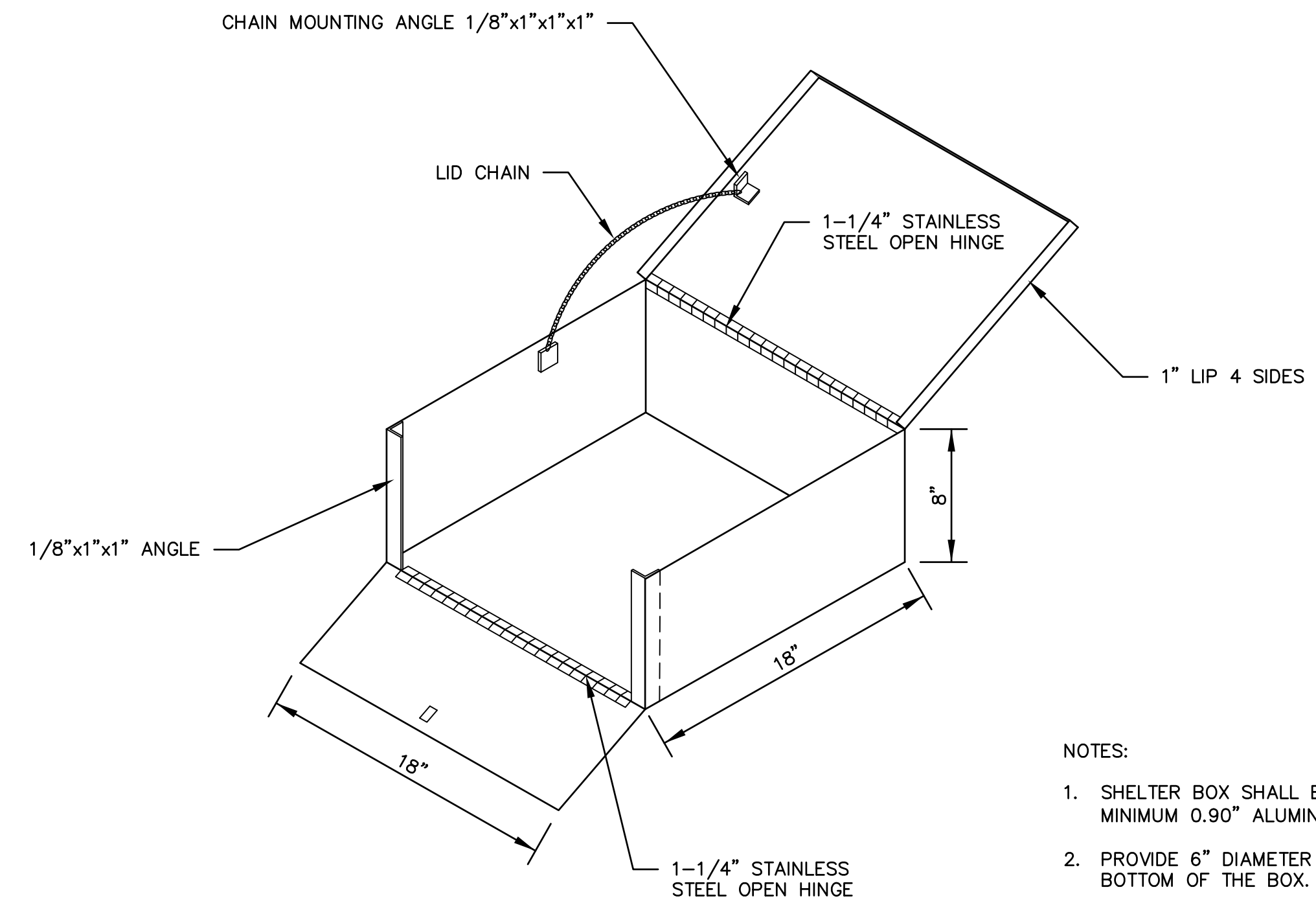
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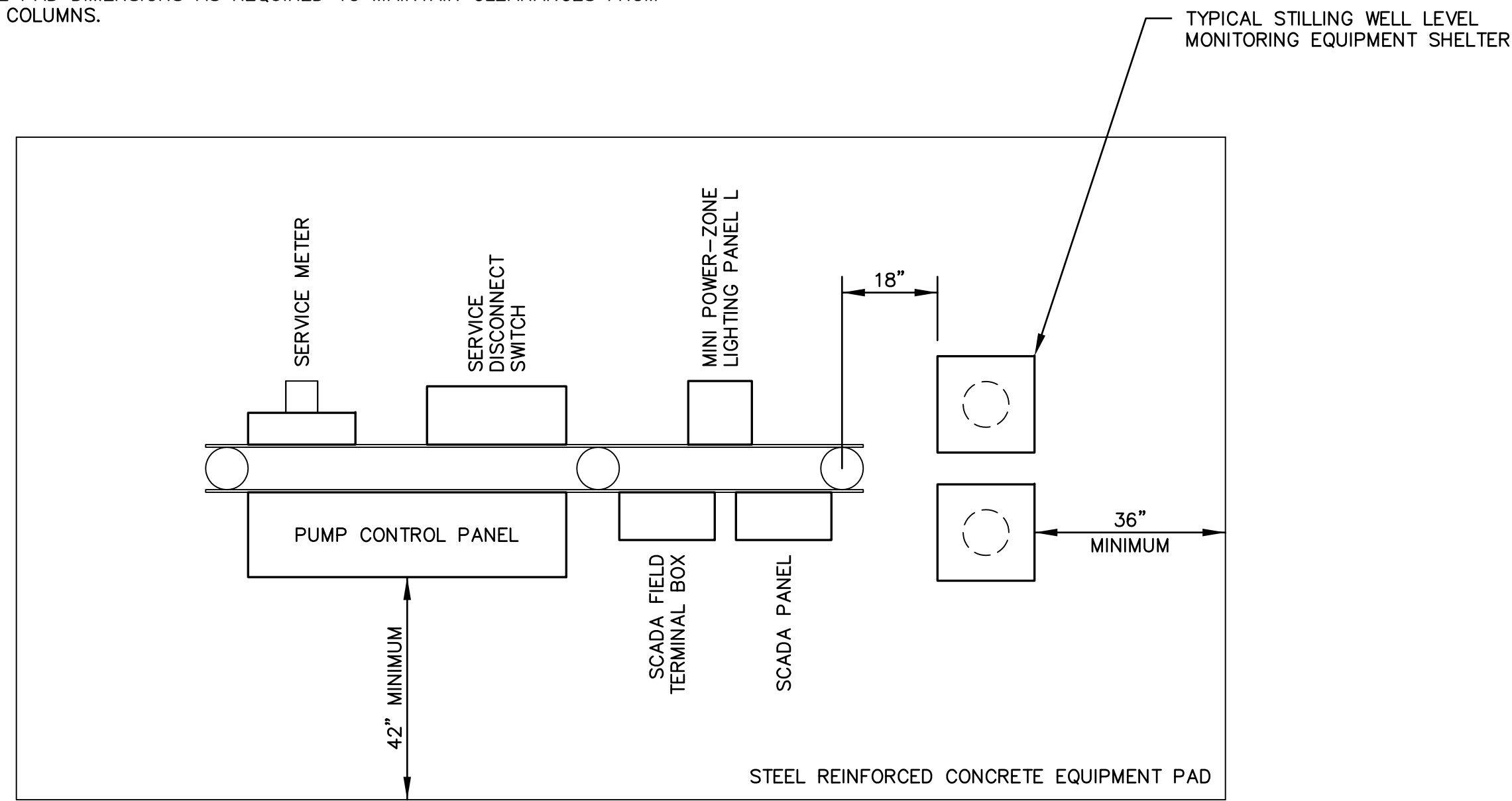
TYPICAL LEVEL MONITORING STILLING WELL DETAIL
NOT TO SCALE



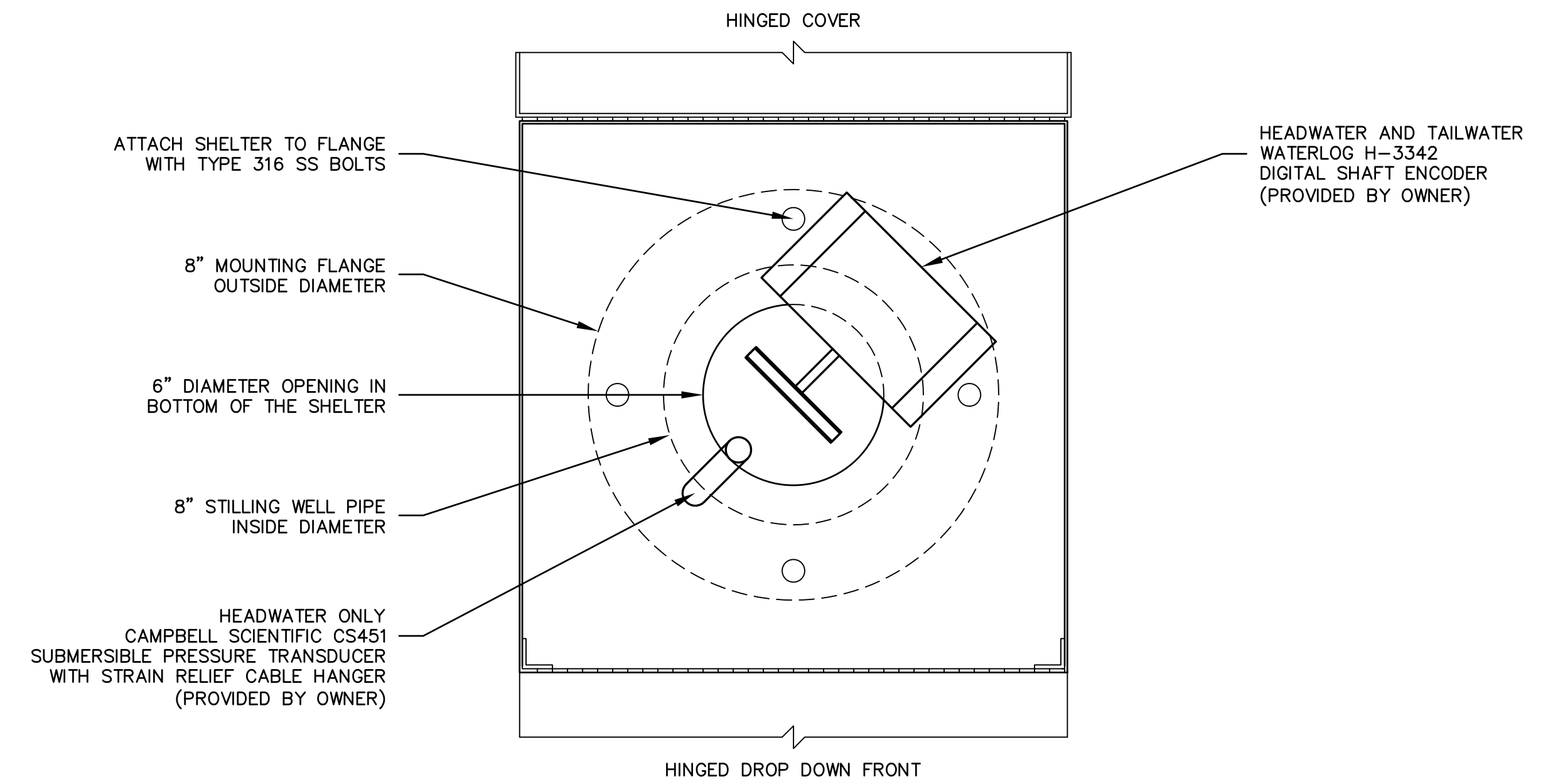
- NOTES:
1. SHELTER BOX SHALL BE CUSTOM FABRICATED FROM MINIMUM 0.90" ALUMINUM.
 2. PROVIDE 6" DIAMETER HOLE CENTERED IN THE BOTTOM OF THE BOX.

TYPICAL LEVEL MONITORING EQUIPMENT SHELTER DETAIL
NOT TO SCALE

- NOTES:
1. INCREASE PAD DIMENSIONS AS REQUIRED TO MAINTAIN CLEARANCES FROM CANOPY COLUMNS.



STILLING WELL AND ELECTRICAL EQUIPMENT PAD DETAIL
NOT TO SCALE



TYPICAL LEVEL MONITORING EQUIPMENT SHELTER INTERIOR DETAIL
NOT TO SCALE

LOCATION: D:\DOCUMENTS\BUSINESS\FOUR WATERS\SURV\LAKE APOPKA\DRAWINGS\DWGS_WELL\B56F41B56F4.DWG

Signature
W. David Lassiter, P.E.
FL Professional Eng. #37971
Date

REV	NO	DATE	BY	DESCRIPTION
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LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION
ELECTRICAL DETAILS
LAKE APOPKA, FLORIDA

DESIGN	WDL	JOB NUMBER	ISSUE DATE	ISSUE
19-1010 <td>AUGUST 2020 <td>100%</td> <td></td> <td></td> </td>	AUGUST 2020 <td>100%</td> <td></td> <td></td>	100%		

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904-414-2400 C.O.A.# 31101 WWW.FWENG.COM

DRAWING NUMBER
E-7

ELECTRIC SERVICE POLE BY DUKE ENERGY
 UNDERGROUND PRIMARY CONDUITS
 (NOTE 1)
 SERVICE TRANSFORMER PAD
 (NOTE 2)

OVERHEAD POWER LINE BY DUKE ENERGY

ELECTRICAL EQUIPMENT PAD
 (SEE SHEET E-9)

P100

PUMP STATION
 (SEE SHEET E-9)

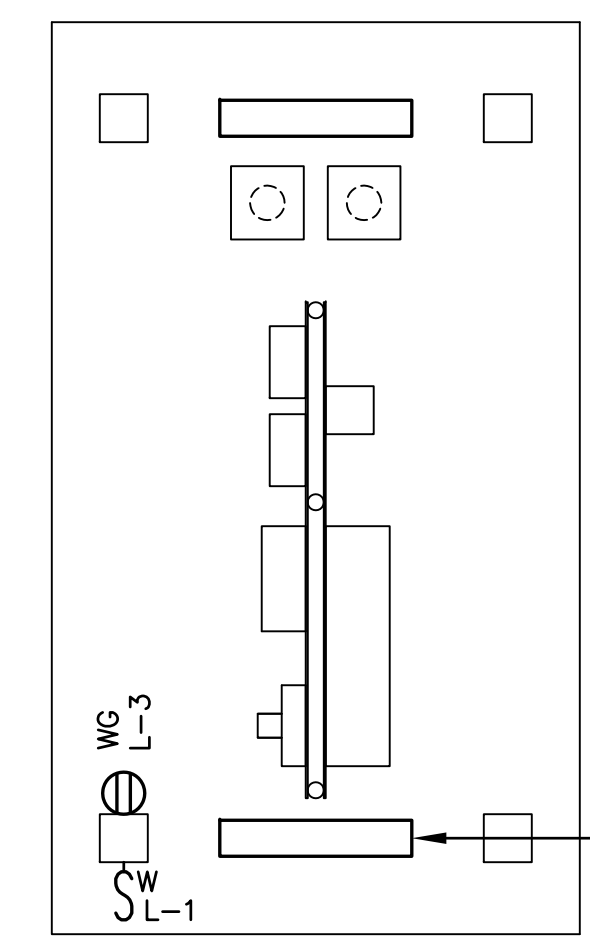
MOTOR OPERATED GATES 1 & 2
 AND PHASE I LEVEL MONITORING
 STILLING WELL EQUIPMENT PAD
 (SEE SHEET E-10)

MOTOR OPERATED GATE 3 AND
 LAKE TAILWATER LEVEL MONITORING
 STILLING WELL EQUIPMENT PAD
 (SEE SHEET E-10)

P300, C30, S300

P330, C330, S330

TYPICAL DIRCT BURIED CONDUIT
 SCH 40 PVC, MINIMUM 24" COVER
 WARNING TAPE AT 12"

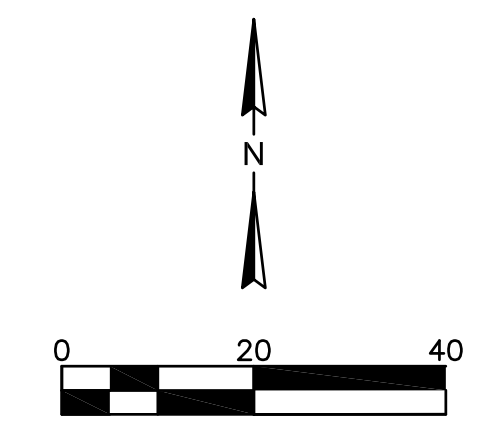


TYPICAL WP LED LIGHT FIXTURE
 LITHONIA EMS L48 6000LM IMAFL
 MD 120 GZ10 40K 80CRI

ELECTRICAL EQUIPMENT PAD LIGHTING PLAN
 NOT TO SCALE

NOTES:

1. UNDERGROUND PRIMARY ELECTRICAL CONDUITS TO BE PROVIDED BY THE CONTRACTOR IN ACCORDANCE WITH DUKE ENERGY REQUIREMENTS. PROVIDE 2-4" SCH 40 PVC, MINIMUM 48" COVER, LONG RADIUS ELBOWS, PULL CORD, AND TERMINATE AT EACH END AS DIRECTED BY DUKE ENERGY. PRIMARY CABLE TO BE PROVIDED BY DUKE ENERGY.
2. PRECAST CONCRETE TRANSFORMER PAD TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR IN ACCORDANCE WITH DUKE ENERGY REQUIREMENTS. THE GROUND SHALL BE LEVELED AND THOROUGHLY COMPACTED BY THE CONTRACTOR BEFORE THE PAD IS INSTALLED. PAD MOUNTED TRANSFORMER TO BE PROVIDED BY DUKE ENERGY.



LOCATION: D:\DOCUMENTS\BUSINESS\FOUR WATERS\SURV\LAKE APOPKA\DRAWINGS\DWGS_WELL\85624\85624.DWG

Signature
 W. David Lassiter, P.E.
 FL Professional Eng. #37971
 Date

REV	NO	DATE	DRWN	CHKD	BY	DESCRIPTION
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LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION

ELECTRICAL SITE PLAN
 LAKE APOPKA, FLORIDA

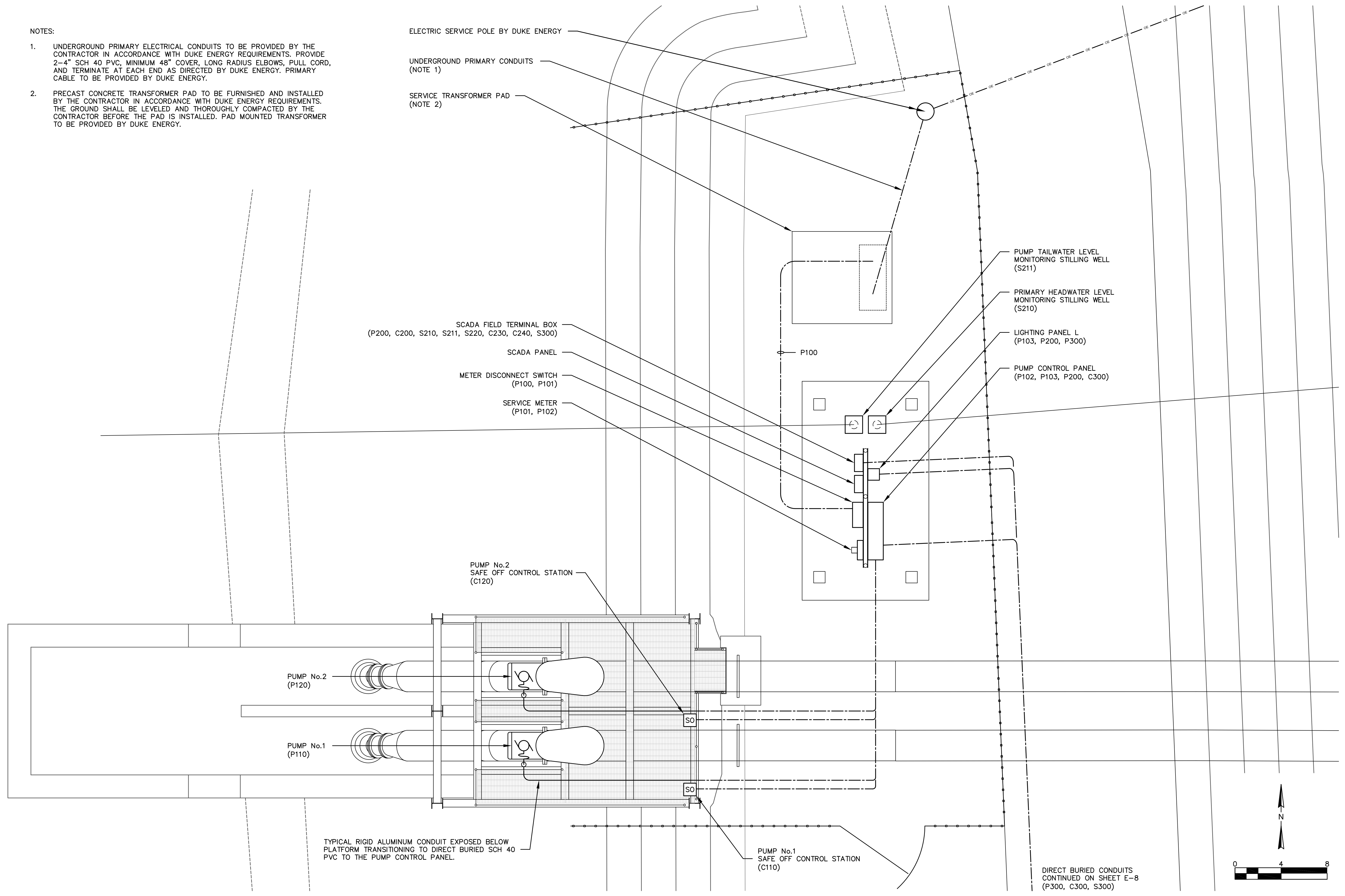
DESIGN	DRAWN	SLD
WDL	SLD	19-10-10
JOB NUMBER	ISSUE	AUGUST 2020
DATE	ISSUE	100%

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DRAWING NUMBER
E-8

NOTES:

- UNDERGROUND PRIMARY ELECTRICAL CONDUITS TO BE PROVIDED BY THE CONTRACTOR IN ACCORDANCE WITH DUKE ENERGY REQUIREMENTS. PROVIDE 2-4" SCH 40 PVC, MINIMUM 48" COVER, LONG RADIUS ELBOWS, PULL CORD, AND TERMINATE AT EACH END AS DIRECTED BY DUKE ENERGY. PRIMARY CABLE TO BE PROVIDED BY DUKE ENERGY.
- PRECAST CONCRETE TRANSFORMER PAD TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR IN ACCORDANCE WITH DUKE ENERGY REQUIREMENTS. THE GROUND SHALL BE LEVELED AND THOROUGHLY COMPACTED BY THE CONTRACTOR BEFORE THE PAD IS INSTALLED. PAD MOUNTED TRANSFORMER TO BE PROVIDED BY DUKE ENERGY.



DIRECT BURIED CONDUITS
CONTINUED ON SHEET E-8
(P300, C300, S300)

LOCATION: D:\DOCUMENTS\BUSINESS\FOUR WATERS\SURV\LAKE APOPKA\DRAWINGS\DWGS_WELL\85624\85624.DWG

DESIGN		DRAWN	SLD	JOB		ISSUE	DATE	ISSUE
WDL		19-10-10	AUGUST	2020		100%		
NUMBER								
ISSUE								

LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION

ELECTRICAL PLAN
PUMP STATION

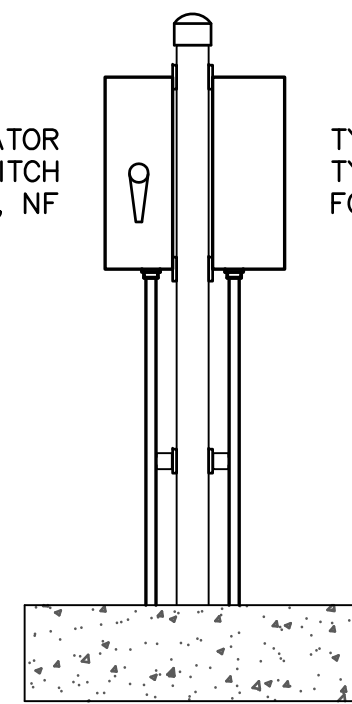
LAKE APOPKA, FLORIDA

Signature: W. David Lassiter, P.E.
FL Professional Eng. #37971
Date: _____

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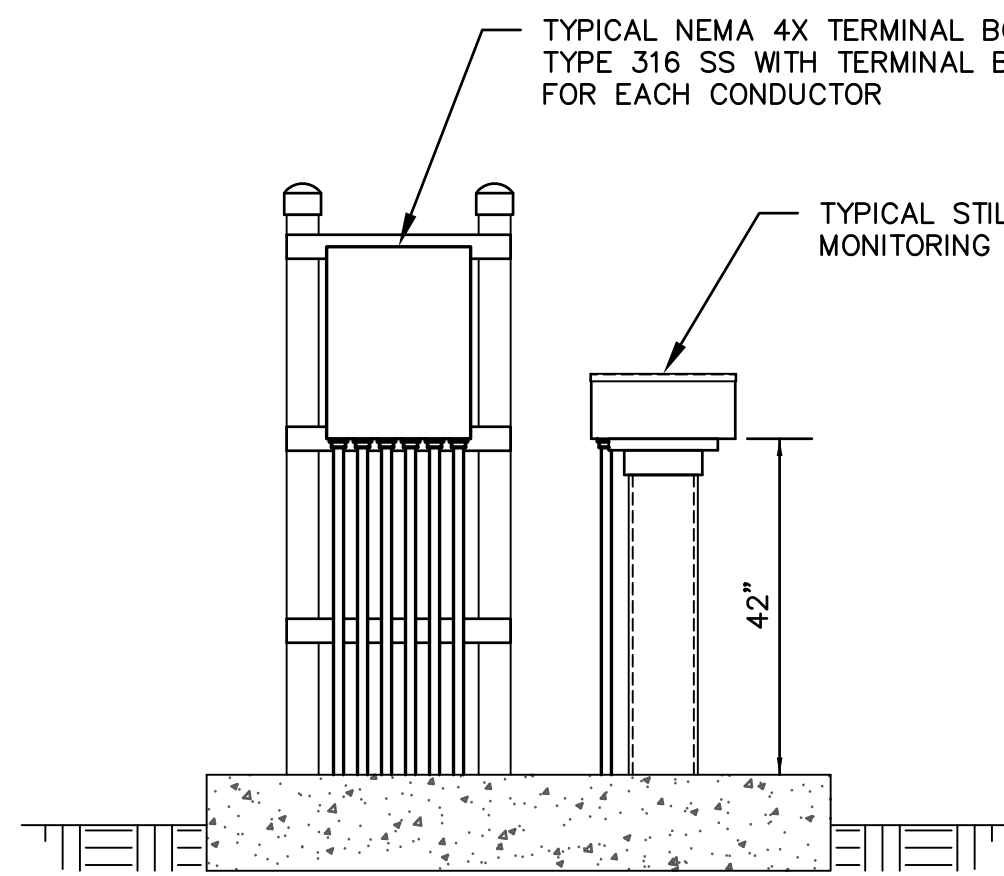
DRAWING NUMBER
E-9

TYPICAL GATE MOTOR OPERATOR LOCAL DISCONNECT SWITCH
NEMA 4X SS, 30A, 3P, NF

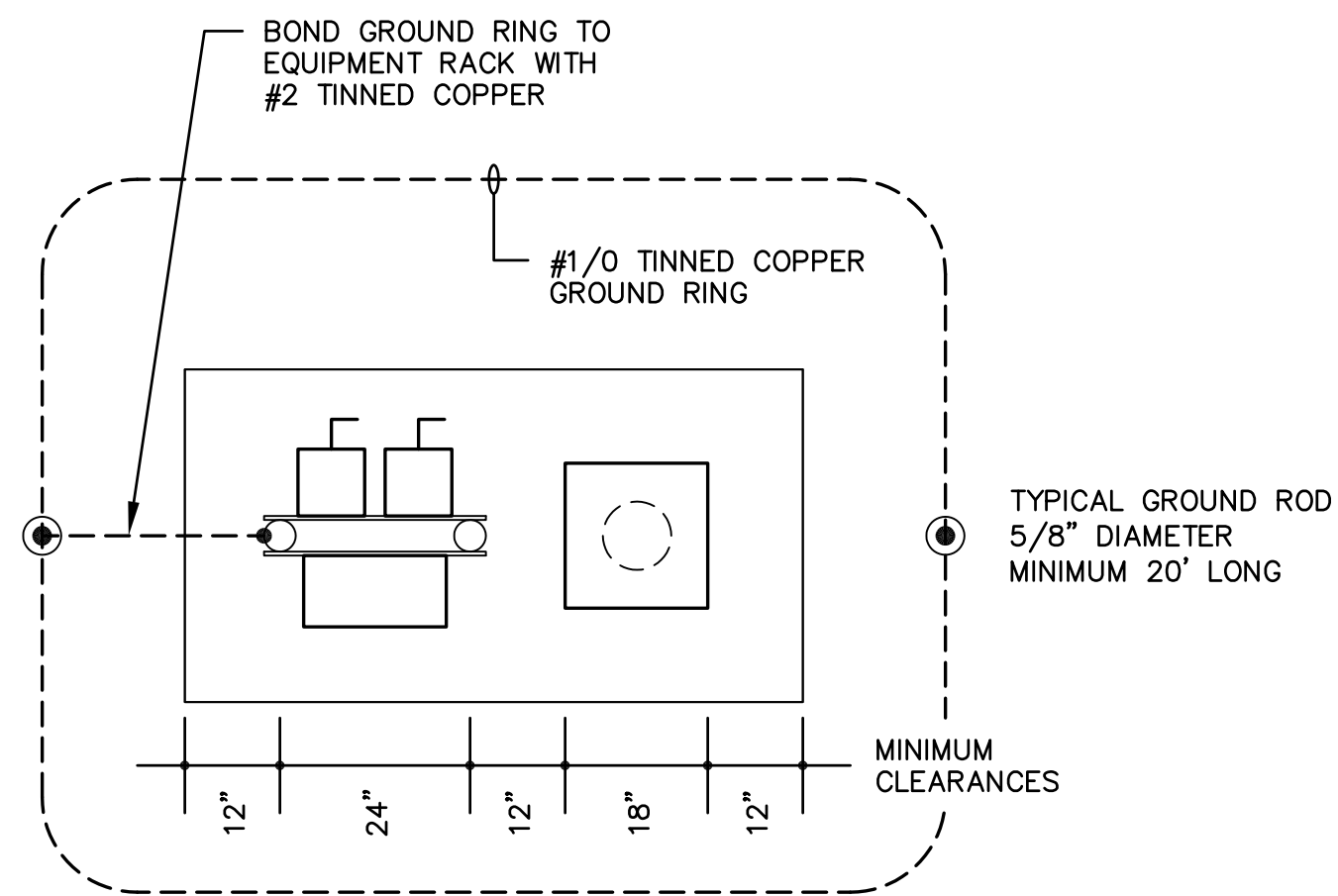


SIDE VIEW

TYPICAL NEMA 4X TERMINAL BOX
TYPE 316 SS WITH TERMINAL BLOCKS
FOR EACH CONDUCTOR

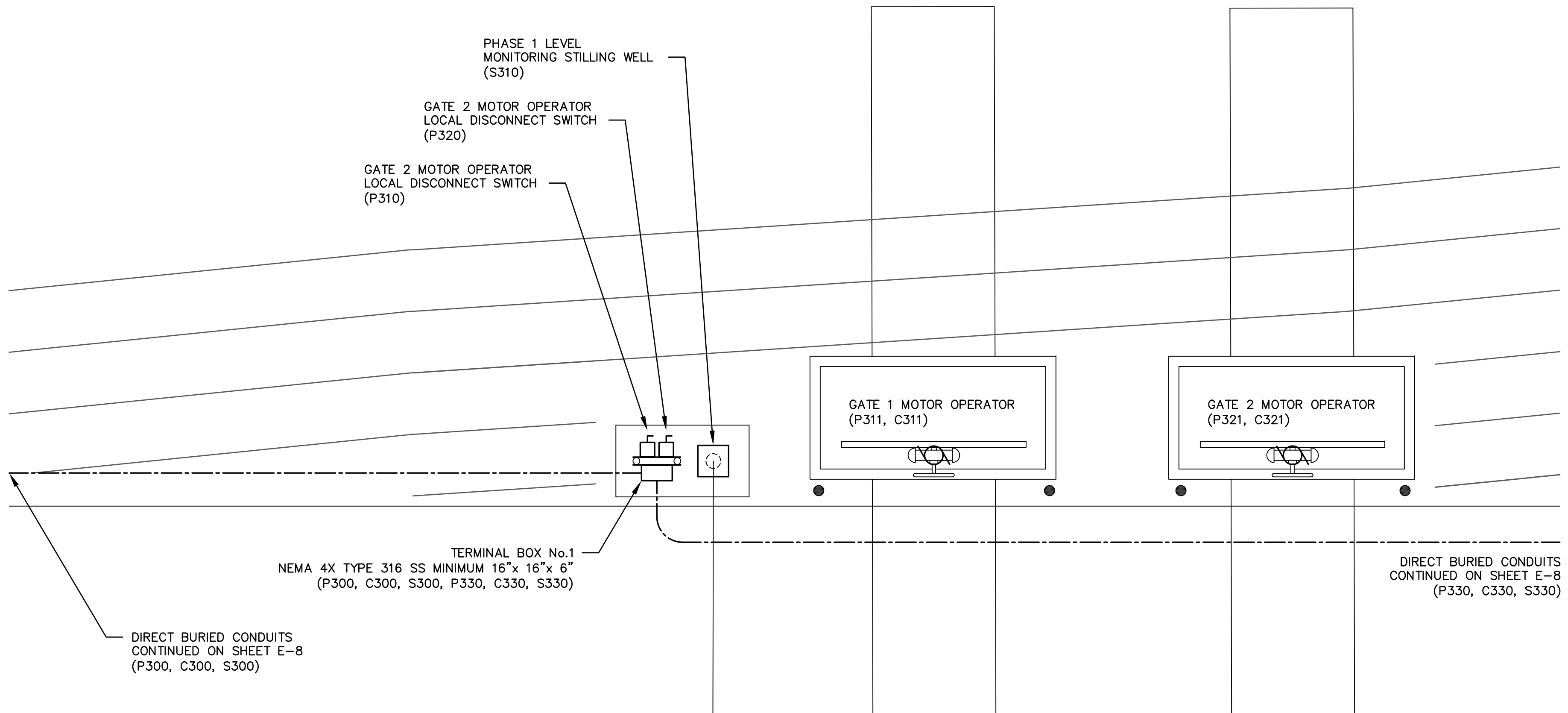
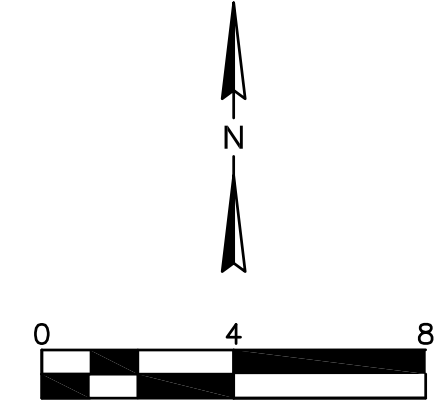
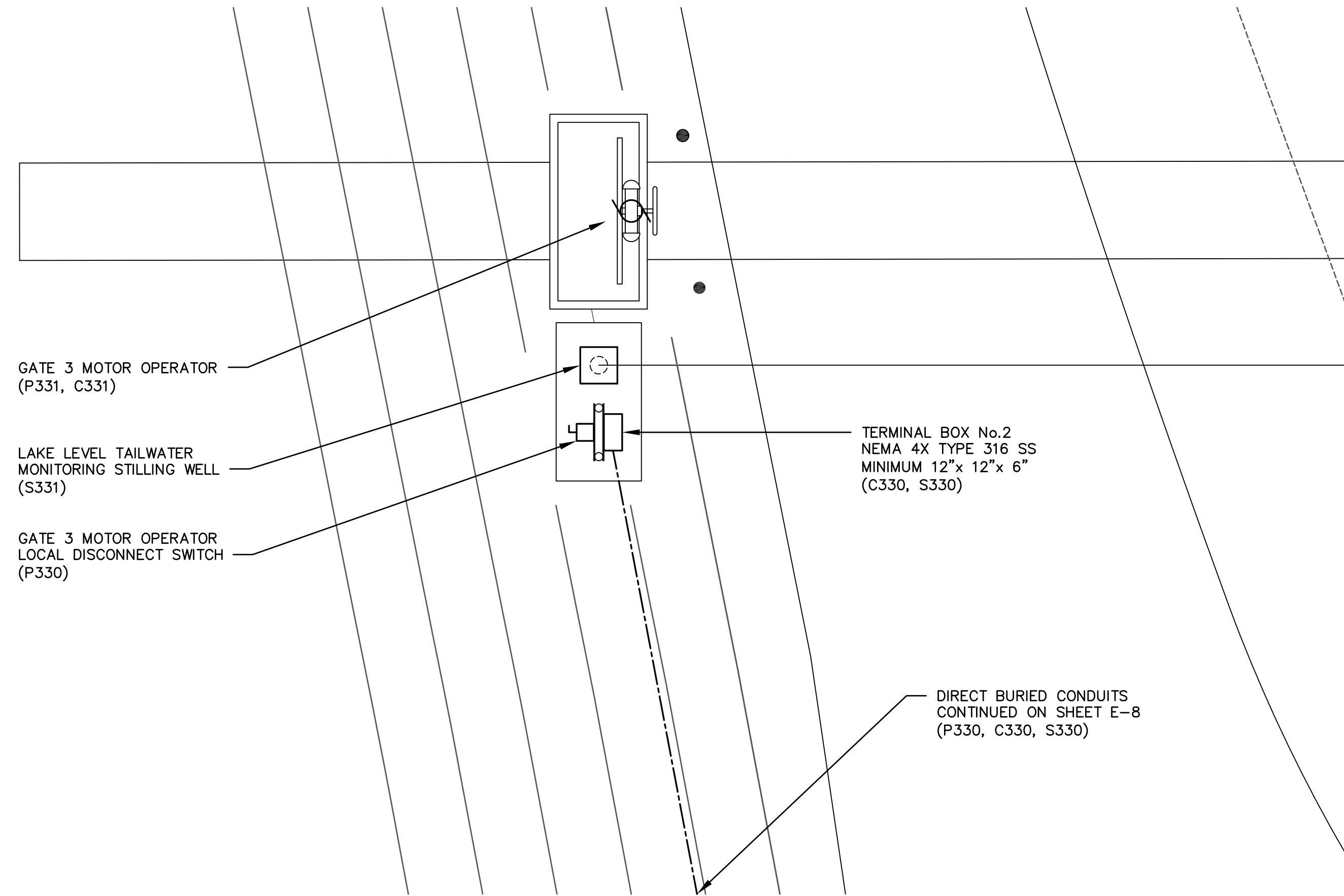


FRONT VIEW



PLAN VIEW

TYPICAL GATE OPERATOR/STILLING WELL EQUIPMENT PAD DETAIL
NOT TO SCALE



LOCATION: D:\DOCUMENTS\BUSINESS\FOUR WATERS\SRV\LD\LAKE APOPKA\DRAWINGS\DWGS_WELL\85641\85641.DWG

Signature
W. David Lassiter, P.E.
FL Professional Eng. #37971
Date

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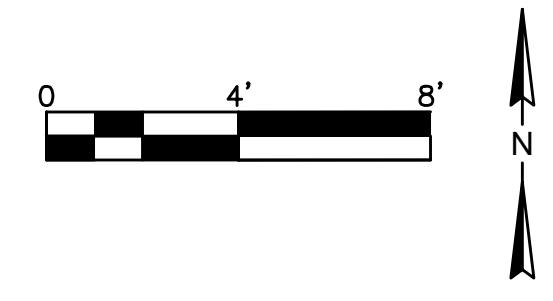
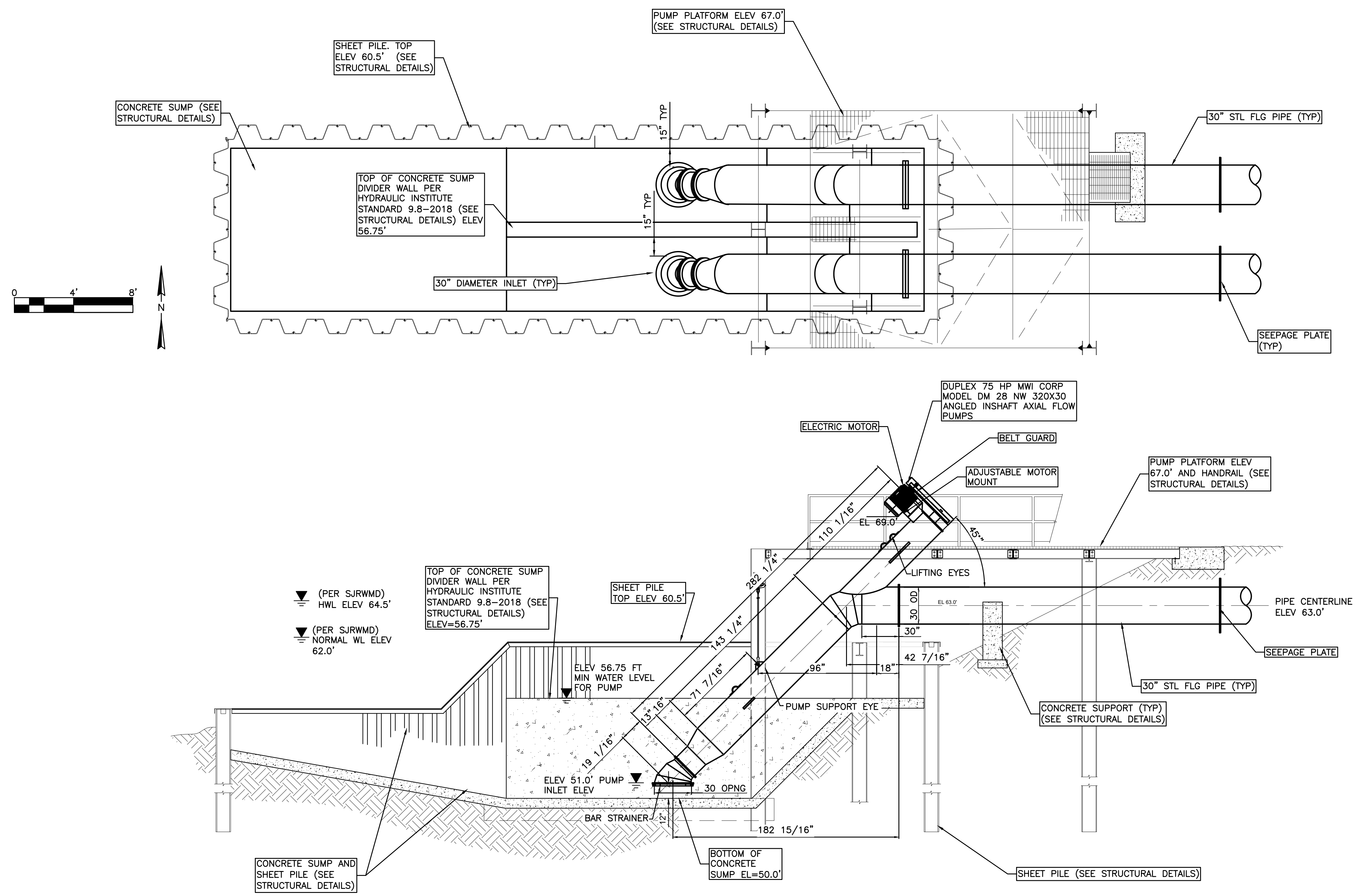
LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION
ELECTRICAL PLAN
MOTOR OPERATED GATES
LAKE APOPKA, FLORIDA

DESIGN	DATE	ISSUE	ISSUE
WDL	19-10-10	AUGUST	2020
JOB NUMBER			
ISSUE DATE			
ISSUE			100%

FOUR WATERS ENGINEERING
824 6th AVE. N. JACKSONVILLE BEACH, FLORIDA 32250
904-414-2400 C.O.A.# 31101 WWW.FWENG.COM

DRAWING NUMBER
E-10

STEVE DUCHARNE LOCATION: R/A 19-1010 LAKE APOPKA, X, Y, DES 100 PERCENT DWS



Signature
Michael R. King, P.E.
FL Professional Eng. # 71640
Date

REV	NO	DATE	DESCRIPTION
1	1		
2	2		
3	3		
4	4		
5	5		
6	6		

LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION
MECHANICAL DETAILS
LAKE APOPKA, FLORIDA

DESIGN	DATE	ISSUE	ISSUE
MRK	19-1010	AUGUST 2020	100%

FOUR WATERS ENGINEERING
324 6th AVE. N. JACKSONVILLE BEACH, FLORIDA 32250
904-444-2400 C.O.A.# 31101 WWW.FWENG.COM

DRAWING NUMBER
M-1

100% SPECIFICATIONS FOR

LAKE AOPKA NORTH SHORE

INTERCONNECT PUMP STATION

Prepared for:



Prepared by:

Four Waters Engineering, Inc.
324 6th Avenue North
Jacksonville Beach, FL 32250
(904) 414-2400

August 2020



St. Johns River Water Management District Lake Apopka North Shore Interconnect Pump Station

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**SECTION 01000
GENERAL REQUIREMENTS**

PART 1 - GENERAL

1.01 SCOPE AND INTENT

A. Description of Project:

The project consists of the construction of a canal transfer pumping station, culvert installation, and earthen berm, culverts and controls located approximately 1.15 miles north of Lake Apopka near the intersection of Canal Road and Fudge/McDonald Road, Apopka, Florida 32703.

B. Work Included:

1. The Contractor shall furnish all supervision, labor, materials, power, light, heat, fuel, water, tools, appliances, equipment, supplies, and means of construction necessary for proper performance and completion the work. The Contractor shall obtain and pay for all required permits. The Contractor shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the District (St. Johns River Water Management District), and in strict accordance with the Contract Documents. The Contractor shall clean up the Work and maintain it during and after construction, until accepted, and shall do all work and pay all costs incidental thereto. The Contractor shall repair or restore all structures and property that may be damaged or disturbed during performance of the Work.
2. The cost of incidental work described in these General Requirements, for which there are no specific Contract Items, shall be considered as part of the general cost of doing the Work and shall be included in the prices for the various Contract Items. No additional payment will be made for incidental work.
3. The Contractor shall provide and maintain such modern materials, tools, and equipment as may be necessary, in the opinion of the District and Engineer, to perform in a satisfactory and acceptable manner all the work required by this Contract. Only equipment of established reputation and proven efficiency shall be used. The Contractor shall be solely responsible for the adequacy of his workmanship, materials and equipment, prior approval of the District or Engineer notwithstanding.

C. Public Utility Installations and Structures:

1. Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, vaults, manholes and all other

appurtenances and facilities pertaining thereto whether owned or controlled by the District, other governmental bodies or privately owned by individuals, firms or corporations, used to serve the public with transportation, traffic control, gas, electricity, telephone, sewerage, drainage, water or other public or private property which may be affected by the Work shall be deemed included hereunder.

2. The Contract Documents contain data relative to existing public utility installations and structures above and below the ground surface. These data are not guaranteed as to their completeness or accuracy and it is the responsibility of the Contractor to make its own investigations to inform itself fully of the character, condition and extent of all such installations and structures as may be encountered and as may affect the construction operations.
3. The Contractor shall protect all public utility installations and structures from damage during the work. Access across any buried public utility installation or structure shall be made only in such locations and by means approved by the District and Engineer. The Contractor shall so arrange its operations as to avoid any damage to these facilities. All required protective devices and construction shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor which are shown on the Drawings or have been located in the field by the utility shall be repaired by the Contractor, at its expense, as directed by the District. No separate payment shall be made for such protection or repairs to public utility installations or structures.
4. Public utility installations or structures owned or controlled by the District or other governmental body which are shown on the Drawings to be removed, relocated, replaced or rebuilt by the Contractor shall be considered as a part of the general cost of doing the work and shall be included in the prices bid for the various contract items. No separate payment shall be made therefore.
5. Where public utility installations of structures owned or controlled by the District or other governmental body are encountered during the course of the work, and are not indicated on the Drawings or in the Technical Specifications "Specifications", and when, in the opinion of the Engineer, removal, relocation, replacement or rebuilding is necessary to complete the work under this Contract, such work shall be accomplished by the utility having jurisdiction, or such work may be ordered, in writing by the District, for the Contractor to accomplish. If such work is accomplished by the utility having jurisdiction it will be carried out expeditiously and the Contractor shall give full cooperation to permit the utility to complete the removal, relocation, replacement or rebuilding as required. If such work is accomplished by the Contractor, it will be paid for as extra work as provided in the Agreement.
6. The Contractor shall, at all times in performance of the work, employ approved methods and exercise reasonable care and skill so as to avoid unnecessary delay, injury, damage or destruction of public utility installations

and structures; and shall, at all times in the performance of the work, avoid unnecessary interference with, or interruption of, public utility services, and shall cooperate fully with the District thereof to that end.

7. The Contractor shall give written notice to District, other governmental utility departments and other owners of public utilities of the location of his proposed construction operations, at least forty-eight hours in advance of breaking ground in any area or on any unit of the work.
8. The maintenance, repair, removal, relocation or rebuilding of public utility installations and structures, when accomplished by the Contractor as herein provided, shall be done by methods approved by the owners of such utilities.

1.02 DRAWINGS AND PROJECT MANUAL

- A. Drawings: When obtaining data and information from the Drawings, figures shall be used in preference to scaled dimensions, and large scale drawings in preference to small scale drawings.
- B. Copies Furnished to Contractor:
 1. After the payment and performance bond and insurance have been submitted and approved by the District, and the Contract has been executed by both parties, the District will furnish the Contractor one (1) complete set of drawings (22-inch by 34-inch).
 2. The Contractor shall furnish each of the subcontractors, manufacturers, and material suppliers such copies of the Contract Documents as may be required for their work. All copies of the Contract Documents shall be printed from the reproducible sets furnished to the Contractor. All costs of reproduction and printing shall be borne by the Contractor.
- C. Supplementary Drawings:
 1. When, in the opinion of the District and Engineer, it becomes necessary to explain more fully the work to be done or to illustrate the work further or to show any changes which may be required, drawings known as Supplementary Drawings, with Specifications pertaining thereto, will be prepared by the ENGINEER and the Contractor will be furnished one (1) complete set of drawings (22-inch by 34-inch).
 2. The Supplementary Drawings shall be binding upon the Contractor with the same force as the Drawings. Where such Supplementary Drawings require either less or more than the estimated quantities of work, credit to the District or compensation therefore to the Contractor shall be subject to the terms of the Agreement.
- D. Contractor to Check Drawings and Data:

1. The Contractor shall verify all dimensions, quantities and details shown on the Drawings, Supplementary Drawings, schedules, Specifications or other data received from the District and Engineer, and shall notify the District of all errors, omissions, conflicts, and discrepancies found therein. Failure to discover or correct errors, conflicts or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction or improper operation resulting there from nor from rectifying such conditions at the Contractor's own expense. The Contractor will not be allowed to take advantage of any errors or omissions, as full instructions will be furnished by the Engineer, should such errors or omissions be discovered.
 2. All schedules are given for the convenience of the Engineer and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quality of materials and equipment included in work to be done under the Contract.
- E. Technical Specifications: The Specifications consist of three parts: General, Products and Execution. The General Section contains General Requirements which govern the Work. Products and Execution modify and supplement these by detailed requirements for the Work and shall always govern whenever there appears to be a conflict.
- F. Intent:
1. All Work called for in the Specifications applicable to this Contract, but not shown on the Drawings in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified in either the Drawings or in the Specifications, but involved in carrying out their intent or in the complete and proper execution of the work, is required and shall be performed by the Contractor as though it were specifically delineated or described.
 2. The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, and interpretation of these Specifications shall be made upon that basis.

1.03 MATERIALS AND EQUIPMENT

A. Manufacturer:

1. The names of proposed manufacturers, material suppliers, and dealers who are to furnish materials, fixtures, equipment, appliances or other fittings shall be submitted to the Engineer for approval, as early as possible, to afford proper investigation and checking. Such approval must be obtained before Shop

Drawings will be checked. No manufacturer will be approved for any materials to be furnished under this Contract unless he shall be of good reputation and have manufactured products of ample capacity. The manufacturer shall, upon the request of the Engineer, be required to submit evidence that he has manufactured a similar product to the one specified and that it has been previously used for a like purpose for a sufficient length of time to demonstrate its satisfactory performance.

2. All transactions with the manufacturers or subcontractors shall be through the Contractor, unless the Contractor shall request, in writing to the Engineer, that the manufacturer or subcontractor deal directly with the Engineer. Any such transactions shall not in any way release the Contractor from his full responsibility under this Contract.
 3. Any two or more pieces of material or equipment of the same kind, type or classification, and being used for identical types of service, shall be made by the same manufacturer.
- B. Delivery and Storage:
1. The Contractor shall deliver and store materials to the site in ample quantities to ensure the most speedy and uninterrupted progress of the work so as to complete the work within the allotted time. However, the Contractor shall not store materials on site for more than thirty days before installation.
 2. The Contractor shall also coordinate deliveries in order to avoid delay in, or impediment of, the progress of the work of any related Contractor.
 3. All materials and equipment shall be properly stored on site in accordance with these Specifications and the manufacturer's recommendations.
- C. Service of Manufacturer's engineer:
1. The Contract prices for equipment shall include the cost of furnishing a competent and experienced engineer or superintendent who shall represent the manufacturer and shall assist the Contractor, when required, to install, adjust, test and place in operation, the equipment in conformity with the Contract Documents.
 2. After the equipment is placed in permanent operation by the District, such engineer or superintendent shall make all adjustments and tests required by the Engineer to prove that such equipment is in proper and satisfactory operating condition and shall instruct such personnel as may be designated by the District in the proper operation and maintenance of such equipment.

1.04 INSPECTION AND TESTING

A. General:

1. Inspection and testing of materials will be provided by the Contractor and witnessed by the District unless otherwise specified.

- a. Pressure Testing of New Piping
 - b. Pump Testing
2. The testing personnel shall make the necessary inspections and tests, and the reports thereof shall be in such form as will facilitate checking to determine compliance with the Contract Documents. Five copies of the reports shall be submitted and authoritative certification thereof must be furnished to the District as a prerequisite for the acceptance of any material or equipment.
 3. If, in the making of any test of any material or equipment, it is ascertained by the Engineer that the material or equipment does not comply with the Contract Documents, the Contractor will be notified thereof by the District and the Contractor will be directed to refrain from delivering said material or equipment, or to remove it promptly from the site or from the work and replace it with acceptable material, without cost to the District.
 4. 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 District normally takes over the operation thereof.

B. Costs:

1. Inspection and testing of materials furnished under this Contract will be provided by the Contractor, unless otherwise specified.
2. The cost of shop and field tests of equipment and certain other tests specifically called for in the Contract Documents shall be borne by the Contractor and such costs shall be deemed to be included in the Contract price.
3. Materials and equipment submitted by the Contractor as the equivalent to those specifically named in the Contract may be tested by the District for compliance. The Contractor shall reimburse the District for the expenditures incurred in making such tests of materials and equipment which are rejected for non-compliance.

C. Inspection of Materials:

1. The Contractor shall give notice in writing to the District, sufficiently in advance of his intention to commence the manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. Such notice shall contain a request for inspection, the date of commencement and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice, the District will arrange to have a representative present at such times during the manufacture as may be necessary to inspect the materials or he will notify the Contractor that the inspection will be made at a point other than the point of manufacture.

2. The Contractor must comply with these provisions before shipping any material. Such inspection shall not release the Contractor from the responsibility for furnishing materials meeting the requirements of the Contract Documents.
- D. Certificate of Manufacture:
1. When inspection is waived or when the District so requires, the Contractor shall furnish to the Engineer authoritative evidence in the form of Certificate of Manufacture that the materials to be used in the work have been manufactured and tested in conformity with the Contract Documents.
 2. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.
- E. Shop Tests:
1. Testing for pressure, duty, capacity, rating, efficiency, performance, function or special requirements which are specified shall be tested in the shop of the maker in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents.
 2. No such equipment or materials shall be shipped to the work site until the District notifies the Contractor, in writing, that the results of such tests are acceptable.
 3. Five copies of the manufacturer's actual test data and interpreted results thereof, accompanied by a certificate of authenticity sworn to be a responsible official of the manufacturing company and/or independent laboratory, shall be forwarded to the District and Engineer for approval.
 4. The cost of shop tests and of furnishing manufacturer's preliminary and shop test data of operating equipment shall be borne by the Contractor.
- F. Final Field Tests:
1. Upon completion of the work and prior to final payment, all equipment and piping installed under this Contract shall be subjected to acceptance tests as specified or required to provide compliance with the Contract Documents.
 2. The Contractor shall furnish labor, fuel, energy, water and all other materials, equipment and instruments necessary for all acceptance tests, at no additional cost to the District. The Contractor and furnishing Manufacturer shall assist in the final field tests as applicable.
- G. Final Inspection: During such final inspections, the Work shall be clean and functional.

1.05 ACCIDENT PREVENTION

- A. Precautions shall be exercised at all times for the protection of person and property. The safety provisions of applicable laws, building and construction codes shall be observed.
- B. The Contractor shall comply with the U.S. Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91-596), and under Hours and Safety Standards Act Section 107. Hours and Safety Standards Act (PL 91-54), except where state and local safety standards exceed the federal requirements and except where state safety standards have been approved by the Secretary of Labor in accordance with provisions of the Occupational Safety and Health Act, shall be complied with.
- C. First Aid: The Contractor shall keep upon the site, at each location where work is in progress, a completely equipped first aid kit and shall provide ready access thereto at all times when men are employed on the work.

1.06 LINES AND GRADES

- A. Grade:
 - 1. All work under this Contract shall be constructed in accordance with the lines and grades shown on the Drawings, or as given by the Engineer. The full responsibility for keeping alignment and grade shall rest upon the Contractor.
 - 2. Bench marks and base line controlling points shall be established prior to beginning work. Reference marks for lines and grades as the work progresses will be located to cause as little inconvenience to the prosecution of the work as possible. The Contractor shall so place excavation and other materials as to cause no inconvenience in the use of the reference marks provided. The Contractor shall remove any obstructions placed by the Contractor contrary to this provision.
- B. Surveys:
 - 1. The Contractor shall furnish and maintain, at the Contractor's expense, stakes and other such materials.
 - 2. The Contractor shall check such reference marks by such means as he may deem necessary and, before using them, shall call the Engineer's attention to any inaccuracies.
 - 3. The Contractor shall, at the Contractor's expense, establish all working or construction lines and grades as required from the reference marks set by the District, and shall be solely responsible for the accuracy thereof.
- C. Safeguarding Marks:

1. The Contractor shall safeguard all points, stakes, grade marks, monuments and bench marks made or established on the work, bear the cost of reestablishing them if disturbed, and bear the entire expense of rectifying work improperly installed due to not maintaining or protecting or to removing without authorization such established points, stakes and marks.
2. The Contractor shall safeguard all existing and known property corners, monuments and marks adjacent to but not related to the work and, if required, shall bear the cost of reestablishing them if disturbed or destroyed.

1.07 ADJACENT STRUCTURES AND LANDSCAPING

A. Responsibility:

1. The Contractor shall also be entirely responsible and liable for all damage or injury as a result of the Contractor's operations to all other adjacent public and private property, structures of any kind and appurtenances thereto met with during the progress of the work.
2. The cost of protection, replacement in their original locations and conditions or payment of damages for injuries to such adjacent public and private property and structures affected by the work, whether or not shown on the Drawings, and the removal, relocation and reconstruction of such items called for on the Drawings or specified shall be included in the various Contract Items and no separate payments will be made therefore.
3. Contractor is expressly advised that the protection of buildings, structures, tanks, pipelines, power poles, etc. and related work adjacent and in the vicinity of his operations, wherever they may be, is solely the Contractor's responsibility.
4. Conditional inspection of buildings or structures in the immediate vicinity of the project which may reasonably be expected to be affected by the Work shall be performed by and be the responsibility of the Contractor.
5. Contractor shall, before starting operations, make an examination of the adjacent structures, buildings, facilities, etc., and record by notes, measurements, photographs, video, etc., conditions which might be aggravated by open excavation and construction. Repairs or replacement of all conditions disturbed by the construction shall be made to the satisfaction of the District. Copies of surveys, photographs, reports, etc., shall be given to the District.
6. Prior to the beginning of any excavations the Contractor shall advise the District of all structures on which he intends to perform work or which performance of the project work will affect.

- B. Protection of Trees: All trees and shrubs shall be adequately protected by the Contractor with boxes and otherwise and in accordance with ordinances governing the protection of trees. Excavated materials shall be placed so as not to injure such

trees or shrubs. Trees or shrubs destroyed by negligence of the Contractor or his employees shall be replaced by him with new stock of similar size and age, at its proper season and at the sole expense of the Contractor.

- C. Lawn Areas: Lawn areas shall be left in as good condition as before the starting of the work. Where sod is to be removed, it shall be carefully removed, and later replaced, or the area where sod has been removed shall be restored with new sod. It is the responsibility of the Contractor to water replaced sod until roots are established.

1.08 PROTECTION OF WORK AND PUBLIC

A. Barricades, Guards and Safety Provisions:

1. The Contractor shall be solely responsible for adhering to the rules and regulations of OSHA and appropriate authorities regarding safety provisions. To protect persons from injury and to avoid property damage, adequate barricades, construction signs, lights and guards as required shall be placed and maintained by the Contractor at his expense during the progress of the Work and until it is safe for traffic to use the roads and streets. Material piles, equipment and pipe which may serve as obstructions for traffic shall be enclosed by fences or barricades and shall be protected by proper lights when the visibility is poor.
2. Signage and barricades shall be in accordance with the latest editions of applicable FDOT manuals.
3. During construction, pedestrian corridors shall be maintained in a safe, passable, and stabilized manner. Measures utilized shall include, but not be limited to, boardwalks or stabilized pathways. The Contractor shall be solely responsible for coordination with School Board Transportation Safety Manager for potential construction impacts to schoolyards and crossings. Closure of any sidewalks and/or school crossings near schools shall require coordination with the School Board Transportation Safety Manager and written authorization from Utilities if construction is conducted when school is in session.
4. Contractor shall notify the District 72 hours prior to any construction activity that will block Laughlin Road (Wildlife Drive) or Fudge Road.
5. Canal Road and Fudge/McDonald Road (Wildlife Drive) is open to public access on Fridays, Saturdays, Sundays, and during Federal holidays. Contractor shall take caution at all times and ensure the safety of the public.
6. The Contractor shall coordinate any traffic conflicts with other contractors or District.

B. Noise:

1. The Contractor shall eliminate noise to as great an extent as practicable at all times. Air compressing equipment shall be equipped with silencers and the

exhaust of all gasoline motors or other power equipment shall be provided with mufflers. The Contractor shall construct sound barriers as necessary to eliminate noise.

2. In the vicinity of hospitals and schools, special care shall be used to avoid noise or other nuisances. The Contractor shall strictly observe all local regulations and ordinances covering noise control.
 3. Except in the event of an emergency, all work shall be done pursuant to Section 51 of the Contract entitled WORK SCHEDULE.
- C. Access to Public Services: Neither the materials excavated nor the materials or equipment used in the construction of the work shall be so placed as to prevent free access to all fire hydrants, valves, manholes or other public services.
- D. Dust Prevention: The Contractor shall prevent dust nuisance from his operations or from traffic by keeping the roads and/or construction areas sprinkled with water at all times.

1.09 CUTTING AND PATCHING

- A. The Contractor shall do all cutting, fitting or patching of his portion of the work that may be required to make the several parts thereof join and coordinate in a manner satisfactory to the Engineer and in accordance with the Drawings and Specifications.
- B. The work must be done by competent workmen skilled in the trade required by the restoration.

1.10 CLEANING

- A. During Construction:
 1. During construction of the work, the Contractor shall, at all times, keep the site of the work and adjacent premises as free from material, debris and rubbish as is practicable and shall remove the same from any portion of the site if, in the opinion of the District and Engineer, such material, debris, or rubbish constitutes a nuisance or is objectionable.
 2. The Contractor shall remove from the site all of his surplus materials and temporary structures when no further need therefore develops. Contractor shall be responsible and liable for all spillage and incur all associated costs including, but not limited to, costs related to repair and maintenance resulting from damages thereof, and fines that may be levied as a result of citations given by State or local regulatory agencies.
- B. Final Cleaning:
 1. At the conclusion of the Work, all erection plant, tools, temporary structures and materials belonging to the Contractor shall be promptly taken away, and

he shall remove and promptly dispose of all water, dirt, rubbish or any other foreign substances in a legal manner.

1.11 MISCELLANEOUS

A. Protection Against Siltation and Bank Erosion:

1. The Contractor shall arrange his operations and construct erosion control devices to minimize siltation and bank erosion on construction sites and on existing or proposed water course and drainage channels.
2. The Contractor, at his own expense, shall remove any siltation deposits and correct any erosion problems as directed by the District which results from his construction operations.

B. Protection of Wetland Areas:

1. The Contractor shall properly dispose of all surplus material, including soil, in accordance with local, state and federal regulations.
2. Under no circumstances shall surplus material be disposed of in wetland areas as defined by the Florida Department of Environmental Protection or the wetland areas under construction under this project.

C. Existing Facilities: The Work shall be so conducted to maintain existing traffic lanes in operation, except where shown in the Drawings.

D. Use of Chemicals: All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfection, polymer, reactant, or of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.

E. Cooperation With Other Contractors and Forces:

1. During progress of work under this Contract, it may be necessary for other contractors and persons employed by the District to work in or about the project.
2. The District reserves the right to put such other contractors to work and to afford such access to the Site of the Work to be performed hereunder at such times as the District deems proper.
3. The Contractor shall not impede or interfere with the work of such other contractors engaged in or about the Work and shall so arrange and conduct his work that such other contractors may complete their work at the earliest date possible.

F. Construction shall be conducted and shall result in construction of the improvements of this project in full accordance with the conditions of the permits granted for the project.

1.12 WARRANTY SUBMITTALS REQUIREMENTS

1. For all major pieces of equipment, submit a warranty from the equipment manufacturer. The manufacturer's warranty period shall be concurrent with the Contractor's for one (1) year, unless otherwise specified, commencing at the time of final acceptance by the District.
2. The Contractor shall be responsible for obtaining certificates for equipment warranty for all major equipment specified which 1 Hp motor or which lists for more than \$1,000. The Engineer reserves the right to request warranties for equipment not classified as major. The Contractor shall still warrant equipment not considered to be "major" in the Contractor's one-year warranty period even though certificates of warranty may not be required.
3. The District shall incur no labor or equipment costs during the guarantee period.
4. Guarantee shall cover all necessary labor, equipment and replacement parts resulting from faulty or inadequate design, improper assembly or erection, defective workmanship and materials, leakage, breakage or other failure of all equipment and components furnished by the manufacturer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01010
SUMMARY OF PROJECT

PART 1 - GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

A. This Contract is for the construction of the Lake Apopka North Shore Interconnect Pump Station, Bid Number 36033 for the St. Johns River Water Management District (District). The Work consists of furnishing all labor, equipment, and materials for the construction of the facilities consisting of, but not limited to, the following:

1. Construction of a canal transfer pump station with two (2) 75 HP angled line shaft, axial flow pumps, 30” welded steel piping, fittings, valves, pump supports and pilings, platform structure and pilings, concrete sump and sheet piling, and all associated electrical, controls, and instrumentation to complete fully operating canal transfer pumps station as shown on the Drawings and specified in the Specifications.
2. Site work construction and improvements in the vicinity of the new canal transfer pump station consisting of site grading, installation of pre-engineering canopy, construction of concrete pad and unpaved pump station access , installation of chain link fencing, installation of shoreline erosion protection including engineered turf and rip rap, and installation of sodding as shown on the Drawings and specified in the Specifications.
3. Construction of an earthen berm across the drainage canal and installation of two (2) 60” corrugated aluminum alloy cross drain culverts with motor operated slide gate as shown on the Drawings and specified in the Specifications.
4. Installation of a 48” corrugated aluminum alloy cross drain culvert with motor operated slide gate across Canal Road as shown on the Drawings and specified in the Specifications.

1.02 CONTRACTOR’S USE OF PREMISES

A. The Contractor shall assume full responsibility for the protection and safekeeping of products and materials at the job site. If additional storage or work areas are required, they shall be obtained by the Contractor at no additional cost to the District.

1.03 PROJECT SEQUENCE

A. The Contractor shall establish his work sequence based on the use of crews to facilitate completion of construction and testing within the specified Contract Time.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

**SECTION 01025
MEASUREMENT AND PAYMENT**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall receive and accept the compensation provided in the Cost Schedule and the Contract Documents as full payment for furnishing all materials, labor, tools and equipment, for performing all operations necessary to complete the Work under the Contract, and also in full payment for all loss or damages arising from the nature of the Work, or from any discrepancy between the actual quantities of work and quantities herein estimated by the Engineer or from the action of the elements of any unforeseen difficulties which may be encountered during the prosecution of the Work until the final acceptance by the District.
- B. The prices stated in the proposal include all costs and expenses for taxes, labor, equipment, materials, commissions, transportation charges and expenses, patent fees and royalties, labor for handling materials during inspection, together with any and all other costs and expenses for performing and completing the Work as shown on the Drawings and specified herein.
- C. The Contractor's attention is again called to the fact that the quotations for the various items of work are intended to establish a total price for completing the Work in its entirety.

1.02 PAYMENT

- A. Payments will be made pursuant to Section 6 of the Contract entitled Payment of Invoices.

1.03 PAYMENT OF BID ITEMS

- A. No separate payment will be made for the following Work and its cost shall be included in appropriate Payment Items
 1. Maintenance and replacement of plantings and sodding.
 2. Record drawings.
 3. Construction photographs and videotape recordings.
 4. Field office(s) and storage facilities.
 5. Clean up.
 6. Testing.
 7. Appurtenant work.
 8. Contractor fees associated with the performance of the Work.
 9. Three (3) Copies of warranties and Operations and Maintenance manuals.
- B. The following will clarify the Work included for bid items in the Itemized Cost Schedule:
 1. Mobilization (Bid Item No. 1)

- a. This item shall be for the preparatory work and operations in mobilizing for beginning work on the Project. Examples of work under this item include:
 - i. Securing required permits and payment of any permit fees by the Contractor.
 - ii. The mobilization of field offices, buildings, safety equipment, first aid supplies, sanitary and other facilities, as required.
 - iii. Preparation of an initial construction schedule.
 - iv. Provision of preconstruction photographs and video documentation.
 - b. The Contractor is responsible for securing a site for storage of materials and equipment and all other construction needs and providing security for this site and its contents.
2. General Conditions (Bid Item No. 2)
- a. Measurement of various items for General Conditions will not be made for payment and all items shall be included in the lump sum price. Such price and payment shall be full compensation for the general requirements are defined in Division 1 of the Specifications. Examples of work under this item include:
 - i. The provision of and maintenance of field offices, buildings, safety equipment, first aid supplies, sanitary and other facilities, as required.
 - ii. Installation of temporary erosion and sedimentation control facilities
 - iii. Site security facilities
 - iv. Providing shop drawings, schedules, samples, testing, operating and maintenance manuals, and record documents
 - v. Surveying and field engineering
 - vi. Payment and performance bonds
 - b. The General Conditions shall include costs for addressing Division 1 requirements such as shop drawings, schedules, samples, testing, surveying, field engineering, record documents, operating and maintenance manual, and similar items.
3. Angled Lineshaft Axial Flow Pumps (Bid Item No. 3)
- a. The quantity for payment shall be the actual number of angled lineshaft axial flow pumps with associated appurtenances satisfactorily furnished, installed, tested and incorporated into the canal transfer pump station.
 - b. Measurement for this item shall be for furnishing all labor, materials and equipment to furnish, install, and test the angled lineshaft axial flow pumps at the canal transfer pump station complete with motors, belts and pulleys, pump mounting, discharge piping and fittings, and flap gate valves, and all incidental and related work to complete this item as shown on the Drawings and detailed in the Specifications.

4. Canal Transfer Pump Station (Bid Item No. 4)
 - a. Measurement for this item shall be for furnishing all labor, materials and equipment necessary to construct the canal transfer pump station including the pump station platform and pilings, pump supports and pilings, sheet piling, engineered turf, fencing, fill and grading, unpaved road surface, concrete pads and sumps, pump station control panel, electrical, instrumentation and controls, stilling wells, associated rip-rap, and other appurtenances as shown on the drawings and detailed in the Specifications.
5. Earthen Berm, Culverts, and Slide Gates (Bid Item No. 5)
 - a. Measurement for this item shall be for furnishing all labor, materials and equipment necessary to construct an earthen berm across the drainage canal, install two cross-drain culverts with precast concrete drainage structure and remote operated slide gates, associated rip-rap, stilling wells, unpaved access road, and other appurtenances as shown on the Drawings and detailed in the Specifications.
6. Culvert and Slide Gate (Bid Item No. 6)
 - a. Measurement for this items shall be for furnishing all labor, materials and equipment necessary to install a culvert across Canal Road with precast concrete drainage structure and remote operated slide gate, associated rip-rap, stilling well, and other appurtenances as shown on the Drawings and detailed in the Specifications.
7. Demobilization and Cleanup (Bid Item No. 7)
 - a. Measurement of various items for Demobilization and Cleanup shall be for cleanup of the construction site and storage areas, demobilizing equipment, materials, and facilities, and ending work on the Project.
8. Supplemental Work Allowance (Bid Item No. 8)
 - a. The purpose of this item is to allow minor deviations from the construction documents to be paid by the District without the need for a change order. Minor work not covered by the contract documents, must be approved in writing by the District project manager prior to beginning any supplemental work. The supplemental work allowance may only be charged if directed by the project manager to do so. Any work not authorized to be performed under the supplemental work allowance, shall not be performed unless and until an executed change order is issued by the District.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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**SECTION 01041
PROJECT COORDINATION**

PART 1 - GENERAL

1.01 PIPE LOCATIONS

- A. Piping and culverts shall be located substantially as indicated on the Drawings, but the District and Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items where required with prior approval from the District.

1.02 OPEN EXCAVATIONS

- A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights, and other means to prevent accidents to persons, and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by workmen.

1.03 TEST PITS

- A. Test pits for the purpose of locating underground pipelines or structures in advance of the construction shall be excavated, backfilled, and compacted by the Contractor. Test pits shall be backfilled immediately after their purpose has been satisfied and maintained in a manner satisfactory to the District and Engineer. The costs for such test pits shall be borne by the Contractor.

1.04 CARE AND PROTECTION OF PROPERTY

- A. The Contractor shall be responsible for the preservation of all public and private property and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the Work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition similar or equal to that existing before the damage was done, or he shall make good the damage in other manner acceptable to the District and Engineer.

1.05 COOPERATION WITHIN THIS CONTRACT

- A. The Contractor shall, prior to interrupting a utility service (water, sewer, etc.) for the purpose of making cut-ins to the existing lines or for any other purposes, contact the

District and make arrangements for the interruption which will be satisfactory to the District.

- B. Canal Road and Fudge/McDonald Road are open to public access on Fridays, Saturdays, Sundays, and during Federal holidays. Contractor shall take caution at all times and ensure the safety of the public.
- C. Contractor shall notify the District 72 hours prior to any construction activity that will block Canal Road or Fudge/MacDonald Road.

1.06 UTILITY NOTIFICATION AND COORDINATION

- A. Provide for the coordination of the Work with the required work of public agencies and utilities. Contact Sunshine State One Call of Florida prior to any work in areas of existing utilities. Notify applicable utilities prior to commencing Work, if damage occurs, or if conflicts or emergencies arise during Work.
- B. Contractor is responsible for addressing conflicts with existing piping on site.

1.07 PROJECT MILESTONES

- A. General: Include the Milestones specified herein as a part of the Progress Schedule required under Section 01310, Construction Progress Schedule, Construction Progress Documentation, and the Agreement.
- B. Project Milestones: Generally described in the Agreement Form. Following is a detailed description of each:

1. Substantial Completion

- a. The work may not be considered substantially complete unless the punch list items that remain, as identified by the District, can be completed within thirty (30) days. All painting, finishes, fencing, cleanup, final grading, grassing and landscape planting shall have been completed and ready for inspection before substantial completion is given. After (or concurrent with) the Demonstration Tests, with any minor deficiencies noted, the Contractor wishing to consider the Work substantially complete, shall have work completed as follows and submit to the District:
 - i. A written notice that the Work is substantially complete.
 - ii. A list of items to be completed or corrected and explanations thereof.
 - iii. All Operations and Maintenance manuals have been submitted and approved in accordance with the contract documents.
 - iv. Project Record Documents are complete and have been submitted and reviewed in accordance with the Contract documents.

- v. All areas to be used and occupied are safe, operable in automatic and complete.
 - vi. All deficiencies noted on inspection reports or non-conformances are corrected or the correction plan is approved.
- b. Within a reasonable time after receipt of such notice, the District will make an inspection, if necessary, to determine the status of completion.
 - c. Should District determine that the Work is not substantially complete:
 - i. The District and Engineer will promptly notify Contractor in writing, giving the reasons therefore.
 - ii. Contractor shall remedy the deficiencies in the Work within 16 days and send a second written notice of substantial completion to District and Engineer.
 - iii. District and Engineer will reinspect the Work.
 - d. When District finds that the Work is substantially complete, they will:
 - i. Prepare a tentative Certificate of Substantial Completion, with a tentative list of items to be completed or corrected before final inspection.
 - ii. After consideration of any objections made by the District as provided in the General Conditions of the Contract, the Engineer will execute the Certificate of Substantial Completion with a revised list of items to be completed or corrected.
2. Final Completion
- a. When Contractor considers the Work is complete with all minor deficiencies completed or corrected, he shall submit written certification that:
 - i. Contract Document requirements have been met.
 - ii. Work has been inspected for compliance with Contract Documents.
 - iii. Work has been completed in accordance with Contract Documents.
 - iv. Equipment and systems have been tested in the presence of the District's representative and are operational.
 - v. All minor deficiencies have been corrected or completed and the Work is ready for final inspection.
 - vi. Project record documents are complete and submitted.
 - vii. Transfer of all spares and expendables has been made to the District with a full accounting of the quantities and amounts due.
 - b. District will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.

- c. Should District consider that the Work is incomplete or defective:
 - i. District and Engineer will promptly notify the Contractor in writing, listing the incomplete or defective work.
 - ii. Contractor shall take immediate steps to remedy the stated deficiencies within 16 days, and send a second written certification to District that the Work is complete.
 - iii. District will reinspect the Work.
- d. When the District and Engineer find that the Work is acceptable under the Contract Documents, the District shall request the Contractor to make closeout submittals.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

3.01 COORDINATION OF WORK

- A. Coordinate the Work of all trades so that each will have sufficient space and time within which to work properly and efficiently.
- B. Changes in the intended design of the Project as a result of improperly coordinated construction Work will not be tolerated. Delays in the Work caused by rejections of installed materials due to improper coordination, and as otherwise specified, will not be considered valid justification for extensions of Contract Time.

3.02 CUTTING, FITTING, AND PATCHING

- A. Cut, fit, adjust, or patch Work and work of others, including excavation and backfill as required, to make Work complete.
- B. Restore existing work, surfaces that are to remain in completed work including concrete-embedded piping, conduit, and other utilities as specified and as shown.
- C. Make restorations with new materials and appropriate methods as specified for new Work of similar nature; if not specified, use recommended practice of manufacturer or appropriate trade association.

END OF SECTION

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SECTION 01070
ABBREVIATIONS AND SYMBOLS

PART 1 - GENERAL

1.01 STANDARDS AND ABBREVIATIONS

- A. Referenced Standards: Any reference to published specifications or standards of any organization or association shall comply with the requirements of the specification or standard which is current on the date of Advertisement for Bids. In case of a conflict between the referenced specifications or standards, the one having the more stringent requirements shall govern.

In case of conflict between the referenced specifications or standards and the Contract Documents, the Contract Documents shall govern.

- B. Abbreviations:

AAA	American Arbitration Association
AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturers Association
AASHTO	American Association of State Highway & Transportation Officials
ABA	American Bar Association
ABMA	American Boiler Manufacturers Association
ABPA	Acoustical and Board Products Association
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies
AFBMA	Anti-Friction Bearing Manufacturers Association
AGA	American Gas Association
AGC	Associated General Contractors of America
AGMA	American Gear Manufacturers Association
AHA	American Hardboard Association
AI	The Asphalt Institute
AIA	American Institute of Architects
AIA	American Insurance Association
AIEE	American Institute of Electrical Engineers (Now IEEE)
AIMA	Acoustical and Insulating Materials Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Condition Association
ANSI	American National Standards Institute
APA	American Plywood Association

API	American Petroleum Institute
APWA	American Public Works Association
ARI	American Refrigeration Institute
ASA	American Standards Association (Now ANSI)
ASAHC	American Society of Architectural Hardware Consultants
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASSCBC	American Standard Safety Code for Building Construction
ASTM	American Society for Testing and Materials
AWG	American Wire Gauge
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWPB	American Wood Preservers Bureau
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Institute of America (formerly SCPI)
CDA	Copper Development Association
CFS	Cubic Feet Per Second
CMAA	Crane Manufacturers Association of America
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard
DHI	Door and Hardware Institute
DIPRA	Ductile Iron Pipe Research Association
District	St. Johns River Water Management District
DOT Spec	Standard Specification for Road and Bridge Construction Florida Department of Transportation, 1982
E/A	Engineer and/or Architect
EDA	Economic Development Association
EEI	Edison Electric Institute
EPA	Environmental Protection Agency
FCI	Fluid Control Institute
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
Fed Spec	Federal Specification
FPS	Feet Per Second
FS	Federal Standards
GPM	Gallons Per Minute
HMI	Hoist Manufacturers Institute
HP	Horsepower
HSBII	Hartford Steam Boiler Inspection and Insurance Co.
ID	Inside Diameter
IEEE	Institute of Electrical and Electronic Engineers
IFI	Industrial Fasteners Institute
IPCEA	Insulated Power Cable Engineers Association

IPS	Iron Pipe Size
MGD	Million Gallons Per Day
MHI	Materials Handling Institute
MMA	Monorail Manufacturers Association
NBFU	National Board of Fire Underwriters
NBHA	National Builders' Hardware Association
NBS	National Bureau of Standards
NCSA	National Crushed Stone Association
NCSPA	National Corrugated Steel Pipe Association
NEC	National Electrical Code
NECA	National Electrical Contractors' Association
NEMA	National Electrical Manufacturers' Association
NFPA	National Fire Protection Association
NLA	National Lime Association
NPC	National Plumbing Code
NPT	National Pipe Threads
NSC	National Safety Council
NSF	National Sanitation Foundation
OD	Outside Diameter
OSHA	U.S. Department of Labor, Occupational Safety and Health Act
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PDF	Portable Document Format
PS	United States Products Standards
PSI	Pounds per Square Inch
PSIA	Pounds per Square Inch Absolute
PSIG	Pounds per Square Inch Gauge
RAS	Return Activated Sludge
RPM	Revolutions Per Minute
SAE	Society of Automotive Engineers
SDI	Steel Decks Institute
SJI	Steel Joists Institute
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SSI	Scaffolding and Shoring Institute
SSPC	Steel Structures Painting Council
SSPC	Structural Steel Painting Council
STA	Station (100 feet)
TDH	Total Dynamic Head
TH	Total Head
UBC	Uniform Building Code
UL	Underwriter's Laboratories, Inc.
USASI or	United States of America Standards Institute

C. Additional abbreviations and symbols are shown on the Drawings.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

**SECTION 01200
PROJECT MEETINGS**

PART 1 - GENERAL

1.01 GENERAL

- A. The District will schedule physical arrangements for meetings throughout progress of the Work, prepare meeting agenda with regular participant input and distribute with written notice of each meeting, preside at meetings, record minutes to include significant proceedings and decisions, and reproduce and distribute PDF copies of minutes within 5 business days after each meeting to participants and parties affected by meeting decisions.

1.02 PRECONSTRUCTION CONFERENCE

- A. CONTRACTOR shall be prepared to discuss the following subjects, as a minimum:

1. Required schedules.
2. Sequencing of critical path work items.
3. Progress payment procedures.
4. Project changes and clarification procedures.
5. Use of Site, access, office and storage areas, security and temporary facilities.
6. Major product delivery and priorities.
7. Contractor's safety plan and representative.

- B. Attendees will include:

1. District's representatives.
2. Contractor's office representative.
3. Contractor's resident superintendent.
4. Contractor's quality control representative.
5. Subcontractors' representatives whom Contractor may desire or District may request to attend.
6. Others as appropriate.

1.03 PROGRESS MEETINGS

- A. Contractor shall schedule regular progress meetings at the District Field Office located at 25633 County Road 448A, Mt Dora, FL 32757, conducted monthly to

review the Work progress, Progress Schedule, Schedule of Submittals, Application for Payment, contract modifications, and other matters needing discussion and resolution.

B. Attendees will include:

1. District's representative(s), as appropriate.
2. Contractor, Subcontractors, and Suppliers, as appropriate.
3. Engineer's representative(s).
4. Others as appropriate.

1.04 OTHER MEETINGS

- A. In accordance with Contract Documents and as may be required by District.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

**SECTION 01300
SUBMITTALS**

PART 1 - GENERAL

1.01 DEFINITIONS

- A. Submittal: Written and graphic information submitted by Contractor that requires Engineer's/District's approval. Submittals may include shop drawings, O&M manuals, samples, material testing results, and pressure test results.

1.02 PROCEDURES

- A. Direct submittals to District at the address identified at the Preconstruction Conference.

- B. Transmittal of Submittal:

- 1. Contractor shall:

- a. Review each submittal and check for compliance with Contract Documents.
 - b. Stamp each submittal with approval stamp before submitting to District.
 - i. Stamp to include Project name, Contract number, submittal number, Specification Section number, Contractor's reviewer name, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with Contract Documents.
 - ii. District will not review submittals that do not bear Contractor's approval stamp and will return them without action.

- 2. Complete, sign, and transmit with each submittal package, one Transmittal of Contractor's Submittal form in format approved by District.

- 3. Identify each submittal with the following:

- a. Numbering and Tracking System (for shop drawing submittals):
 - i. Sequentially number each submittal per Specification Section (i.e. 11201-001, 11261-002,...).
 - ii. Resubmission of submittal shall have original number with sequential alphabetic suffix (i.e. 11201-001A, ...).
 - b. Specification Section and paragraph to which submittal applies.
 - c. District's Project title and number, and Engineer's project number.

- d. Date of transmittal.
 - e. Names of Contractor, Subcontractor or Supplier, and manufacturer as appropriate.
- 4. Identify and describe each deviation or variation from Contract Documents.
- C. Format:
 - 1. Do not base Shop Drawings on reproductions of Contract Documents.
 - 2. Package submittal information by individual Specification Section. Do not combine different Specification Sections together in submittal package, unless otherwise directed in Specification.
 - 3. Present in a clear and thorough manner and in sufficient detail to show kind, size, arrangement, and function of components, materials, and devices, and compliance with Contract Documents.
 - 4. Index with labeled tab dividers in orderly manner.
- D. Timeliness: Schedule and submit in accordance Contractor's Schedule of Submittals, and requirements of individual Specification Sections.
- E. Processing Time:
 - 1. Time for review shall commence on District's receipt of submittal.
 - 2. District will act upon Contractor's submittal and transmit response to Contractor not later than 30 days after receipt, unless otherwise specified.
 - 3. Resubmittals will be subject to same review time.
 - 4. No adjustment of Contract Times or Price will be allowed due to delays in progress of Work caused by rejection and subsequent resubmittals.
- F. Resubmittals: Clearly identify each correction or change made.
- G. Incomplete Submittals:
 - 1. District will return entire submittal for Contractor's revision if preliminary review deems it incomplete.
 - 2. When any of the following are missing, submittal will be deemed incomplete:
 - a. Contractor's review stamp, completed and signed.
 - b. Transmittal of Contractor's Submittal, completed and signed.
 - c. Insufficient number of copies.
 - d. Electronic submittals that are poor quality scan and unreadable.
- H. Submittals not required by Contract Documents:
 - 1. Will not be reviewed and will be returned stamped or with Technical Memorandum "Not Subject to Review."

2. District will keep one copy and return all remaining copies to Contractor.

1.03 SUBMITTALS

A. Action Submittals:

1. Prepare and submit Action Submittals required by individual Specification Sections.
2. Shop Drawings:
 - a. Copies: Four copies for use by District, plus additional copies as required by Contractor. Electronic submittals may be used upon approval from the District.
 - b. Identify and indicate:
 - i. Applicable Contract Drawing and Detail number, products, units and assemblies, and system or equipment identification or tag numbers.
 - ii. Equipment and Component Title: Identical to title shown on Drawings.
 - iii. Critical field dimensions and relationships to other critical features of Work. Note dimensions established by field measurement.
 - iv. Project-specific information drawn accurately to scale.
 - c. Manufacturer's standard schematic drawings and diagrams as follows:
 - i. Modify to delete information that is not applicable to the Work.
 - ii. Supplement standard information to provide information specifically applicable to the Work.
 - d. Product Data: Provide as specified in individual Specifications.
 - e. Foreign Manufacturers: When proposed, include following additional information:
 - i. Names and addresses of at least two companies that maintain technical service representatives close to Project. At least one company shall be within 100 miles of the work.
 - ii. Complete list of spare parts and accessories for each piece of equipment.
3. Samples:
 - a. Copies: Three and electronic, unless otherwise specified in individual Specifications.
 - b. Preparation: Mount, display, or package Samples in manner specified to facilitate review of quality. Attach label on unexposed side that includes the following:

- i. Manufacturer name.
 - ii. Model number.
 - iii. Material.
 - iv. Sample source.
 - c. Manufacturer's Color Chart: Units or sections of units showing full range of colors, textures, and patterns available.
 - d. Full-size Samples:
 - i. Size as indicated in individual Specification Section.
 - ii. Prepared from same materials to be used for the Work.
 - iii. Cured and finished in manner specified.
 - iv. Physically identical with product proposed for use.
- 4. Action Submittal Dispositions: District will review, mark, and stamp as appropriate, and distribute marked-up copies as noted:
 - a. No Exceptions Taken:
 - i. Contractor may incorporate product(s) or implement Work covered by submittal.
 - ii. Distribution:
 - I.* Two (2) copies and electronic to District.
 - II.* Two (2) copies and electronic to Engineer.
 - III.* Remaining copies returned to Contractor appropriately annotated.
 - b. Note Comments:
 - i. Contractor may incorporate product(s) or implement Work covered by submittal, in accordance with District's notations.
 - ii. Distribution:
 - I.* Two (2) copies and electronic to District.
 - II.* Two (2) copies and electronic to Engineer.
 - III.* Remaining copies returned to Contractor appropriately annotated.
 - c. Resubmit:
 - i. Contractor may not incorporate product(s) or implement Work covered by submittal.
 - ii. Distribution:
 - I.* Two (2) copies and electronic to District.
 - II.* Two (2) copies and electronic to Engineer.
 - III.* Remaining copies returned to Contractor appropriately annotated.

- d. Rejected:
 - i. Contractor may not incorporate product(s) or implement Work covered by submittal. Product is unacceptable. Submit new product.
 - ii. Distribution:
 - I.* Two (2) copies and electronic to District.
 - II.* Two (2) copies and electronic to Engineer.
 - III.* Remaining copies returned to Contractor appropriately annotated.

B. Informational Submittals:

- 1. General:
 - a. Copies: Submit four copies and electronic, unless otherwise indicated in individual Specification Section.
 - b. Refer to individual Specification Sections for specific submittal requirements.
 - c. District and Engineer will review each submittal. If submittal meets conditions of the Contract, District will forward copies to appropriate parties. If District determines submittal does not meet conditions of the Contract and is therefore considered unacceptable, District will retain one copy and return remaining copies with review comments to Contractor, and require that submittal be corrected and resubmitted.
- 2. Application for Payment: In accordance with Division 00, General Conditions
- 3. Certificates:
 - a. General:
 - i. Provide notarized statement that includes signature of entity responsible for preparing certification.
 - ii. Signed by officer or other individual authorized to sign documents on behalf of that entity.
 - b. Material Test: Prepared by qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
 - c. Certificates of Successful Testing or Inspection: Submit when testing or inspection is required by Laws and Regulations or governing agency or specified in Sections 02663 Reclaimed Water Transmission/Distribution Mains and in Section 02661 Wastewater Force Mains.

4. Construction Photographs and Video: In accordance with Section 01380, Construction Photographs, and as may otherwise be required in Contract Documents.
5. Contract Closeout Submittals: In accordance with Section 01700, Contract Closeout.
6. Contractor-Design Data:
 - a. Written and graphic information.
 - b. List of assumptions.
 - c. List of performance and design criteria.
 - d. Summary of loads or load diagram, if applicable.
 - e. Calculations.
 - f. List of applicable codes and regulations.
 - g. Name and version of software.
 - h. Information requested in individual Specification Section.
7. Manufacturer's Instructions: Written or published information that documents manufacturer's recommendations, guidelines, and procedures in accordance with Specification 02663, Reclaimed Water Transmission/Distribution Mains and Section 02661 Wastewater Force Main.
8. Operation and Maintenance Data: As specified in individual Specification Sections.
9. Schedules:
 - a. Schedule of Submittals: Prepare separately or in combination with Progress Schedule as specified in Section 01300, Construction Progress Schedule
 - i. Show for each, at a minimum, the following:
 - I.* Specification Section number.
 - II.* Identification by numbering and tracking system as specified under Paragraph Transmittal of Submittal.
 - III.* Estimated date of submission to District, including reviewing and processing time.
 - ii. On a monthly basis, submit updated schedule to District if changes have occurred or resubmittals are required.
 - b. Progress Schedules: In accordance with Section 01310, Construction Progress Schedule.
10. Special Guarantee: Supplier's written guarantee as required in individual Specification Sections.
11. Statement of Qualification: Evidence of qualification, certification, or registration as required in Contract Documents to verify qualifications of

professional land surveyor, engineer, materials testing laboratory, specialty Subcontractor, trade, Specialist, consultant, installer, and other professionals.

12. Submittals Required by Laws, Regulations, and Governing Agencies:

- a. Submit promptly notifications, reports, certifications, payrolls, and otherwise as may be required, directly to the applicable federal, state, or local governing agency or their representative.
- b. Transmit to Engineer for District's records one copy of correspondence and transmittals (to include enclosures and attachments) between Contractor and governing agency.

13. Test and Inspection Reports:

- a. General: Shall contain signature of person responsible for test or report.
- b. Factory:
 - i. Identification of product and Specification Section, type of inspection or test with referenced standard or code.
 - ii. Date of test, Project title and number, and name and signature of authorized person.
 - iii. Test results.
 - iv. If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
 - v. Provide interpretation of test results, when requested by District and Engineer.
 - vi. Other items as identified in Specification 02 73 30, Fusible Polyvinyl Chloride (PVC) Pipe, and Specification 02 66 30, Reclaimed Water Transmission/Distribution Mains.
- c. Field: As a minimum, include the following:
 - i. Project title and number.
 - ii. Date and time.
 - iii. Record of temperature and weather conditions.
 - iv. Identification of product and Specification Section.
 - v. Type and location of test, Sample, or inspection, including referenced standard or code.
 - vi. Date issued, testing laboratory name, address, and telephone number, and name and signature of laboratory inspector.
 - vii. If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
 - viii. Provide interpretation of test results, when requested by District and Engineer.
 - ix. Other items as identified in individual Specification Sections.

14. Onsite Records: Contractor shall have at least one set of complete, approved submittals and shop drawings on the Site at all times when Work is in progress.
15. Testing and Startup Data: As specified in individual Specification Sections.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

**SECTION 01310
CONSTRUCTION PROGRESS SCHEDULES**

PART 1 - GENERAL

1.01 SUBMITTALS

A. Informational Submittals:

1. Preliminary Progress Schedule: Submit with the work plan within time specified in the Agreement.
2. Detailed Progress Schedule:
 - a. Submit initial Detailed Progress Schedule within 30 days following the Effective Date of the Contract or 10 days before submission of the first Application for Payment, whichever shall first occur.
 - b. Submit an Updated Progress Schedule in accordance with Paragraph 1.03 of this Section.
3. Submit with Each Progress Schedule Submission: Contractor's certification that Progress Schedule submission is actual schedule being utilized for execution of the Work.
 - a. Disk file compatible with latest version of Microsoft Project, unless otherwise approved by District.
 - b. Progress Schedule: Five legible copies.
 - c. Narrative Progress Report: Same number of copies as specified for Progress Schedule.
4. Prior to final payment, submit a final Updated Progress Schedule.

1.02 PRELIMINARY PROGRESS SCHEDULE

- A. In addition to basic requirements outlined in the General Conditions, show a detailed schedule, beginning with the Pre-Construction meeting for minimum duration of 90 days, and a summary of balance of Project through Final Completion.
- B. Show activities including, but not limited to the following:
 1. Pre-Construction Meeting.
 2. Permits.
 3. Submittals, with review time. Contractor may use Schedule of Submittals specified in Section 01300: Submittals.
 4. Early procurement activities for long lead equipment and materials.

5. Initial Site work.
 6. Earthwork.
 7. Specified Work sequences and construction constraints.
 8. Contract Milestone and Completion Dates.
 9. District-furnished products delivery dates or ranges of dates.
 10. Major structural, mechanical, equipment, electrical, architectural, and instrumentation and control Work.
 11. System startup summary.
 12. Project close-out summary.
 13. Demobilization summary.
- C. Update Preliminary Progress Schedule monthly as part of progress payment process. Failure to do so may result in the District withholding all or part of the monthly progress payment until the Preliminary Progress Schedule is updated in a manner acceptable to District.
- D. Format: In accordance with Article Progress Schedule—Critical Path Network.

1.03 DETAILED PROGRESS SCHEDULE

- A. In addition to requirements of the Agreement, submit Detailed Progress Schedule beginning with the Pre-construction meeting and continuing through Final Completion.
- B. Show the duration and sequences of activities required for complete performance of the Work reflecting means and methods chosen by Contractor.
- C. When accepted by District, Detailed Progress Schedule will replace Preliminary Progress Schedule and become Baseline Schedule. Subsequent revisions will be considered as Updated Progress Schedules.
- D. Format: In accordance with Article Progress Schedule—Critical Path Network.
- E. Update monthly to reflect actual progress and occurrences to date, including weather delays.

1.04 PROGRESS SCHEDULE-CRITICAL PATH NETWORK

- A. General: Comprehensive computer-generated schedule using CPM, generally as outlined in Associated General Contractors of America (AGC) 580, “Construction Project Planning and Scheduling Guidelines.” If a conflict occurs between the AGC publication and this Specification, this Specification shall govern.
- B. Contents:

1. Schedule shall begin with the date of Pre-construction meeting and conclude with the date of Final Completion.
2. Identify Work calendar basis using days as a unit of measure.
3. Show complete interdependence and sequence of construction and Project-related activities reasonably required to complete the Work.
4. Identify the Work of separate stages and other logically grouped activities, and clearly identify critical path of activities.
5. Reflect sequences of the Work, restraints, delivery windows, review times, Contract Times and Project Milestones set forth in the Agreement and Section 01041: Project Coordination.
6. Include as applicable, at a minimum:
 - a. Obtaining permits, submittals for early product procurement, and long lead time items.
 - b. Mobilization and other preliminary activities.
 - c. Initial Site work.
 - d. Specified Work sequences, constraints, and Milestones, including Substantial Completion date(s) Subcontract Work.
 - e. Major equipment design, fabrication, factory testing, and delivery dates.
 - f. Site Work.
 - g. Concrete Work.
 - h. Equipment Work.
 - i. Project closeout and cleanup.
 - j. Demobilization.
7. No activity duration, exclusive of those for Submittals review and product fabrication/delivery, shall be less than 1 day or more than 30 days, unless otherwise approved.
8. Activity duration for Submittal review shall not be less than review time specified unless clearly identified and prior written acceptance has been obtained from District.
9. Contractor shall include a mandatory 30 days, minimum float time for utility relocation work. District will not consider Contract Time extensions related to utility coordination matters unless the utility related delays exceed the 30 days float time and extend the critical path of the Project Schedule.

C. Network Graphical Display:

1. Plot or print on paper not greater than 30-inch by 42-inch or smaller than 22-inch by 34-inch, unless otherwise approved.
2. Title Block: Show name of Project, District, date submitted, revision or update number, and the name of the scheduler. Updated schedules shall indicate data date.

3. Identify horizontally across top of schedule the time frame by year, month, and day.
 4. Identify each activity with a unique number and a brief description of the Work associated with that activity.
 5. Indicate the critical path.
 6. Show, at a minimum, the controlling relationships between activities.
 7. Plot activities on a time-scaled basis, with the length of each activity proportional to the current estimate of the duration.
 8. Plot activities on an early start basis unless otherwise requested by District.
 9. Provide a legend to describe standard and special symbols used.
- D. Schedule Report:
1. On 8-1/2-inch by 11-inch white paper, unless otherwise approved.
 2. List information for each activity in tabular format, including, at a minimum:
 - a. Activity Identification Number.
 - b. Activity Description.
 - c. Original Duration.
 - d. Remaining Duration.
 - e. Early Start Date (Actual start on Updated Progress Schedules).
 - f. Early Finish Date (Actual finish on Updated Progress Schedules).
 - g. Late Start Date.
 - h. Late Finish Date.
 - i. Total Float.
 3. Sort reports, in ascending order, as listed below:
 - a. Activity number sequence with predecessor and successor activity.
 - b. Early-start.
 - c. Total float.

1.05 PROGRESS OF THE WORK

- A. Updated Progress Schedule shall reflect:
1. Progress of Work to within 5 working days prior to submission.
 2. Approved changes in Work scope and activities modified since submission.
 3. Delays in Submittals or resubmittals, deliveries, or Work.
 4. Adjusted or modified sequences of Work.
 5. Other identifiable changes.
 6. Revised projections of progress and completion.
 7. Report of changed logic.

- B. Produce detailed sub-schedules during Project, upon request of District, to further define critical portions of the Work such as facility shutdowns.
- C. If Contractor fails to complete activity by its latest scheduled completion date and this Failure is anticipated to extend Contract Times (or Milestones), Contractor shall, within 7 days of such failure, submit a written statement as to how Contractor intends to correct nonperformance and return to acceptable current Progress Schedule. Actions by Contractor to complete the Work within Contract Times (or Milestones) will not be justification for adjustment to Contract Price or Contract Times.
- D. District may order Contractor to increase plant, equipment, labor force or working hours if Contractor fails to:
 - 1. Complete a Milestone activity by its completion date.
 - 2. Satisfactorily execute Work as necessary to prevent delay to overall completion of Project, at no additional cost to District.

1.06 NARRATIVE PROGRESS REPORT

- A. Format:
 - 1. Organize same as Progress Schedule.
 - 2. Identify, on a cover letter, reporting period, date submitted, and name of author of report.
- B. Contents:
 - 1. Number of days worked over the period, work force on hand, construction equipment on hand (including utility vehicles such as pickup trucks, maintenance vehicles, stake trucks).
 - 2. General progress of Work, including a listing of activities started and completed over the reporting period, mobilization/demobilization of subcontractors, and major milestones achieved.
 - 3. Contractor's plan for management of Site (for example, lay down and staging areas, construction traffic), utilization of construction equipment, buildup of trade labor, and identification of potential Contract Document changes.
 - 4. Identification of new activities and sequences as a result of executed Contract Document changes.
 - 5. Documentation of weather conditions over the reporting period, and any resulting impacts to the work.
 - 6. Description of actual or potential delays, including related causes, and the steps taken or anticipated to mitigate their impact.
 - 7. Changes to activity logic.
 - 8. Changes to the critical path.

9. Identification of, and accompanying reason for, any activities added or deleted since the last report.
10. Steps taken to recover the schedule from Contractor -caused delays.

1.07 SCHEDULE ACCEPTANCE

A. District's acceptance will demonstrate agreement that:

1. Proposed schedule is accepted with respect to:
 - a. Contract Times, including Final Completion and all intermediate Milestones are within the specified times.
 - b. Specified Work sequences and constraints are shown as specified.
 - c. Specified District-furnished Equipment or Material arrival dates, or range of dates, are included.
 - d. Access restrictions are accurately reflected.
 - e. Startup and testing times are as specified.
 - f. Submittal review times are as specified.
 - g. Startup testing duration is as specified and timing is acceptable.
2. In all other respects, District's acceptance of Contractor's schedule indicates that, in District's judgement, schedule represents reasonable plan for constructing Project in accordance with the Contract Documents. District's review will not make any change in Contract requirements. Lack of comment on any aspect of schedule that is not in accordance with the Contract Documents will not thereby indicate acceptance of that change, unless Contractor has explicitly called the nonconformance to District's attention in submittal. Schedule remains Contractor's responsibility and Contractor retains responsibility for performing all activities, for activity durations, and for activity sequences required to construct Project in accordance with the Contract Documents.

B. Unacceptable Progress Schedule:

1. Make requested corrections; resubmit within 10 days.
2. Until acceptable to District as Baseline Progress Schedule, continue review and revision process, during which time Contractor shall update schedule on a monthly basis to reflect actual progress and occurrences to date.

C. Unacceptable Detailed Progress Schedule:

1. Make requested corrections; resubmit within 10 days.
2. Until acceptable to District as Baseline Progress Schedule, continue review and revision process.

D. Narrative Report: All changes to activity duration and sequences, including addition or deletion of activities subsequent to District's acceptance of Baseline Progress

Schedule, shall be delineated in Narrative Report current with proposed Updated Progress Schedule.

1.08 ADJUSTMENT OF CONTRACT TIMES

- A. Reference the Agreement.
- B. Evaluation and reconciliation of Adjustments of Contract Times shall be based on the Updated Progress Schedule at the time of proposed adjustment or claimed delay.
- C. Schedule Contingency:
 - 1. Contingency, when used in the context of the Progress Schedule, is time between Contractor's proposed Completion Time and Contract Completion Time.
 - 2. Contingency included in Progress Schedule is a Project resource available to both Contractor and District to meet Contract Milestones and Contract Times. Use of Schedule contingency shall be shared to the proportionate benefit of both parties.
 - 3. Use of schedule contingency suppression techniques such as preferential sequencing and extended activity times is prohibited.
 - 4. Pursuant to Contingency sharing provisions of this Specification, no time extensions will be granted, nor will delay damages be paid until a delay occurs which (i) consumes all available contingency time, and (ii) extends Work beyond the Contract Completion date.
- D. Claims Based on Contract Times:
 - 1. Where District has not yet rendered formal decision on Contractor's Claim for adjustment of Contract Times, and parties are unable to agree as to amount of adjustment to be reflected in Progress Schedule, Contractor shall reflect an interim adjustment in the Progress Schedule as acceptable to District.
 - 2. It is understood and agreed that such interim acceptance will not be binding on either Contractor or District, and will be made only for the purpose of continuing to schedule Work until such time as formal decision has been rendered as to an adjustment, if any, of the Contract Times.
 - 3. Contractor shall revise Progress Schedule prepared thereafter in accordance with District's formal decision.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

**SECTION 01410
PERMITS AND FEES**

PART 1 - GENERAL

- A. The Contractor shall secure and pay for **all** permits and licenses related to his work, including but not limited to, the necessary construction permits, as provided for in the General Conditions except as otherwise provided herein.

- B. Permits by District: The District prior to the advertisement of the project has applied and received approval for permits with the following agencies:
 - 1. Florida Department of Environmental Protection
 - 2. U.S. Army Corps of Engineers
 - 3. Orange County Conservation Area Impact Permit

- C. Permits by Contractor:
 - 1. NPDES/SWPPP/Dewatering
 - 2. Orange County Building Permit

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01505 MOBILIZATION

PART 1 - GENERAL

1.01 DEFINITION AND SCOPE

- A. Mobilization shall include obtaining all permits, moving all equipment onto the site, and setting up other construction facilities; all as required for the proper performance and completion of the Work. Mobilization shall include, but not be limited to the following:
1. Transporting tools, equipment, personnel and materials to the work site; construction offices, temporary facilities and,
 2. Installation and maintenance of erosion and sediment control measures;
 3. Preparation of Maintenance of Traffic Plans and Detour Plans submitted and approved by the appropriate regulatory agencies and permitting departments.
 4. Move onto the site all Contractor's equipment required for the first month's operations.
 5. Secure construction water supply.
 6. Secure work site as needed for safety or public.
 7. Arrange for and erect Contractor's Work and storage yard and employee's parking facilities.
 8. Obtain all required permits.
 9. Post all OSHA, EPA, Department of Labor and all other required notices.
 10. Submit a detailed construction CPM schedule acceptable to the District as specified.
 11. Submit a schedule of submittals.

1.02 DEMOBILIZATION

- A. Demobilization is the timely and proper removal of all Contractor owned material, or equipment, from the jobsite and the proper restoration or completion of Work necessary to bring the site into full compliance with the contract documents, in addition to the following:
1. Cleanup and removal of debris from work site and stored material locations,
 2. Removal of all construction equipment Maintenance of Traffic (MOT) products and any unused materials and supplies; and

3. Removal of all sediment and erosion control devices after stabilization is achieved.
4. Delivery of contractually required documents such as record drawings, warranty documentation, and operation and maintenance manuals.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

**SECTION 01600
MATERIAL AND EQUIPMENT**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Material and equipment incorporated into the Work:
1. Conform to applicable specifications and standards.
 2. Comply with size, make, type and quality specified, or as specifically approved in writing by District and Engineer.
 3. Manufactured and fabricated products:
 - a. Design, fabricate and assemble in accordance with the best engineering and shop practices.
 - b. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
 - c. Two or more items of the same kind shall be identical, by the same manufacturer.
 - d. Products shall be suitable for service conditions.
 - e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
 4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.
- B. Related Work Described Elsewhere:
1. Agreement
 2. Submittals: Section 01300

1.02 APPROVAL OF MATERIALS

- A. Only new materials and equipment shall be incorporated in the Work. All materials and equipment furnished by Contractor shall be subject to the inspection and approval of District. No material shall be delivered to the site without prior approval of District.
- B. The Contractor shall submit to District, data relating to materials and equipment he proposes to furnish for the Work. Such data shall be in sufficient detail to enable District to identify the particular product to form an opinion as to its conformity to the specifications.

- C. Facilities and labor for handling and inspection of all materials and equipment shall be furnished by the District. If District or Engineer requires, either prior to beginning or during progress of the Work, Contractor shall submit samples of materials for such special tests as may be necessary to demonstrate that they conform to the specifications. Such samples shall be furnished, stored, packed and shipped as directed at Contractor's expense. Except as otherwise noted, Contractor will make arrangements for and pay for the tests.
- D. Contractor shall submit data and samples sufficiently early to permit consideration and approval before materials are necessary for incorporation in the Work. Any delay of approval resulting from Contractor's failure to submit samples or data promptly shall not be used as a basis of claim against District or Engineer.
- E. In order to demonstrate the proficiency of Workers or to facilitate the choice among several textures, types, finishes and surfaces, Contractor shall provide such samples of workmanship or finish as may be required.
- F. The materials and equipment used on the Work shall correspond to the approved samples or other data.

1.03 SUBSTITUTIONS AND PRODUCT OPTIONS

- A. The substitution requirements of this Section are in addition to the requirements of the Agreement.
- B. The intent of these Specifications is to provide the District with a quality facility without discouraging competitive bidding. Substitutions may be submitted and will be evaluated as specified herein.
- C. For products specified only by reference standards, performance and descriptive methods, without naming manufacturer's products, the Contractor may provide the products of any manufacturer complying with the Contract Documents, subject to the review of product data by District as specified herein.
- D. For products specified by naming a manufacturer's product followed by the words "or equal" or "or approved equal", the Contractor may provide any of the named products. He may substitute a product by another manufacturer as an equal only after review by the Engineer and the District's Representative as specified herein. In all cases, any product provided must comply with all of the specified requirements.

1.04 MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION

- A. When Contract Documents require that installation of Work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including electronic copies (PDF format) to District.

- B. Maintain one set of complete instructions at the job site during installation and until completion.
- C. Handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements.
 - 1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with District and Engineer for further instructions.
 - 2. Do not proceed with Work without clear instructions.
- D. Perform Work in accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.05 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of products in accordance with construction schedules. Coordinate to avoid conflict with Work and conditions at the site.
 - 1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 - 2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.
- B. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

1.06 STORAGE AND PROTECTION

- A. Store products in accord with manufacturer's instructions, with seals and labels intact and legible.
 - 1. Store products subject to damage by the elements in weather tight enclosures.
 - 2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.
 - 3. Store fabricated products above the ground, on blocking or skids, prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.
 - 4. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
- B. All materials and equipment to be incorporated in the Work shall be handled and stored by Contractor before, during and after shipment in a manner to prevent

warping, twisting, bending, breaking, chipping, rusting, and any injury, theft or damage of any kind whatsoever to the material or equipment.

- C. Cement, sand and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural and miscellaneous steel, and reinforcing steel shall be stored off the ground or otherwise to prevent accumulations of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical. Precast concrete beams shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in a manner to reduce breakage, chipping, cracking and spalling to a minimum.
- D. All materials which, in the opinion of District or Engineer, have become so damaged as to be unfit for the use intended or specified shall be promptly removed from the site of the Work, and Contractor shall receive no compensation for the damaged material or its removal.
- E. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.
- F. Protection After Installation: Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove covering when no longer needed.
- G. The Contractor shall be responsible for all material, equipment and supplies sold and delivered to the District under this Contract until final inspection of the Work and acceptance thereof by the District. In the event any such material, equipment and supplies are lost, stolen, damaged or destroyed prior to final inspection and acceptance, Contractor shall replace same without additional cost to the District.
- H. Should Contractor fail to take proper action on storage and handling of equipment supplied under this Contract within seven days after written notice to do so has been given, the District retains the right to correct all deficiencies noted in previously transmitted written notice and deduct the cost associated with these corrections from Contractor's Contract. These costs may be comprised of expenditures for labor, equipment usage, administrative, clerical, engineering and any other costs associated with making the necessary corrections.

1.07 STORAGE AND HANDLING OF EQUIPMENT ON SITE

- A. Special attention shall be given to the storage and handling of materials on site. As a minimum, the procedure outlined below shall be followed:
 - 1. Materials shall not be shipped until approved by the District. The intent of this requirement is to avoid unnecessary delivery of unapproved materials and

to reduce on-site storage time prior to installation and/or operation. Under no circumstances shall materials be delivered to the site more than one month prior to installation without written authorization from the District. Materials shipped to the site shall be stored in accordance with Paragraph 1.06, herein.

2. Manufacturer's storage instructions shall be carefully studied by Contractor and reviewed with District by the Contractor. These instructions shall be carefully followed and a written record of this kept by the Contractor.

1.08 WARRANTY

- A. For all major pieces of material, submit a warranty from the material manufacturer to the District. The manufacturer's warranty period shall be concurrent with the Contractor's for one (1) year after the Substantial Completion.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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**SECTION 01700
CONTRACT CLOSEOUT**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Comply with requirements stated in the Agreement and Specification 01700 Contract Closeout for administrative procedures in closing out the Work.

1.02 SUBSTANTIAL COMPLETION

- A. Contractor shall comply with requirements for Substantial Completion in the Agreement, in addition to the following:
 - 1. When the Contractor considers the Work as substantially complete, he shall submit to the District a written notice stating so and requesting the District to make an inspection to determine the status of completion. This request shall be accompanied by a list of items to be completed or corrected.
 - 2. Should the District determine that the Work is not substantially complete; the District will promptly notify the Contractor in writing, given the reasons therefore. The Contractor shall remedy the deficiencies in the Work within 16 days, and send a second written notice of substantial completion to the District for re-inspection.
 - 3. When the Engineer finds that the Work is substantially complete, he will prepare and deliver to the District a tentative Certificate of Substantial Completion with a tentative list of items to be completed or corrected prior to final payment. After consideration of any objections made by the District, the Engineer will execute and deliver to the District and the Contractor a final Certificate of Substantial Completion with a revised tentative list of items to be completed or corrected.

1.03 FINAL INSPECTION AFTER COMPLETION

- A. Contractor shall comply with requirements for Substantial Completion in the Agreement, in addition to the following:
 - 1. When the Contractor considers the Work complete, he shall submit written certification that:
 - a. Contract Documents have been reviewed.
 - b. Work has been inspected for compliance with Contract Documents.
 - c. Work has been completed in accordance with Contract Documents.

- d. Equipment and systems have been tested in the presence of the District's Representative and are operational.
 - e. Work is completed and ready for final inspection.
- B. The District will make a final inspection if necessary to verify the status of completion after receipt of such certification.
 - C. Should the District consider that the Work is incomplete or defective, he will promptly notify the Contractor in writing, listing the incomplete and defective Work, to the best of his knowledge at that time. If the District has inadvertently omitted any items from the list it shall not relieve the Contractor from his obligations shown on the Drawings and specified in the Project Manual. Contractor shall take immediate steps within 16 days to remedy the stated deficiencies and send a second written certification to the District and Engineer that the Work is complete.
 - D. When the District finds that the Work is acceptable under the Contract Documents, he shall request the Contractor to make closeout submittals.
 - E. Should the District perform re-inspection due to failure of the Work to comply with the claims of status of completion made by the Contractor, the District will deduct the amount of any compensation or costs paid for additional inspections or tests from the final payment to the Contractor.
 - F. SJRWMD warranty submittals per General Requirements Section 01000.

1.04 CONTRACTOR'S CLOSEOUT SUBMITTALS TO DISTRICT

- A. Evidence of compliance with requirements of governing authorities.
- B. Project Record Documents: To requirements of Section 01720, Project Record Documents and Survey.
- C. Operating and Maintenance Data, Instructions to District's Personnel: To requirements of Section 01730, Operating and Maintenance Data.
- D. Spare Parts and Maintenance Materials: To requirements of Technical Sections of the Specifications.
- E. Evidence of Payment and Release of Liens: To requirements of General and Special Conditions.
- F. Certificate of Insurance for Products and Completed Operations.
- G. Evidence of all Certifications of Warranties and Bonds.

1.05 FINAL APPLICATION FOR PAYMENT

- A. Contractor shall submit the final Application for Payment in accordance with procedures and requirements stated in the Agreement.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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**SECTION 01710
CLEANING**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Execute cleaning, during progress of the Work, and at completion of the Work.
- B. Related Work Described Elsewhere:
 - 1. General Conditions and Requirements of the Contract.
 - 2. Each Specification Section: Cleaning for specific Products or Work.

1.02 DISPOSAL REQUIREMENTS

- A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Use only those cleaning materials which will not create hazard to health or property and which will not damage surfaces.
- B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.
- C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 DURING CONSTRUCTION

- A. Execute daily cleaning to keep the Work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.
- B. Provide on-site containers for the collection of waste materials, debris and rubbish.

- C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

3.02 DUST CONTROL

- A. Construction techniques that minimize the production and distribution of dust shall be used.
- B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

3.03 FINAL CLEANING

- A. Prior to final completion, or District occupancy, the District shall conduct an inspection of sight-exposed interior and exterior surfaces and all Work areas, to verify that the entire Work is clean.

END OF SECTION

**SECTION 01720
PROJECT RECORD DOCUMENTS AND SURVEY**

PART 1 - GENERAL

1.01 PURPOSE AND DESCRIPTION OF WORK

- A. The purpose of the Project Record Documents is to provide the District with factual information regarding all aspects of the Work, both concealed and visible, to enable future location, identification and modification of the Work without lengthy and expensive site measurement, investigation or examination.
- B. Provide professional surveying and mapping work required for the execution of the contract, including verification of existing survey data, construction layout, and production of the As-Built Drawings. This Work shall be performed by a Surveyor that is licensed by the State of Florida as a professional surveyor and mapper pursuant to Chapter 472, F.S.
- C. The location of the constructed improvements as depicted in the contract drawings is required. To verify the As-Built Drawing accuracies and to insure the Work was constructed in conformance with the contract drawings, the survey documents are required to be certified by the Surveyor.

1.02 DEFINITIONS

- A. Except where specific definitions are used within a specific section, the following terms, phrases, words and their derivation shall have the meaning given herein when consistent with the context in which they are used. Words used in the present tense include the future tense, words in the plural number include the singular number and words in the singular number include the plural number. The word "shall" is mandatory, and the word "may" is permissive.
 - 1. As-Built Drawings: Drawings prepared by the Contractor's Surveyor shall depict the actual location of installed utilities for the completed Work in a full size hard copy and an electronic AutoCAD file (dwg) format.
 - 2. Record Drawings: Drawings, prepared by and certified by the District's Consultant Engineer, shall be a compiled representation of the constructed project, a listing of the sources and the basis of information used in the preparation of the "record drawings", the constructed project meets the Engineer's design intent and note the material deviations from the design documents, and the accuracy of the location information is based upon the Contractor's surveyor data.
 - 3. Surveyor: Contractor's Surveyor that is licensed by the State of Florida as a professional surveyor and mapper pursuant to Chapter 472, F.S.

1.03 QUALIFICATIONS OF THE SURVEYOR

- A. The Surveyor, who is proposed by the Contractor to provide services for the Project, is subject to the approval of the District. Prior to any services being performed, the

Contractor shall submit the name and address of any proposed Surveyor and a written acknowledgement from the Surveyor stating that he has the hardware, software and adequate scope of services in his agreement with the Contractor to fully comply with the requirements of this specification. These submittals shall be provided to the District for approval prior to the Pre-Construction meeting. It is recommended that the Surveyor attend the Preconstruction meeting. Any Surveyor, who has not previously performed work for the District in the past, shall attend the Preconstruction meeting.

1.04 RELATED REQUIREMENTS

- A. All General Conditions, Supplements to the General Conditions, and any Addenda issued by the District are a part of this Section in the same manner as if fully written herein, and shall govern the Work of this Section, except where more stringent articles or requirements are stipulated, then they shall govern this Section.
- B. The Contract Documents are complementary and what is required by anyone shall be as binding as if required by all.
- C. Other requirements affecting Record Documents may appear in pertinent other sections of these specifications.

1.05 QUALITY ASSURANCE

- A. Delegate the responsibility for maintenance of the Record Documents to one person on the Contractor's staff as approved by the District.
- B. Thoroughly coordinate changes within the Record Documents, making adequate and proper entries on each page of specifications and each sheet of drawings and other documents where such entry is required to show progress and changes properly.
- C. Make entries within 24-hours after receipt of information has occurred.
- D. Survey documents shall comply with the minimum technical standards of Chapter 61G17-6 of the Florida Administrative Code (FAC) and Table 01720-1 Minimum Survey Accuracies specified in, whichever are more stringent. Asset attribute data shall be signed, sealed and dated by the Surveyor. All coordinates shall be geographically registered in the Florida State Plan Coordinate System using the contract drawings control points for horizontal and vertical controls.

**Table 01720-1
Minimum Survey Accuracies**

Asset/Location	Horizontal Accuracy (feet)	Elevation Accuracy (feet)	Location: horizontal center and vertical top, unless otherwise specified
Bench Marks	N/A	0.01	Point
Horizontal Control	0.01	N/A	Point
Easements and Tracts	*	N/A	Survey Monuments
Civil Site, Topo and Foundation Drawings	0.1	0.01	All
Hydrants	0.01	N/A	Operating Nut
Blow off Valves	0.01	N/A	Valve Enclosure
Air Release Valves	0.01	N/A	Valve Enclosure
Master Meters	0.01	N/A	Register
Meter Box	0.01	N/A	Top of Meter Box
Clean-out	0.01	N/A	Top of Clean-out
Pumps and Pump skids	0.01	0.01	Top Center of pump and Pipe Inverts (Inlet/Discharge)
Manholes	0.01	0.1	Top Center of Cover
Manhole	N/A	0.01	Pipe Inverts
System Valves	0.01	0.1	Operating Nut and Valve Body
Buried Valves 4-inches and greater	0.01	0.1	Valve
Fittings	0.01	0.1	Top of Fitting and Ground
Piping at beginning and end and at 25' max intervals	0.01	0.1	Top of Pipe and Ground
Restrained Pipe	0.01	N/A	Limits
Connections	0.01	0.1	Pipe Invert
Bore & Jack Casing	0.01	0.1	Top of Casing at Limits of Casing
Existing Utilities**	0.01	0.1	Conflicts

* Shall conform to the requirements of the "Chapter 61G17-6, 'Minimum Technical Standards', FAC", certified by a Surveyor.

** Existing utilities including but not limited to water, wastewater, reclaimed water, storm, fiber optic cable, electric, gas and structures within the limits of construction.

1.06 SUBMITTALS

- A. Comply with pertinent provisions for the timely submittal requirements under this article and specification section.
- B. Prior to submitting a monthly payment application, the Contractor's progressive As-Built Drawings shall be acceptable to the District.
- C. Progressive As-Built Drawings which will indicate the horizontal and vertical locations of all current constructed improvements with sufficient information and notes to easily determine if the improvements were constructed in conformance with the Contract Documents. The progressive As-Built Drawings shall include a Surveyor's certified statement regarding the constructed improvements being within the specified accuracies or if not indicating the variances, as described in Table 01720-1 Minimum Survey Accuracies.
- D. Prior to submitting a request for final payment or the District issuing a Certificate of Completion for the Work, the Contractor shall submit the final Record Documents to the District for approval. Retainage funds will be withheld at the District's discretion based on the quality and accuracy of the final Record Documents.

1.07 RECORD DOCUMENTS AT SITE

- A. Maintain at the site and always available for District's use one record copy of:
 - 1. Construction Contract, Drawings, Specifications, General Conditions, Supplemental Conditions, Bid Proposal, Instruction to Bidders, Addenda, and all other Contract Documents.
 - 2. Change Orders, Verbal Orders, and other modifications to Contract.
 - 3. Written instructions by the District as well as correspondence related to Requests for Information (RFIs).
 - 4. Accepted Shop Drawings, Samples, product data, substitution and "or-equal" requests.
 - 5. Field test records, inspection certificates, manufacturer certificates and construction photographs.
 - 6. Progressive As-Built Drawings.
- B. Maintain the documents in an organized, clean, dry, legible condition and completely protected from deterioration and from loss and damage until completion of the Work, transfer of all record data to the final Record Documents and for submittal to the District.

PART 2 - PRODUCTS

2.01 AS-BUILT DRAWINGS

- A. Maintain the electronic As-Built Drawings to accurately record progress of Work and change orders throughout the duration of the Contract.
- B. Date all entries. Enter RFI No., Change Order No., etc. when applicable.

- C. Call attention to the entry by highlighting with a “cloud” drawn around the area affected.
- D. In the event of overlapping changes, use different colors for entries of the overlapping changes.
- E. Design call-outs shall have a thin strike line through the design call-out and all As-Built information must be labeled (or abbreviated “AB”) and be shown in a bolder text that is completely legible.
- F. Make entries in the pertinent other documents while coordinating with the Engineer and the District for validity.
- G. Entries shall consist of graphical representations, plan view and profiles, written comments, dimensions, State Plane Coordinates, details and any other information as required to document field and other changes of the actual Work completed. As a minimum, make entries to also record:
 - 1. Depths of various elements of foundation in relation to finish floor datum and State Plane Coordinates and elevations.
 - 2. Plan view and profile drawings: State Plane coordinates and elevations or depths for all assets shown in the Asset Attribute Data Table on each drawing if the fittings, valves, appurtenances, etc. are shown on that drawing sheet.
 - 3. When electrical boxes, or underground conduits and plumbing are involved as part of the Work, record true elevations and locations, dimensions between boxes.
 - 4. Actually installed pipe or other Work materials, class, pressure rating, diameter, size, specifications, etc. Similar information for other encountered underground utilities, not installed by Contractor, their owner and actual location if different than shown in the Contract Documents.
 - 5. Details, not on original contract Drawings, as needed to show the actual location of the Work completed in a manner that allows the District to find it in the future.
 - 6. The Contractor shall mark all arrangements of conduits, circuits, piping, ducts and similar items shown schematically on the construction documents and show on the As-Built Drawings the actual horizontal and vertical alignments and locations.
 - 7. Major architectural and structural changes including relocation of doors, windows, etc. Architectural schedule changes according to contractor’s records and shop drawings.
 - 8. Grade elevations above and below water surface as necessary to verify grade elevations of newly constructed features.

2.02 RECORD DOCUMENTS

- A. A full size, two (2) hard copy set of the final Record Documents and shall include all of the documents described below under this subsection 2.02.

- B. The following documents shall be signed and sealed by the Surveyor:
1. Survey and Survey Map Report for the location of constructed pipes within any easements and right-of-way. As a minimum the Survey Map Report shall identify or describe the locations where the pipe centerline was constructed within three feet of the easement or right-of-way boundary, where the pipe was constructed outside the easement or right-of-way boundary, any corners that had to be reset, measurements and computations made, boundary issues, and accuracies obtained. Survey map report shall be dated after the Work within the right-of-ways or easements have been completed.
 2. Buried Valves 4-inches and greater
- C. Digital Set of the final Record Documents including but not limited to:
1. Scanned digital copies of the final As-Built Drawings
 2. Electronic Survey documents electronically sealed by the Surveyor
 3. Final Record Documents information
 4. Digital As-Built Drawing in the Engineer's current version of AutoCAD file (dwg) format for the Contract Drawings, updated to match the final Record Drawing information.
- D. Scanned Documents: Scan the Survey Documents and other Record Documents reflecting changes from the Bid Documents.
- E. The scanned As-Built drawing sets shall be complete and include the title sheet, plan/profile sheets, cross-sections, and details. Each individual sheet contained in the printed set of the As-Built Drawings shall be included in the electronic drawings, with each sheet being converted into an individual tif (tagged image file). The plan sheets shall be scanned in tif format Group 4 at 400 dpi resolution to maintain legibility of each drawing. Then, the tif images shall be embedded into a single pdf (Adobe Acrobat) file representing the complete plan set. Review all Project Record Documents to ensure a complete record of the project.
- F. Provide an encompassing digital AutoCAD file that includes all the information of the As-Built Drawings and any other graphical information in the As-Built Drawings. It shall include the overall Work, utility system layout and associated parcel boundaries and easements. Feature point, line and polygon information for new or altered Work and all accompanying geodetic control and survey data shall be included. The surveyor's certified as-built asset attribute data shall be added to the As-Built Drawings and Surveyor shall electronically seal the data in a comma-delineated ASCII format (txt).

PART 3 - EXECUTION

3.01 SURVEY FIELD WORK

- A. Locate, reference, and preserve existing horizontal and vertical control points and property corners shown on the Drawings prior to starting any construction Work. If the Surveyor performing the Work discovers any discrepancies that will affect the

Project, the Contractor must immediately report these findings to the District. All survey work shall meet the requirements as defined in Florida Administrative Code 61G17-6. Reference and preserve all survey points during construction. If survey points are disturbed, it is the responsibility of the Contractor's Surveyor to reset the points at the Contractor's expense. Copies of the Surveyor's field notes and/or electronic files for point replacement shall be provided to the District.

1. The Surveyor shall locate all improvements for the project using State Plane Coordinates as the horizontal datum and the benchmark referenced on the Drawings as the vertical datum. The District will provide electronic files of the Drawings to be used by the Surveyor in complying with these specifications.
 2. The construction layout shall be established from the reference points shown or listed on the Drawings. The accuracy of any method of staking shall be the responsibility of the Contractor. All construction layout staking shall be done such as to provide for easy verification of the Work by the District.
- B. Use survey control points to layout such work tasks as the following:
1. Clearing, grubbing, work limits, right-of-way lines and easements
 2. Locations for pipelines and all associated structures and appurtenances
- C. The Surveyor shall reference and replace any project control points, boundary corners, benchmarks, section corners, and right-of-way monuments that may be lost or destroyed, at no additional cost to the District. Establish replacement points based on the original survey control. Copies of all reference field notes and/or electronic files for point replacement shall be submitted to the District.

3.02 CONSTRUCTION PROGRESS MEETINGS

- A. Contractor shall provide progressive and a final version of the Record Documents both as paper copies and electronic format described below.
1. Construction Contract, As-Built Drawings, Specifications, General Conditions, Supplemental Conditions, Bid Proposal, Instruction to Bidders, Addenda, and all other Contract Documents.
 2. Specifications and Addenda: Record manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed as well as any changes made by Field Order, Change Order or other.
 3. Change orders, verbal orders, and other modifications to Contract.
 4. Written instructions by the District as well as correspondence related to Requests for Information (RFIs).
 5. Accepted Shop Drawings, samples, product data, substitution and "or-equal" requests.
 6. Field test records, inspection certificates, manufacturer certificates and construction photographs.

B. Progressive record documents shall include the following updated information certified by the Surveyor:

1. Surveyor shall obtain field measurements of vertical and horizontal dimensions of constructed improvements.

3.03 FINAL RECORD DOCUMENTS SUBMITTAL

A. Submit the Final Record Documents within 20 days after Substantial Completion.

1. Participate in review meetings as required and make required changes and promptly deliver the Final Record Documents to the Engineer or District.

3.04 STORAGE AND PRESERVATION

A. Store Record Documents and samples at a protected location in the project field office apart from documents used for construction.

1. Provide files and racks for storage of documents
2. Provide locked cabinet or secure space for storage of samples.

B. File documents and samples in accordance with CSI format with section numbers matching those in the Contract Documents.

C. In the event of loss of recorded data, use means necessary to again secure the data to the District's approval.

1. Such means shall include, if necessary in the opinion of the District, removal and replacement of concealing materials.
2. In such cases, provide replacements of the concealing materials to the standards originally required by the Contract Documents.

END OF SECTION

**SECTION 01730
OPERATION AND MAINTENANCE DATA**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Detailed information for the preparation, submission, and District's review of Operations and Maintenance (O&M) Data, as required by individual Specification sections.

1.02 DEFINITIONS

- A. Preliminary Data: Initial and subsequent submissions for District's review.
- B. Final Data: Engineer-accepted data, submitted as specified herein.
- C. Maintenance Operation: As used on Maintenance Summary Form is defined to mean any routine operation required to ensure satisfactory performance and longevity of equipment. Examples of typical maintenance operations are lubrication, belt tensioning, adjustment of pump packing glands, and routine adjustments.

1.03 SEQUENCING AND SCHEDULING

- A. Equipment and System Data:
 - 1. Preliminary Data:
 - a. Do not submit until Shop Drawing for equipment or system has been reviewed and approved by District.
 - b. Submit prior to shipment date.
 - 2. Final Data: Submit data not less than 30 days prior to installation of equipment or system equipment or system field functional testing.

1.04 DATA FORMAT

- A. Prepare preliminary data in the form of an instructional manual. Prepare final data on electronic media.
- B. Instructional Manual Format:
 - 1. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.
 - 2. Size: 8-1/2 inches by 11 inches, minimum.
 - 3. Cover: Identify manual with typed or printed title "OPERATION AND MAINTENANCE DATA" and list:
 - a. District's Project number and title.
 - b. Designate applicable system, equipment, material, or finish.
 - c. Identity of general subject matter covered in manual.
 - d. Identity of equipment number and Specification section.

4. Title Page:
 - a. Contractor name, address, and telephone number.
 - b. Subcontractor, Supplier, installer, or maintenance contractor's name, address, and telephone number, as appropriate.
 - i. Identify area of responsibility of each.
 - ii. Provide name and telephone number of local source of supply for parts and replacement.
 5. Table of Contents:
 - a. Neatly typewritten and arranged in systematic order with consecutive page numbers.
 - b. Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
 6. Paper: 20-pound minimum, white for typed pages.
 7. Text: Manufacturer's printed data, or neatly typewritten.
 8. Three-hole punch data for binding and composition; arrange printing so that punched holes do not obliterate data.
 9. Material shall be suitable for reproduction, with quality equal to original. Photocopying of material will be acceptable, except for material containing photographs.
- C. Electronic Media Format:
1. Portable Document Format (PDF):
 - a. After all preliminary data has been found to be acceptable to District, submit Operation and Maintenance data in PDF format on CD.
 - b. Files to be exact duplicates of Engineer-accepted preliminary data. Arrange by specification number and name.
 - c. Files to be fully functional and viewable in most recent version of Adobe Acrobat.

1.05 SUBMITTALS

- A. Informational:
1. Data Outline: Submit a detailed outline of proposed organization and contents of Final Data prior to preparation of Preliminary Data.
 2. Preliminary Data:
 - a. Submit PDF for District's review.
 - b. If data meets conditions of the Contract:
 - i. Submit PDF to Resident Project Representative.
 - ii. Submitted PDF will be retained in Engineer's file for District's use.
 - c. If data does not meet conditions of the Contract:

- i. A PDF will be returned to Contractor with Engineer's comments for revision.
 - ii. Engineer's comments will be retained in Engineer's file.
 - iii. Resubmit PDF in accordance with Engineer's comments.
- 3. Final Data: Submit three (3) hard copies in format specified herein and one (1) electronic version.

1.06 DATA FOR EQUIPMENT AND SYSTEMS

A. Content for Each Unit (or Common Units) and System:

- 1. Product Data:
 - a. Include only those sheets that are pertinent to specific product.
 - b. Clearly annotate each sheet to:
 - i. Identify specific product or part installed.
 - ii. Identify data applicable to installation.
 - iii. Delete references to inapplicable information.
 - c. Function, normal operating characteristics, and limiting conditions.
 - d. Performance curves, engineering data, nameplate data, and tests.
 - e. Complete nomenclature and commercial number of replaceable parts.
 - f. Original manufacturer's parts list, illustrations, detailed assembly drawings showing each part with part numbers and sequentially numbered parts list, and diagrams required for maintenance.
 - g. Spare parts ordering instructions.
 - h. Where applicable, identify installed spares and other provisions for future work (for example, reserved panel space, unused components, wiring, terminals).
- 2. As-installed, color-coded piping diagrams.
- 3. Charts of valve tag numbers, with the location and function of each valve.
- 4. Drawings: Supplement product data with Drawings as necessary to clearly illustrate:
 - a. Format:
 - i. Provide reinforced, punched, binder tab; bind in with text.
 - ii. Reduced to 8-1/2 -inch by 11 -inch, or 11 -inch by 17 -inch folded to 8-1/2 -inch by 11 -inch.
 - iii. Where reduction is impractical, fold and place in 8-1/2 -inch by 11-inch envelopes bound in text.
 - iv. Identify Specification section and product on Drawings and envelopes.
 - b. Relations of component parts of equipment and systems.
 - c. Control and flow diagrams.
 - d. Coordinate drawings with Project record documents to assure correct illustration of completed installation.

5. Instructions and Procedures: Within text, as required to supplement product data.
 - a. Format:
 - i. Organize in consistent format under separate heading for each different procedure.
 - ii. Provide logical sequence of instructions for each procedure.
 - iii. Provide information sheet for District's personnel, including:
 - I.* Proper procedures in event of failure.
 - II.* Instances that might affect validity of guarantee or Bond.
 - b. Installation Instructions: Including alignment, adjusting, calibrating, and checking.
 - c. Operating Procedures:
 - i. Startup, break-in, routine, and normal operating instructions.
 - ii. Test procedures and results of factory tests where required.
 - iii. Regulation, control, stopping, and emergency instructions.
 - iv. Description of operation sequence by control manufacturer.
 - v. Shutdown instructions for both short and extended duration.
 - vi. Summer and winter operating instructions, as applicable.
 - vii. Safety precautions.
 - viii. Special operating instructions.
 - d. Maintenance and Overhaul Procedures:
 - i. Routine maintenance.
 - ii. Guide to troubleshooting.
 - iii. Disassembly, removal, repair, reinstallation, and re-assembly.
 6. Guarantee, Bond, and Service Agreement: In accordance with Section 01700, Contract Closeout.
- B. Content for Each Electric or Electronic Item or System:
1. Description of Unit and Component Parts:
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data, nameplate data, and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
 - d. Interconnection wiring diagrams, including control and lighting systems.
 2. Circuit directories of panelboards.
 3. Electrical service.
 4. Control requirements and interfaces.
 5. Communication requirements and interfaces.
 6. List of electrical relay settings, and control and alarm contact settings.

7. Electrical interconnection wiring diagram, including as applicable, single-line, three-line, schematic and internal wiring, and external interconnection wiring.
 8. As-installed control diagrams by control manufacturer.
 9. Operating Procedures:
 - a. Routine and normal operating instructions.
 - b. Startup and shutdown sequences, normal and emergency.
 - c. Safety precautions.
 - d. Special operating instructions.
 10. Maintenance Procedures:
 - a. Routine maintenance.
 - b. Guide to troubleshooting.
 - c. Adjustment and checking.
 - d. List of relay settings, control and alarm contact settings.
 11. Manufacturer's printed operating and maintenance instructions.
 12. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
- C. Maintenance Summary:
1. Compile individual Maintenance Summary for each applicable equipment item, respective unit or system, and for components or sub-units.
 2. Format:
 - a. Use Maintenance Summary Form bound with this section or electronic facsimile of such.
 - b. Each Maintenance Summary may take as many pages as required.
 - c. Use only 8-1/2-inch by 11-inch size paper.
 - d. Complete using typewriter or electronic printing.
 3. Include detailed lubrication instructions and diagrams showing points to be greased or oiled; recommend type, grade, and temperature range of lubricants and frequency of lubrication.
 4. Recommended Spare Parts:
 - a. Data to be consistent with manufacturer's Bill of Materials/Parts List furnished in O&M manuals.
 - b. "Unit" is the unit of measure for ordering the part.
 - c. "Quantity" is the number of units recommended.
 - d. "Unit Cost" is the current purchase price.
- D. Warranty:
1. Include manufacturer's product warranty documentation of warranty timeframes and components covered.

1.07 SUPPLEMENTS

A. The supplements listed below, following “End of Section”, are part of this Specification.

1. Forms: Maintenance Summary Form.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

MAINTENANCE SUMMARY FORM

PROJECT: _____ CONTRACT NO.: _____

1. EQUIPMENT ITEM _____

2. MANUFACTURER _____

3. EQUIPMENT/TAG NUMBER(S) _____

4. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS) _____

5. NAMEPLATE DATA (hp, voltage, speed, etc.) _____

6. MANUFACTURER'S LOCAL REPRESENTATIVE _____

a.

Name _____

Telephone No. _____

b.

Address _____

7. MAINTENANCE REQUIREMENTS

Maintenance Operation Comments	Frequency	Lubricant (If Applicable)
List briefly each maintenance operation required and refer to specific information in manufacturer's standard maintenance manual, if applicable. (Reference to manufacturer's catalog or sales literature is not acceptable.)	List required frequency of each maintenance operation.	Refer by symbol to lubricant required.

**SECTION 02320
EXCAVATING, BACKFILLING, AND COMPACTION**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Dewatering, excavating, shoring, sheeting, bracing, trenching, backfilling, and all other earthwork operations required for utility and other underground lines and appurtenances.
- B. Providing access to open trenches after utility lines have been installed and bedded, but prior to backfilling being commenced, to permit recording of record or "as-built" survey information.

1.02 QUALITY ASSURANCE

- A. Tests and inspections:
 - 1. Test methods:
 - a. Maximum dry density of backfill materials shall be determined by ASTM D1557, Procedure A.
 - b. Field density tests shall be determined by ASTM D1556, ASTM D2922, or ASTM D2937.
 - 2. Required tests:
 - a. Backfill material: Determine suitability of backfill and bedding material not previously evaluated.
 - b. Maximum density tests: Determine optimum moisture content and maximum dry density of backfill and bedding materials placed and compacted.
 - c. Field density tests: Determine in-place density of backfill materials placed and compacted. One test for every 100 linear feet of trench and one test for each 1 foot vertical lift.
 - d. Other tests as may be required by the District.
 - 3. Required inspections:
 - a. Excavation inspection: Detailed inspection of exposed excavations prior to placing bedding and backfill material.
 - b. Bedding conditions: Determine and evaluate condition of bedding to receive utility lines.

- B. Requirements of regulatory agencies: In addition to complying with other legal requirements, comply with the following.
 - 1. Code of Federal Regulations Title 29 CFR Part 1926, Subpart P, Excavations.
 - 2. Occupational Safety and Health Administration Document 2226.
 - 3. Florida Statutes, Chapter 553 Building Construction Standards, Part VI, Trench Safety Act.
- C. Reference specifications and standards:
 - 1. ASTM: D422 Particle-Size Analysis of Soils.
 - 2. ASTM: D1556 Density and Unit Weight of Soil in Place by the Sand-Cone Method.
 - 3. ASTM: D1557 Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³).
 - 4. ASTM: D2419 Sand Equivalent Value of Soils and Fine Aggregate.
 - 5. ASTM: D2922 Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 6. ASTM: D2937 Density of Soil In-Place by the Drive-Cylinder Method.
 - 7. CFR: Title 29 CFR Part 1926 Safety and Health Regulations for Construction.
 - 8. Florida Statutes: Chapter 553 Building Construction Standards.
 - 9. OSHA: Document 2226 Excavations.

1.03 SUBMITTALS

- A. Procedures: In accord with Section 01300.
- B. Drawings and engineering design calculations: Signed and sealed engineering drawings and calculations by Professional Engineer licensed in the state of Florida for required shoring, sheeting, or cribbing for approval prior to starting installation of shoring, sheeting, or cribbing.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Source of materials: Materials may be obtained by selective stockpiling of excavated soils and/or from an on-site or off-site borrow pit approved by the District.

1. Select bedding material shall be clean, natural, excavated sand, free from roots, organic material, trash or other debris, maximum size 1 inch containing less than 15 percent by weight passing the No. 200 sieve.
2. Backfill material for pipe zone shall be free from stones, roots, foreign material and organic material. Maximum size of particles shall be 1-inch with less than 15 percent by weight passing the No. 200 sieve. This material may be clean natural sand or gravel, imported quarry waste or select excavated material, provided that such material consists of loam, sand, sandy clay loam, gravel or other materials of the GM/GC classification, as classified in accordance with ASTM D2487.
3. Backfill above the pipe zone shall be excavated material obtained from the Contractor's excavations. Such materials shall be free of roots, trash, debris, deleterious materials, broken concrete or paving materials, organic materials, boulders, rocks or stones larger than three (3) inches and expansive soils.
4. Gravel shall be 1-inch minus crushed rock, meeting the requirements of No. 57 aggregate as specified in Section 901 of the FDOT Standard Specifications.
5. Deficiency of Backfill: Where excavated material is indicated as backfill on the drawings or specified herein and there is a deficiency due to the rejection of part of the material, the required quantity of sand, gravel or other approved backfill material shall be obtained from a source secured by the Contractor.

PART 3 - EXECUTION

3.01 PROTECTION

- A. Public and adjacent properties: Protect in accord with applicable laws and ordinances.
- B. Existing on-site features, plant life, including trees, scheduled to remain:
 1. Protect from damage at all times.
 2. Do not allow earth-moving equipment within the branch spread perimeter (drip line) of existing trees.
 3. Do not cut tree roots over 2 inches in diameter without prior approval from the District.
 4. Support trees during excavation in an approved manner.
 5. When excavation adjacent to existing trees is necessary, use all possible care to avoid injury to trees and tree roots. Excavate by hand all areas where 2 inches and larger roots occur. Tunnel under and heavily wrap with burlap roots 2 inches and larger in diameter, except directly in the path of pipe or conduit, to prevent scarring or excessive drying. When a trenching machine runs close to trees having roots smaller than 2 inches in diameter, hand trim

wall of trench adjacent to tree, making clean cuts through roots. Paint roots 1 inches and larger in diameter with two coats of Tree Seal, or District-approved equivalent. Close trenches adjacent to trees within 24 hours; when this is not possible, shade side of trench adjacent to tree with burlap or canvas.

6. All work around and adjacent to existing trees, including inspection prior to backfill, shall be approved by the District. Obtain District's approval in writing for all procedures prior to commencement of work. Trees that die due to damage or unacceptable work shall be back-charged to Contractor.
- C. Where utility line excavation occurs in lawn, grassed, or landscaped areas, carefully remove and stockpile sod and plants to preserve for transplanting.
1. Place excavated material from trenches on lawn or grass, provided a drop cloth or other approved method is employed to protect lawn or grass from permanent damage. Do not keep stockpiled materials on lawn or grass for more than 72 hours
 2. Immediately after completion of backfilling and testing of utility lines, replace sod and replant plants in a manner to restore lawn, grass, and landscaping to its original condition within practical limits. Replace damaged landscaping at no cost to the District as part of the work of this Section.
- D. Open trenches: Barricade all open trenches during work hours and cover at the close of each day's work. Maximum length of open trenches shall be 350 feet.
- E. Dust control:
1. Throughout entire construction period, effectively dust-palliate working area, unpaved roads, and involved portions of site.
 2. Palliation: Intermittently water and sprinkle with such frequency as will satisfactorily allay dust at all times. Chemical treatment of any type is not permitted.
- F. Water control:
1. Maintain trenches and other excavations free of water while lines are being placed and until backfill has been completed and approved.
 2. Maintain adequate pumping equipment at all times to provide for emergencies.
 3. Dispose of water in such a manner as not to create a nuisance, cause damage to property, or interfere with activities of other contractors. Prevent water from migrating outside of construction areas. Use District-approved methods and materials to confine water to construction areas. Failure to contain water is not permitted.
 4. Dewater as required to maintain site in a relatively dry condition, including well point dewatering.

5. Methods of dewatering and disposal of water are subject to the District's approval.
 6. Contractor is responsible for permitting with FDEP as necessary for dewatering, including necessary sampling of groundwater required by FDEP.
- G. Bracing and shoring:
1. The Contractor shall furnish, install and maintain sheeting, bracing, shoring and sloping required to support the sides of the excavation, and to prevent any movement which may damage adjacent utilities, pavements or structures, damage or delay the work or endanger life and health. All voids outside the supports shall be immediately filled and compacted.
 2. Support excavations in accord with all legal requirements.
 3. Set and maintain sheet piling and shoring timbers in a manner that will prevent caving of walls of excavations or trenches and not impose other loads or surcharges on lines.
 4. When it is impractical to remove shoring and bracing, obtain approval from the District to leave in place. Record locations of such "in-place" shoring and bracing on Project Record Documents and indicate type of material and thickness.
- H. Stockpiled excavated materials: Confine excavated materials to immediate area of stockpiled location.
- I. When obstructions that are not shown on the plans are encountered during the progress of the work and an alteration or revision to the plans is required, the District will have the plans revised or may order the removal, relocation or reconstruction of the obstruction.

3.02 EXCAVATION

- A. General: Include removal of materials and obstructions that interfere with the execution of the Work.
1. Unless indicated otherwise, excavation for utilities lines shall be by open trench.
 2. Sides of trenches shall be as nearly vertical as practicable.
 3. The excavation and preparation of trenches shall not proceed in advance of installation more than 100 feet, except as approved by the District. Trenching shall not, under any conditions, exceed the installation that can be bedded, inspected, tested, backfilled and compacted in one working day.
- B. Trench widths:
1. Lines less than 6 inches outside diameter: 18 inches, minimum.

2. Larger lines: Clear distance on each side of line of not less than 12 inches.
- C. Trench depth: Excavate trenches to lines and grades as necessary for construction of utility lines indicated.
- D. Over-excavation: Backfill over-depth excavations to required grade with specified bedding and backfill material at no additional cost to the District. Compact bedding and backfill material to specified density.
- E. Perform any dewatering and pumping required to keep excavations free of standing water.
- F. Refer to geotechnical reports for seasonal high groundwater table elevation estimates. It is the sole responsibility of contractor to make its own judgments as to the actual conditions, and to draw its own conclusions as to means and methods required for performance of the work. Provide dewatering, if required, at whatever elevation groundwater is actually encountered.
- G. A plan for any proposed dewatering shall be submitted for approval prior to commencement of any such work. Any permitting for dewatering which may be required shall be the responsibility of Contractor, including required groundwater sampling.
- H. Sequence, schedule, coordinate, and perform the work so as to maintain safe, unobstructed passage as required for emergency egress and general site access. Provide any and all bridging of trenches of work, barricades, etc., that may be required to comply with this requirement.
- I. When the trench bottom is found to contain unsuitable material which is unstable to such a degree that in the judgment of the District it cannot be removed, a foundation for the pipe, structure and/or appurtenance shall be constructed using piling, treated timber, concrete or other material approved by the District.
 1. Unsuitable materials are soils, exposed at the trench bottom that are compressible, expansive, contain extraneous rubble, offer uneven foundation support, or have a natural moisture content three (3) percent in excess of the soils optimum moisture content. Unsuitable materials/soils shall include, but not be limited to, muck, peat, expansive clays, boulders, soils in a quick condition, rubble, any portion of trees, roots or similar vegetation, wood or other unyielding material.
 2. The Contractor shall notify the District immediately when unstable material is encountered. The District will investigate the questionable material to determine its stability. Should the District require soils testing to aid in his determination, then all tests revealing suitable materials shall be paid for by the Contractor.
 3. Where the District determines that unstable material is present below the pipe envelope which will not provide adequate support for the pipe, the Contractor

shall remove the unstable material and replace with a minimum of six (6) inches of Gravel up to the bottom of the pipe envelope.

3.03 BACKFILL

A. General:

1. Backfill consists of bedding, backfill, and restoration of surface.
2. Do not cover lines until they have been inspected and approved for alignment and grade and recording of record or "as-built" survey information has been performed.
3. The minimum distance between test sampling points along the trench shall be in accordance with the following table:

TRENCH ZONE	STANDARD PROCTOR ASTM D1557	FIELD DENSITY ASTM D1556	RELATIVE DENSITY	
			GREEN AREA	PAVED AREA
PIPE BEDDING	ONE TEST FOR EACH SOIL TYPE FOUND	ONE TEST FOR EVERY 100 LINEAR FEET *	98%	98%
HAUNCHING			98%	98%
PIPE ZONE			95%	95%
BACKFILL ABOVE PIPE ZONE			95%	98%
MANHOLE FOUNDATION		ONE PER MANHOLE *	95%	98%

* Per lift

4. The Contractor shall not achieve compaction by the use of heavy rolling equipment or by running heavy construction equipment on or in the trench. Backfilling and compaction shall have been completed, tested and the degree of compaction verified before heavy equipment is operated over the trench.
5. Puddling or flooding with water to achieve compaction shall not be permitted.
6. When unsatisfactory compaction is revealed, the Contractor shall immediately re-excavate the trench, replace and re-compact the backfill to the required relative densities over the entire depth of the trench.
7. Partial Backfill During Testing: When conditions require that pipe testing should be accomplished before completion of backfilling or with pipe joints accessible for examination, sufficient backfill material shall be placed over the pipe barrel, between the joints, to prevent pipe movement.

- B. Bedding: Bedding is defined as material supporting and extending to the invert of utility line. Provide 6 inches minimum layer of Select Granular Bedding and compact bedding to 98% of the maximum dry density in accord with ASTM D1557 using mechanical equipment. Bedding shall not be required under or around structures, except at utility lines.
- C. Backfill: Backfill includes material from 12 inches above the lines to, and including, surface restoration.
1. Commence backfilling immediately after approval and survey information recording, to preclude damage to utility lines.
 2. Carefully place backfilling around utility lines so as not to displace or damage line, and fill symmetrically on each side of line to 12 inches above top of line.
 3. Do not backfill against structures until concrete has attained sufficient strength to withstand loads, and structures have been approved.
 4. Place backfill in loose uniform lifts not exceeding 8 inches, unless otherwise specified.
 5. Use mechanical compactors for compaction of backfill.
 6. Pipe Zone Backfill
 - a. Backfill the pipe zone to 12 inches above the top of the pipe for the full width of the trench with Backfill Material For Pipe Zone as specified in paragraph 2.01.A.2.
 - b. Haunching (Up to Springline of Pipe): Place in the trench in horizontal lifts not exceeding 6 inches in uncompacted thickness on both sides of the pipe. Thoroughly tamp and compact the material to obtain a relative density of not less than 98 percent of the maximum density. Use particular attention in placing material on the underside or haunches of the pipe to provide a solid backing to eliminate any voids.
 - c. Remainder of Pipe Zone: Place on both sides of the pipe. Tamp and compact the material to obtain a relative density of not less than 95 percent of maximum density.
 7. Trench Backfill Above Pipe Zone
 - a. Place Backfill Material For Pipe Zone as specified in paragraph 2.01.A.3 in all areas beneath structures, piping, utilities, roads, pavements, or other facilities. Compact each lift to not less than 98% maximum density.
 - b. In other areas, backfill the trench above the pipe zone with material conforming to Backfill Above The Pipe Zone. Place in 12-inch layers and compact each layer by means of mechanical tampers or vibratory compactors to 95% maximum density in field areas and to 98% maximum density under all roadways, walks, paved surfaces and

structures. Backfill to the required surface grade and compact so that no surface settlement occurs.

8. Coordinate and ensure installation of underground utilities marking in accord with Section 02505.

D. Minor structures

1. Support catch basins, vaults, manholes and other minor structures on bottom and all sides by soils compacted to 95% of the maximum dry density in grass or filed areas and to 98% maximum dry density under all roadways, walks, paved surfaces and structures in accord with ASTM D1557 for full depth of fill.
 - a. The pre-cast vaults shall be carefully placed on the prepared foundation so as to be fully and uniformly supported in true alignment, making certain that the pipe can pass through on the designed line and grade.
 - b. Pre-cast vaults shall be handled by lifting rings only.
 - c. Pre-cast vaults and manholes shall be placed and aligned to provide vertical alignment with not more than one eighth (1/8) inch maximum tolerance for five (5) feet of depth. The completed unit shall be rigid, true to dimensions and alignment.

- E. Maintain the surface of the backfilled trench level with the existing grade until the entire project is accepted by the District. Any subsequent settlement of the finished surface during the warranty period shall be considered to be as a result of improper or insufficient compaction and shall be promptly repaired by the Contractor at no cost to the District.

1. The maintenance shall include, but not be limited to, the addition of roadway material to keep the surface of backfilled trenches reasonably smooth, free from ruts and potholes, and suitable for normal traffic flow.

3.04 ADJUST AND CLEAN

A. Surface restoration:

1. Restore surface areas over trenches equivalent to conditions which existed prior to start of work.
2. Reconstruct surfaces in accord with applicable Sections of the Specifications.

B. Disposal:

1. Debris:
 - a. Remove and dispose of all rubbish, debris, and vegetation as it accumulates.

- b. Dispose of debris off-site or at an on-site disposal area designated by District.
- 2. Excess soil: Stockpile at an on-site area designated by District.

END OF SECTION

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SECTION 02355
STEEL H-SECTION PILES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install steel H-Section piling. Included are furnishing, driving, cutting-off, and all other Work for piling.

1.02 RELATED SECTIONS

- A. Section 01300 – SUBMITTALS

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. ASTM A36, Standard Specification for Carbon Structural Steel.
- B. ASTM A572, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
- C. ASTM A588, Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi Minimum Yield Point to 4-inches Thick.
- D. ASTM A690, Standard Specification for High-Strength Low-Alloy Steel H-Piles and Sheet Piling for Use in Marine Environments.
- E. ASTM D1143, Standard Test Method for Piles under Static Axial Compressive Load.
- F. ASTM D3689, Standard Test Method for Individual Piles Under Static Axial Tensile Load.
- G. ASTM D3966, Standard Test Method for Piles Under Lateral Loads.
- H. ASTM D4945, Standard Test Method for High-Strain Dynamic Testing of Piles.
- I. AWS D1.1, Structural Welding Code – Steel.
- J. SSPC-PS 10.01, Hot-Applied Coal Tar Enamel Painting System.
- K. SSPC-PS 11.01, Black (or Dark Red) Coal Tar Epoxy Polyamide Painting System.
- L. SSPC-SP6, Commercial Blast Cleaning.

1.04 SUBMITTALS

- A. Submit Working Drawings as specified in Section 01300 SUBMITTALS. The data submitted shall include the following:

1. Submit working drawings in advance of the start of pile driving showing the location of all piles. Assign an identification number for each pile coinciding with the identification number used in the driving record of each pile. These drawings shall include the driving sequence anticipated for the Work.
2. Full data on type of pile proposed and on hammer and other equipment to be utilized.
3. The proposed pile installation procedures.
4. Details of pile splices.
5. Details of welded assembly for connection to structure.
6. Qualifications of personnel performing welding.
7. Qualifications of personnel supervising the performance of pile installation meeting the requirements as described herein

B. Driving Records:

1. Submit two copies of the driving record of each pile to the District not later than two days after driving. Include the Project name and number, name of CONTRACTOR, pile location and number, computed pile capacity, type and size of hammer used, type of pile driving cap used, rate of operation of pile driving equipment, pile dimensions, elevation of point, elevation of butt before and after cut-off, ground elevation, continuous record of number of blows for each foot of penetration, pile deviation, pile uplift and reaction, and any unusual occurrences during pile driving.
2. Submit Record Drawings showing exact location of each pile as driven.

- C. During progress of the Work, keep an up to date set of Drawings showing field modifications. Immediately upon completion of work, provide Record Drawings showing the actual in-place installation of all Work constructed and/or installed under this Section. Drawings shall include all necessary plans, sections and details, with all reference dimensions and elevations required for complete Record Drawings of the Work.

1.05 QUALITY ASSURANCE

A. CONTRACTOR Qualifications shall meet the requirements of the following.

1. Pile Driver (Installer) Qualifications: An experienced pile driver, with a minimum of 5 years documented experience, to assume engineering responsibility and perform work of this Section. The pile driver shall have specialized experience in installing piles similar to those required for this Project on a minimum of three previous projects and with a record of successful in-service performance.

- B. Comply with all rules, regulations, laws and ordinances of the State of Florida, OSHA and of all other authorities having jurisdiction. All labor, materials, equipment and services necessary to make the work comply with such requirements shall be provided by the CONTRACTOR without additional cost to the District.

1.06 JOB CONDITIONS

A. Product Delivery, Storage and Handling:

1. CONTRACTOR shall deliver, store, handle and protect all products, materials and equipment.
2. Deliver materials to the site in such quantities and at such times as to assure the continuity of pile installation operations for each pile.
3. Store piles in orderly groups above ground and blocked during storage to minimize possible distortion.
4. Lifting points shall be clearly marked on the piles by the manufacturer, and all handling and storage shall be undertaken with consideration for required support.
5. Piles shall be picked up into the leads by the designated lifting points.
6. Piles shall be clearly marked with the length of the pile prior to delivery.

B. Site Information:

1. CONTRACTOR shall review and understand the information contained in the Geotechnical Report. The geotechnical investigation report is made available to the CONTRACTOR for information on factual data only and shall not be interpreted as a warranty of subsurface conditions whether interpreted from written text, boring logs, or other data.
2. The CONTRACTOR shall visit the site and become thoroughly familiar with all site conditions affecting the work and review the location of all piles for potential obstruction or interference during pre-drilling and driving.
3. Test borings and other exploratory operations may be made by the CONTRACTOR at no additional cost to the District, provided such operations are acceptable to the District, in accordance with Contract Documents.

C. Line and Level:

1. Benchmarks and elevations are shown on the Contract Drawings for the use of the CONTRACTOR in establishing lines and levels for the work. The CONTRACTOR shall establish and locate all other lines and levels

and be responsible for the correct location and deviation measurements of all piles.

2. All piles shall be installed at the proper locations and orientations as shown on the plans. Pile locations shall be checked during installation and appropriate measures taken, as necessary, to maintain the correct pile location and orientation.
3. The CONTRACTOR shall cooperate with the District and provide them safe access to the pile installation locations in order to perform their work.

D. Protection:

1. The CONTRACTOR shall protect adjacent property, public utilities and structures, and completed work, from damage associated with the pile driving operation. Damage due to pile driving as a result of CONTRACTOR'S work shall be repaired by the CONTRACTOR at no additional cost to the District.

E. Cost of Redesign:

1. Piling driven incorrectly, out of position, or which is defective in any way shall be corrected as directed by the District and as described hereinafter.
2. The District will record all time required by it and the District's consultants, if any, in redesigning piling, foundations or other related structural work and in making revisions to the Contract Documents as a result of improperly installed piles.
3. CONTRACTOR shall reimburse the District for the additional services of the District and their consultants based on a charge of 2.5 times salary costs.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Steel:

1. Provide hot-rolled carbon steel structural shapes and plates, complying with ASTM A588 or ASTM A572, Grade 50, unless otherwise shown or specified. Piles shall be epoxy coated with color chosen by the District.
2. Provide carbon steel angles and plates complying with ASTM A36, unless otherwise shown or specified.
3. Cut to mill tolerances on piles that are to be spliced.

4. The H-pile steel shall be of sufficient strength and rigidity to withstand all driving and handling stresses and to maintain initial shape within the tolerances specified hereinafter. Pile materials shall be new and of uniform quality.
5. Piles shall be coated according to the following requirements:
 - a. Surface Preparation – Prepare the substrate by providing a depth of anchor profile in accordance with the manufacturer’s product data sheet, but in no case less than 2.5 mils. Re-blast piles not coated during the same shift or if the surface to be coated no longer meets the requirements SSPC-SP 10.
 - b. Unless otherwise shown in the Drawings, apply the inorganic zinc primer to all surfaces of piles. Unless otherwise shown in the Drawings, apply coal tar-epoxy coatings to the exposed sides of piles from the top of the piles to a depth of five feet below the lower of the design ground surface or the design scour depth. Apply the coal tar-epoxy in accordance with the following specific requirements:
 - i. Apply the coal tar-epoxy system in two coats. The time interval between the first coat and the second coat will be in strict accordance with the coating manufacturer’s published specifications. Apply the first coat to yield a dry film thickness of 8 to 10 mils. Apply the second coat to attain a total dry film thickness of the two coats between 16 and 20 mils.
 - ii. Ensure that no portion of the coating is less than the specified minimum film thicknesses. The total minimum film thickness for any combination of coats will be the sum total of the averages of the specified thickness range of the individual coats.
 - iii. After applying the coating on the steel piles, the Engineer will thoroughly inspect the surfaces and make film thickness measurements at the approximate rate of one for each 25 square feet of area unless deficient thickness is found. In this case, the rate of sub-measurements will be increased as required to determine the extent of the deficient area.

2.02 FABRICATION

A. Pile tips:

1. Pile tips as driven shall be square and blunt unless shown otherwise on the Contract Drawings. Manufactured pile tips shall not be used for the piles.

2.03 DRIVING EQUIPMENT

A. General:

1. Piles shall be driven with a single-acting steam or diesel hammer of a type approved by the District. CONTRACTOR shall select a hammer with sufficient energy to drive the piling to the required tip elevation without causing damage to the pile. The valve mechanism of single-acting hammers shall be maintained in first-class condition so that the length of the stroke is maintained. If diesel hammers are used, they shall be equipped with chambers and gages arranged so that precise energy information can be read and recorded. CONTRACTOR shall provide all material relative to construction and performance of the hammer as the District may request. Hammer shall be in good operating condition at all times during driving.

- a. Unless otherwise indicated on the Contract Drawings or approved by the District, the hammer shall have a rated driving energy of 66,000 foot-pounds per blow for HP12 x 53 piles and as determined by wave equation analyses.

- ### B. Driving Caps:
- Equip hammer with cushioned or blocked driving cap, conforming to the pile shape. The cushion shall be consistent with wave equation analyses and dynamic testing. The cushion or block shall be replaced when burned or otherwise worn. Keep bearing surfaces of driving cap true and smooth.

- ### C. Leads:
- Use fixed or rigid type pile driver leads that will hold the pile firmly in position and alignment and in axial alignment with the hammer. Free-swinging leads will not be permitted. Extend leads to within 2 feet of the elevation at which the pile enters the ground.

PART 3 - EXECUTION

3.01 INSPECTION

- #### A.
- CONTRACTOR shall examine the areas and conditions under which steel H-Section piles are to be installed. Notify the District, in writing, of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the District.

3.02 PRE-DRIVING WORK

- #### A. Site Conditions:

1. Do not drive piles until the earthwork in the area which piles are to occupy has been completed, as follows:
 - a. Excavations: Stop earth excavation at an elevation of 6-inches to 12-inches above the bottom of the footing before piles are driven. Final excavation to the required elevation of footing bottoms shall be done after the piles have been installed and tested.
 - b. Fills: Construct and compact fills to the elevation of the grade shown.
2. Do not drive pile within 15 feet of any concrete or masonry structure which has not attained its full design strength.
3. When piles are located in an area where pre-drilling is to occur, the piles shall not be driven until the pre-drilling has been completed.

B. Pile Length Markings:

1. Mark length of pile by painting the number of feet from the pile point at 5-foot intervals and painting a horizontal line, at 12-inch intervals, starting 30 feet below pile cut-off.

C. Welding:

1. All shop and field welding shall be performed by certificated welders under the immediate supervision of a representative of an approved standard testing agency or an inspection agency. The costs of all welding inspections shall be borne by the CONTRACTOR.

D. Splices:

1. Splices should be minimized. Where necessary, two splices shall be permitted per length of pile, unless indicated otherwise on the Contract Drawings.
2. Clean surfaces to be welded of all rust, scale, oil, paint, and foreign material. Use only pile members with identical cross-sections for splicing.
3. Make splices before starting driving operations, wherever possible. If a welded splice is required during the driving operation, make the splice when the top of the driven pile portion is at least 3 feet above the ground, to permit inspection of the welded connection during welding and during subsequent driving. The sections of piles to be spliced shall be secured in alignment such that there is no eccentricity between the axes

of the two spliced lengths, or angle between them, after the splice has been completed. Splices performed during driving shall be completed during a stoppage of pile driving not to exceed 60 minutes or as necessary to prevent soil freezing around the pile.

4. Splices shall be 100 percent full penetration butt welded, producing a straight pile alignment through the splice and developing the full strength of the pile in both bearing and bending. Length of pile to be spliced shall be secured in proper alignment so that no eccentricity results.
5. All welding shall be performed in accordance with the applicable provisions of AWS D1.1 and Section 15018 WELDING. Ultrasonic testing of welds at pile splices shall be performed by an independent testing agency approved and paid by the CONTRACTOR. Testing shall be in conformance with ASTM E164-03. The CONTRACTOR shall cooperate with the testing agency to facilitate inspection. Welds which do not conform to applicable specifications shall be repaired at no additional cost as directed by the District.
6. No splices will be permitted within 60 feet of the pile tip.
7. Welded spliced piles shall not be driven until the weld has been accepted by the District's representative. Welds that do not conform to specifications shall be gouged and repaired as directed by the District's representative.

3.03 DRIVING PILES

A. General:

1. The driving shall be performed in an orderly sequence progressing in one direction across each foundation element. No piles shall be installed in an area surrounded by previously driven piles. Piles shall only be driven in the presence of the District or its representative.
2. The CONTRACTOR shall provide the necessary pile driving equipment for full-time operation at the site during the work to complete the work on schedule. The work shall require the mobilization of crane-mounted equipment for installation of the piles. The CONTRACTOR shall provide at least one fully equipped pile-driving rig in full-time operation at the site during the work, and shall mobilize additional equipment, if necessary, to complete the work on schedule.
3. Confirm the following driving criteria by the test piles at each structure. Drive piles to or into the dense sand of the Potomac Group P2 stratum to an average penetration resistance of ten blows per inch for the final 6 inches for HP14 piles and eight blows per inch for the final 6 inches for HP12 piles. If an abrupt increase in driving resistance is encountered, terminate driving when pile penetration is less than 1/2-inch in ten successive blows. Continuously drive each pile at the locations

indicated, to the required point elevation and driving resistance established by the driving and loading of test piles.

4. When the determination of the final driving resistance is being made, the steam, diesel, air, or hydraulic hammer shall be operated at a speed not less than 95 percent of the maximum blows per minute for which the hammer is rated by the manufacturer. The CONTRACTOR shall maintain the boiler or air pressure recommended by the manufacturer and shall employ the proper size hose and connections. When the determination of final driving resistance is being made with a diesel hammer, the energy being delivered to the pile shall be determined as the product of the weight of the ram times the observed or equivalent stroke for open diesel hammers; for closed diesel hammers, the energy shall be that indicated by an output gauge calibrated to measure total hammer energy.
5. Carefully maintain the center of gravity for each group or cluster of piles to conform to the locations shown.
6. Hammer and piles shall be supported in rigid leads designed to hold the pile firmly in position and in alignment with the hammer. Carefully plumb the leads and the pile before driving. Take care during driving to prevent and to correct any tendency of piles to twist or rotate.
7. When handling and driving long piles, take special precautions to ensure against overstress or leading away from a true position when driving.
8. As soon as driving of all piles is completed, excavate to final elevation around the piles, cut to required cutoff elevation, install welded attachments, and place the concrete working mat around the piles as indicated on the Contract Drawings.

B. Driving Tolerances:

1. Drive piles within the following maximum tolerances:
 - a. Location: 3 inches from the location indicated for the center of gravity of each single pile or 1.5 inches for the centroid of pile groups.
 - b. Plumbness: Piles shall not be out of plumb more than 2.5 percent of their length when installed. Maintain 1 inch in 10 feet from the vertical, or a maximum of 4 inches, measured when the pile is above ground, in the leads.

C. Corrective Action:

1. The District may survey the piles at any time. If any heave or any other discrepancy is detected, CONTRACTOR shall re-drive or replace the pile or piles, at no additional cost to the District.

2. Immediately after a pile group is installed, the CONTRACTOR'S Licensed Surveyor shall establish a reference point and its elevation on each pile for the purpose of checking uplift of the pile top as additional piles are installed. If uplift of 0.04 feet or more occurs as a result of pile installation at other locations, the pile shall be redriven to its original elevation, and deeper if necessary, to the approved final driving resistance.
3. The radius of uplift shall be initially assumed to be 35 ft. This radius may be expanded or contracted by the District's representative based on actual field measurements and is defined as the maximum distance between piles such that pile driving causes uplift of 0.04 feet or more in the affected pile.
4. The District will check the piling and determine its acceptability. If not acceptable, the District will advise CONTRACTOR what additional piles must be furnished and driven or other corrective measures to be taken.
5. The District will provide redesign, as required, because of piles driven out of location. All corrective measures, including cost of the District's redesign, shall be at CONTRACTOR'S expense.
6. Partial surveys of piles at cutoff elevation can be submitted to the District for review, as driving proceeds, in order to expedite the Work.

D. Related Activities:

1. Jetting, spudding, and predrilling (at locations not indicated on Contract Drawings) of piles shall not be employed, except with the written consent of the District.

E. Damaged or Misdriven Piles:

1. Damaged piles, and piles driven outside the required driving tolerances, will not be accepted.
2. Withdraw piles rejected after driving, and replace with new piles.
 - a. Solidly fill spaces that are left by withdrawn piles, which will not be filled by new piles, using cohesionless soil material such as gravel, broken stone, and gravel-sand mixtures. Place and compact throughout the length of the space.
3. If abandonment of piles is required because of damage, mislocation, misalignment or obstructions encountered, or failure to meet the driving criteria, CONTRACTOR shall install replacement piles as required, at no additional cost to the District.

4. Drive additional piles where the centerline deviation exceeds 3 inches and a redesign indicates a load on any pile exceeding 110 percent of the design load. Where these additional piles necessitate changes in pile cap dimensions or reinforcement, CONTRACTOR shall carry out all corrective measures required to obtain the approval of the District, at no additional cost to the District. Should it be impractical to drive additional piles in particular situations, provide reinforced concrete straps or other measures, as directed by the District, for redistributing the design loading, at no additional cost to the District.
5. Piles which are bent, crimped, buckled, or otherwise unsatisfactory as hereinafter specified, and which cannot be removed or repaired, shall be abandoned.
6. Piles indicating sudden or peculiar decrease in penetration resistance during driving will be assumed to be broken and will be rejected unless the District's representative review of available data indicates that sudden decrease in driving resistance is due to natural, subsurface conditions and continued acceptable driving behavior is observed.

F. Cutting-Off:

1. Cut-off the tops of driven piles, square with pile axis and at the elevations indicated with a cutting torch or other acceptable method.
2. Piles driven below the required cutoff elevation will not be acceptable and shall be replaced, at no additional cost to the District.

G. Top Plates:

1. After pile is cutoff, where indicated on the Contract Drawings, weld top plates in place, square and level on top of pile. Air holes may be drilled, punched or burned to prevent air pockets under the plate during concrete placement, if acceptable to the District.

3.04 FIELD QUALITY CONTROL

- A. Install and load test piles in order to verify design pile lengths and load capacities. Provide complete testing materials and equipment as required, and perform tests only in the presence of the District or its representative.
- B. Test piles, furnished and driven by CONTRACTOR may be located, cut off, and become part of the foundation system provided they conform to these Specifications requirements.
- C. Reaction piles, furnished and installed by CONTRACTOR to perform pile testing, may be located, cut-off, and become part of the foundation system provided they conform to the Specification requirements.

- D. Test Piles Required: Provide test piles in the locations shown and for the types of tests indicated on the Contract Drawings. In addition, provide dynamic pile load testing as specified below.
- E. Driving Test Piles:
1. Use test piles of the same size and design as required, and drive with the appropriate pile driving equipment operating at the rated driving energy to be used in driving for permanent piles.
 2. Drive test piles at the locations shown or as designated by the District to a tip elevation determined from elevation and pile length information shown on the Contract Drawings, or to the specified driving resistance, whichever occurs first.
- F. Pile Design Load Capacities: The design load capacities per pile shall be as shown on the Drawings.

END OF SECTION

**SECTION 02360
STEEL SHEET PILES**

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. This section covers all members to be used in the construction of steel sheet pile. This specification also covers the installation of steel sheet piling and trimming of the sheet pile to the lines and grades shown on the drawings or as required. This work also includes pre-drilling to facilitate driving sheet pile to the designated elevations.

1.02 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01300, shop drawings and product data showing materials of construction and details of installation.
- B. Provide qualification of proposed sheet pile installer.
- C. Contractor shall provide information from the manufacturer that indicates the sheet piling meets or exceeds the specification listed in this section.
- D. Contractor shall submit verification from the manufacturer that the hammer can deliver the required energy.
- E. Qualifications of independent vibration consulting and monitoring firm as specified herein.
- F. Splice locations, if necessary, shall be reviewed and accepted by engineer prior to installation.

1.03 REFERENCE STANDARDS

- A. American Concrete Institute (ACI)
 - 1. ACI 318/318R - Building Code Requirements for Structural Concrete and Commentary
- B. American Petroleum Institute (API)
 - 1. API Spec 5L - Specification for Line Pipe.
- C. American Society for Testing and Materials (ASTM)
 - 1. ASTM A36 – Standard Specification for Carbon Structural Steel.
 - 2. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 3. ASTM A139 = Standard Specification for Electric-Fusion (ARC) – Welded Steel Pipe (NPS 4 and Over).
 - 4. A252 - Standard Specification for Welded and Seamless Steel Pipe Piles
 - 5. A328 – Standard Specification for Steel Sheet Piling.

6. A572 – Standard Specification for High-Strength Low-Alloy Columbium - Vanadium Structural Steel.
 7. A690 – Standard Specification A690 – Standard Specification for High-Strength Low-Alloy Nickel, Copper, Phosphorus Steel H-Piles and Sheet Piling with Atmospheric Corrosion Resistance for Use in Marine Environments.
 8. ASTM A1011/A101M – Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
- D. American Water Works Association (AWWA)
1. AWWA C200 – Steel Water Pipe – 6 in. (50 mm) and Larger.
- E. American Welding Society (AWS)
1. AWS D1.1 – Structural Welding Code - Steel

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Sheet piling installer shall have, as a minimum, three (3) successful past installations of sheet piling of comparable overall heights and sections and comparable penetration into soils similar to those found on the project.

PART 2 - PRODUCTS

2.01 GENERAL

- A. All Steel sheet piling shall be new and unspliced material throughout, unless otherwise reviewed and accepted by Engineer.

2.02 MATERIALS

- A. Steel sheet piling shall meet the requirements of ASTM A328, (Grade 50)
- B. Steel corners, tees, wyes, and crosses shall meet the requirements of ASTM A328 or ASTM A690.
- C. Steel sheet piles required for the project shall be the type and weight shown on the drawings. Sheet piling shall be constructed with a weathering finish.
1. Additional length beyond those indicated on the drawings may be required to provide the trimming of tops of sheet piling.
- D. The interlocks between steel sheet pile sections shall be configured such that the average width of the annular space between all contact points of the interlocks shall be a maximum of one-eighth (1/8) inch, as determined by Engineer.
- E. Steel sheet piles and interlocks shall not have excessive kinks, camber or twist that would prevent the pile from reasonably free sliding to grade.

- F. All fabricated connections shall be made with the use of angles or bent plates, as necessary, and shall be adequately welded or connected with high strength bolts as accepted by Engineer.
- G. Handling Holes:
1. If handling holes are provided they shall be two (2) standard two and nine-sixteenth (2-9/16) inch diameter handling holes located six (6) inches from one end.
 2. The holes shall be plugged by welding a piece of steel over the hole prior to installing any riprap, backfill or drop structure cap.
 3. The plated hole shall be watertight.
- H. A vibratory hammer shall be utilized for driving the sheet piling providing that such operations do not exceed vibration/noise requirements of the specifications. Impact hammer shall be utilized when vibratory hammer is unable to drive temporary sheet piling to required depth and/or unable to meet vibration requirements. Impact hammer shall also meet noise requirement.
- I. Piles shall be coated according to the following requirements:
1. Surface Preparation – Prepare the substrate by providing a depth of anchor profile in accordance with the manufacturer’s product data sheet, but in no case less than 2.5 mils. Re-blast piles not coated during the same shift or if the surface to be coated no longer meets the requirements SSPC-SP 10.
 2. Unless otherwise shown in the Drawings, apply the inorganic zinc primer to all surfaces of piles. Unless otherwise shown in the Drawings, apply coal tar-epoxy coatings to the exposed sides of piles from the top of the piles to a depth of five feet below the lower of the design ground surface or the design scour depth. Apply the coal tar-epoxy in accordance with the following specific requirements:
 - a. Apply the coal tar-epoxy system in two coats. The time interval between the first coat and the second coat will be in strict accordance with the coating manufacturer’s published specifications. Apply the first coat to yield a dry film thickness of 8 to 10 mils. Apply the second coat to attain a total dry film thickness of the two coats between 16 and 20 mils.
 - b. Ensure that no portion of the coating is less than the specified minimum film thicknesses. The total minimum film thickness for any combination of coats will be the sum total of the averages of the specified thickness range of the individual coats.
 - c. After applying the coating on the steel piles, the Engineer will thoroughly inspect the surfaces and make film thickness measurements at the approximate rate of one for each 25 square feet of area unless deficient thickness is found. In this case, the rate of sub-measurements will be increased as required to determine the extent of the deficient area.

2.03 STORAGE AND HANDLING

- A. Do not subject piles to damage by impact bending stresses in transporting to and store piles outside.
- B. Store and Handle piles such that corrosion protection coating will not be damaged.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:

- 1. All welding or gas cutting shall be in accordance with the current standards of the American Welding Society.
- 2. Virtual Refusal:
 - a. Steel sheet piling shall be driven to the depths shown in the drawings or to virtual refusal if approved by Engineer. Contractor shall provide pre-drilling where necessary to reach those depths specified on the drawings.
 - b. Virtual refusal is defined as ten (10) blows per inch with an approved pile hammer.
 - c. A pile hammer shall be used to determine virtual refusal.
 - d. The hammer shall be operating at the manufacturer's recommended stroke and speed when virtual refusal is measured.

B. Sheet Pile Installation:

- 1. Steel sheet piling shall be assembled before driving and then driven as a continuous wall, progressively in stages to keep the piles aligned correctly and minimize the danger of breaking the interlock between the sheets.
- 2. Steel sheet piling shall be driven to form a tight bulkhead.
- 3. A driving head shall be used and any piling which is damaged in driving or which has broken interlocks between sections shall be pulled and replaced at contractor's expense.
- 4. The piling shall be driven within the following tolerances:
 - a. Alignment:
 - i. Sheet pile shall be driven to form a relatively straight line between the termini points shown on the drawings.
 - ii. Horizontal deviation of any point from a straight line connecting the two ends of the wall section shall be a maximum of four (4) inches.
 - b. Plumbness: Each individual sheet pile section shall be driven vertical, within a horizontal tolerance of two percent (2%) of any vertical length measured along the pile.
 - c. Elevation:

- i. Tops of sheet pile sections shall be within a tolerance of one (1) inch from plan elevations.
 - ii. Contractor shall not be paid for excess sheet pile trimmed off the end of the pile to meet final grade.
- C. Contractor shall brace and/or provide soil grading as necessary during construction operations in order to provide lateral stability for the sheet pile wall. The sheet pile wall has been designed for the soil grades of the final configurations denoted on the drawings only. Other temporary configurations during the construction period shall not be allowed. Backfill behind sheet pile shall not exceed the level shown on the drawings prior to installation of helical tie-back anchors.
- D. Care shall be taken during driving to keep from causing deformations of the top of the piles, splitting of section, or breaking of the interlock between sections. Care shall also be taken during driving to prevent and correct any tendency of steel sheet piles to twist or get out of plumb.
- E. Steel Z piling shall be driven with the ball-end leading. Proper care and planning shall be used to allow for this construction procedure in both immediate and possible future walls.
- F. Alternate Z piles shall be reversed end for proper interlocking in the “normal” position. Piles shall also be aligned properly to maintain a “normal” driving width.
- G. Steel sheet pile that is full length shown on the drawings and is required to be driven below the specified cutoff elevation shall be spliced with additional steel sheet piling with a full penetration butt weld.

END OF SECTION

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**SECTION 02578
SODDING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Permanent sodding at locations indicated on Drawings.

1.02 SUBMITTALS

- A. Procedures: In accordance with Section 01300.
- B. Description of type grass and location from which harvested, for approval by the District.

1.03 PRODUCT HANDLING

- A. Dumping sod from vehicles will not be permitted.
- B. If stacked during transit or storage, the sod shall be placed with all roots facing the bottom of the pallet.
- C. During delivery and while in stacks, sod shall be kept moist and cool and protected from sun and air.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Sod:
 - 1. Sod shall be well-matted with root growth.
 - 2. Unless otherwise directed by the District, sod grass shall be Bahia.
 - 3. Purchase in mature state from local suppliers.
 - 4. Number 1 quality, fresh, premium from certified seed. The turf shall be sufficiently dense so that no surface media is visible when mowed to a height of 1-1/2 inches. Maximum mowing height shall be 2-1/2 inches. At the time of sale, the turf shall contain no more than 1% undesirable grasses and not more than two weeds per 500 square feet. The thickness of the media portion of the sod shall not exceed 1/2 inch.

- a. Sod shall not be acceptable if it contains any of the following weeds: Bermuda grass, quack grass, Johnson grass, poison ivy, nutsedge, nimbleill, thistle, bindwind, bent grass, wild garlic, frond ivy, perennial sorrel, Brome grass, or Kikuyu grass.
- b. The soil media shall be friable and well-drained. Standard size sections of sod shall be strong enough that they can be picked up and handled without damage.

PART 3 - EXECUTION

3.01 HARVESTING

- A. Use approved sod cutters for cutting and removing sod. Exercise care to retain native soil intact.
- B. Cut sod to a thickness sufficient to secure a dense stand of live grass.
- C. Sod shall not contain noxious weeds in excess of 0.50%.

3.02 SOIL PREPARATION

- A. Remove rocks, weeds, and debris from area to be sodded. Work-up soil to a depth of 6 inches and break up all clods to less than 1 inch in size. Soil prep all areas as described elsewhere in Specifications.
- B. Carefully smooth surface areas to be sodded. Roll areas to expose soil depressions or surface irregularities. Regrade as required to obtain optimum conditions.

3.03 PLANTING

- A. At time of planting, sod shall be live, fresh, and uninjured, with native soil mat adhering firmly to root structure.
- B. Pre-irrigate soil to wet it to a depth of 2 inches. Soil should be damp, but not muddy.
- C. Plant sod within 24 hours after it has been delivered to site. Do not leave it exposed to direct sun any longer than is necessary.
- D. Lay first strip of sod slabs along a straight line (use a string in irregular areas). Use a 2 x 4 laid on its side as a "kicker" to butt against sod strips and force them into place. Butt joints tightly, do not overlap edges. On second strip, stagger joints (much as in laying bricks). Use a sharp knife to cut sod to fit curves, edges, and sprinkler heads. Do not use sod strips less than 10 inches wide.

- E. Do not lay entire lawn area before watering. When a conveniently large area has been sodded, water lightly to prevent drying out. Continue to lay sod, and to water, until installation has been completed.
- F. After laying of sod has been completed, roll lightly with lawn roller filled with water to eliminate irregularities and to form good contact between sod and soil. Avoid very heavy rollers or excessive initial watering to avoid roller marks.
- G. Thoroughly water complete lawn surface. Soil should be moistened at least 2 inches deep. Repeat sprinkling at regular intervals to keep sod moist 2 inches deep at all times. After sod is established, decrease watering frequency and increase amount of water per application as needed. Do not allow water to pond. Avoid excessive watering. Soil shall be moist but not saturated. Monitor irrigation as required.
- H. Replace all dead or dying sod with equivalent quality material as directed by the District.
- I. Minimize traffic over sod areas during its growth establishment (90 days).
- J. Sod areas on which an acceptable stand of grass is not present shall be re-sodded.
 - 1. An acceptable stand is living grass from at least 90 percent of the sod placed according to this Specification.
 - 2. Areas on which there is not an acceptable stand of grass shall continue to be replanted throughout the maintenance period until an acceptable stand of grass is present.

END OF SECTION

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**SECTION 02579
ENGINEERED TURF**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Specifications for the Engineered Turf component of the HydroTurf® CS System.
- B. Specifications for approved subgrade below the HydroTurf System.
- C. Specifications for the HydroBinder® Infill Component of the patented HydroTurf® System at locations indicated on Drawings.

1.02 SUBMITTALS

- A. Procedures: In accordance with Section 01300.
- B. Manufacturer
 - 1. Manufacturing Quality Control Testing – Engineered Turf Component
 - a. Certificate of Compliance: Certificate of Compliance shall indicate that the engineered turf meets or exceeds the property values in Table 1. Also, the turf fiber color / blend shall be indicated.
 - b. Provide inspection records of the tufting procedures for every 300,000 sq.ft. of Engineered Turf, including:
 - i. Inspection records that indicate the following properties:
 - I.* Tufting Gauge;
 - II.* Pile height;
 - III.* Roll length and roll numbers;
 - IV.* Total product weight;
 - V.* Tensile Strength Product (lbs./ft.) (MARV) ASTM D 4595; and
 - VI.* Tensile Strength of Yarn (lbs.) (MARV) ASTM D 2256.
- C. Conformance Testing – Engineered Turf
 - 1. Obtain one Engineered Turf sample for every 400,000 sq. ft. of material supplied to the site;
 - 2. Forward samples to the independent testing laboratory and test for the following:

- a. Total product weight;
 - b. CBR Puncture ASTM D6241;
 - c. Tensile Strength Product ASTM D 4595; and
 - d. Tensile Strength of Yarn ASTM D2256.
3. Refer to the properties table under Section 2 for required values for the above properties.

D. Geosynthetics Installer

1. Prior to beginning the installation of the HydroTurf CS System, geosynthetics installer shall submit the following to the District's Representative for Engineered Turf component:
 - a. Verify in writing that geosynthetics installer's personnel have the following experience:
 - i. Geotextile seamers shall have installed at least 1,000,000 square feet of like materials.
 - b. The District's Representative shall be responsible for approving resumes and qualifications of geosynthetics installer personnel; and
 - c. Geosynthetics installer personnel shall attend HydroTurf CS orientation prior to starting the work.

1.03 REFERENCES

A. Latest Version of American Society for Testing and Materials (ASTM) standards:

1. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
2. ASTM C150 - Standard Specification for Portland Cement
3. ASTM C387 - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar
4. ASTM D1335 - Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings
5. ASTM D1577 - Standard Test Methods for Linear Density of Textile Fibers
6. ASTM D1907 - Standard Test Method for Linear Density of Yarn (Yarn Number) by the Skein Method
7. ASTM D2256 - Standard Test Method for Tensile Properties of Yarns by the Single-Strand Method
8. ASTM D4595 - Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method

9. ASTM D5321 - Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method
 10. ASTM D5793 - Standard Test Method for Binding Sites per Unit Length or Width of Pile Yarn Floor Coverings
 11. ASTM D5823 - Standard Test Method for Tuft Height of Pile Floor Coverings
 12. ASTM D5848 - Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Coverings
 13. ASTM D6241 - Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe
- B. American Concrete Institute (ACI) - 306R-10 Guide to Cold Weather Concreting

PART 2 - PRODUCTS

2.01 HYDROTURF CS

A. Delivery, Storage and Handling

1. Delivery:

- a. Deliver materials to the site only after the Engineer and the District approve required submittals.
- b. Contractor shall ensure that all rolls delivered to the site have been properly identified with the following for Engineered Synthetic Turf:
 - i. Manufacturer's name
 - ii. Product identification
 - iii. Lot number
 - iv. Roll number
 - v. Roll dimensions
- c. The Engineered Synthetic Turf shall meet the following delivery requirements:
 - i. The synthetic turf is wrapped in rolls with protective covering.
 - ii. The rolls are not damaged during unloading.
 - iii. Protect the synthetic turf from mud, soil, dirt, dust, debris, cutting, or impact forces.
 - iv. Each roll must be marked or tagged with proper identification.
- d. Separate damaged materials from undamaged materials and store at locations designated by the District until proper disposition of material is determined by the Engineer and the District.
- e. Separate rolls without proper documentation and store until the District's approval is received.

2. On-Site Storage:
 - a. Store in space allocated by the District.
 - b. Protect from puncture, dirt, grease, water, moisture, mud, mechanical abrasions, excessive heat or other damage.
 - c. Store the engineered turf on level prepared surface (not on wooden pallets). The prepared surface for the engineered turf should be graded to drain away from HydroTurf components.
 - d. Stack the engineered turf no more than three rolls high.
3. On-Site Handling:
 - a. Use appropriate handling equipment to load, move or deploy engineered turf. Appropriate handling equipment includes cloth chokers / straps, and spreader bar for loading, spreader and roll bars for deployment. Dragging rolls and / or panels on the ground surface shall not be permitted.
 - b. Do not fold engineered turf material. Folded material shall be rejected.
 - c. The installer is responsible for storage and transporting material from storage area to installation area.
4. Damaged Engineered Synthetic Turf:
 - a. Damaged engineered synthetic turf shall be documented by Contractor.
 - b. Damaged engineered synthetic turf shall be repaired, if approved by the District, in accordance with these specifications or shall be replaced at no additional cost to the District.

B. Engineered Synthetic Turf – Hydroturf CS

1. Manufacturer: Shaw Industries, Inc.
 - a. The engineered turf component shall meet or exceed property values listed in **Table 02579-1** as an individual component and as the performance property as the HydroTurf CS system.
 - b. Engineered synthetic turf shall be supplied by Watershed Geosynthetics as a component of the HydroTurf CS Revetment System.
2. The engineered synthetic turf shall be comprised of the following components:
 - a. Polyethylene slit tape fibers; and
 - b. Two polypropylene backing geotextiles
3. The polyethylene yarn shall conform to the color selected by the District.

Table 02579-1 – Property Values for Engineered Synthetic Turf Component of HydroTurf CS

Property	Test Method	Value
<i>Engineered Turf Component</i>		
Tufted Pile Height (inches)	ASTM D 5823	1.25 ± 0.25
CBR Puncture, lbs	ASTM D6241	800 (MARV)
Tensile Strength, MD/XMD, lbs/ft	ASTM D4595	1000 (MARV)
Pile Weight	ASTM D5848	19 ± 2.0 oz./sq. yd
Total Product Weight		25 ± 2.0 oz./sq. yd
Yarn	ASTM D 1577	Polyethylene Fibrillated Tape Fiber
Tensile Strength of Yarn	ASTM D2256	15 lbs min
Aerodynamic Evaluation	GTRI Wind Tunnel	120 mph with max. uplift of 0.12 lb/sf
UV Resistance and Stability of Synthetic Turf	ASTM G147 ASTM G7	>60% Retained Tensile Strength at 100-year exposure (projected)
Standard Roll Dimensions	15-ft (4.57-m) Wide x 300-ft (91.4-m) Long	
Roll Area (approximate)	4500 ft ² (418-m ²)	
<i>HydroTurf CS System Performance Properties</i>		
Full-Scale Steady State Overtop Test	ASTM D7277 / ASTM D7276	40 ft/s of velocity
Manning's N Value	ASTM D7277 / ASTM D7276	0.017 – 0.020
Full-Scale Steady State Hydraulic Jump Test	Colorado State University (CSU)	Dissipates 30 horsepower per ft (min)
Full-Scale Wave Overtopping Test – Cumulative Volume	CSU Wave Simulator	165,000 ft ³ /ft (min)
Full-Scale Wave Overtopping Test – Maximum Average Wave Discharge	CSU Wave Simulator	4.0 cfs/ft
Internal Friction of Combined Components (Low Confining Stress)	ASTM D 5321	23° min (peak) MicroSpike 33° min (peak) Super GripNet

2.02 HYDROTURF HYDROBINDER INFILL COMPONENT

A. Description

- HydroBinder is a proprietary cementitious product used as the infill component of the HydroTurf system.
- HydroBinder shall be supplied by Watershed Geosynthetics as a component of the HydroTurf Revetment System.

B. Materials

1. The infill shall be HydroBinder Cementitious Infill.
2. The infill material may be delivered in either pallet form of 80 lb. bags or 3000 lb. bulk bag super sacks.
3. Cement, except as otherwise specified herein, shall be a brand of Portland Cement, meeting ASTM C 150 and shall be Type I or Type II.
4. The cementitious infill mix shall conform to the requirements of ASTM C 387 for high strength mortars.
5. The cementitious infill mix shall have a minimum 28-day compressive strength of 5000 psi as measured in accordance with ASTM C 109.

PART 3 - EXECUTION

3.01 PREPARATION

A. Surface Preparation:

1. Subgrade shall be smooth (free from ruts, depressions, etc.), uniform, firm and unyielding, and free from rocks, roots or other debris.
2. No rocks or protrusions greater than 0.75 inch in diameter shall be exposed at the subgrade surface.
3. Approved subgrade shall be capable of supporting the weight of the product, installation equipment, and maintenance equipment.
4. Daily evaluation shall be performed to show that no changes have occurred that would render the subgrade unacceptable.

B. Anchor Trench Preparation

1. Anchor trenches shall be excavated to the grades and dimensions as specified on the construction plans.
2. Anchor trenches shall be straight and uniform with no rough edges.
3. The inside edge of the anchor trench shall be rounded and smooth.
4. Anchor trenches shall be free of sharp objects and other deleterious material.

C. Non-Conforming Work

1. Subgrade or its components not meeting specifications either before or during deployment of the HydroTurf, shall be reported to the District and Engineer and corrected as required.

3.02 INSTALLERS

- A. Installer shall be trained by Watershed Geosynthetics, LLC.

3.03 INSTALLATION

- A. Engineered turf component:
 - 1. Construction quality assurance personnel shall verify that:
 - a. Engineered Turf tufts are not excessively pulled out by the installation process; and
 - b. After the first panel is deployed, all subsequent panels are deployed on top of the previous panel, seamed, and then flipped into position.

3.04 ENGINEERED TURF COMPONENT DEPLOYMENT

- A. Prior to installation of Engineered Turf Component, the construction quality assurance personnel must observe the following:
 - 1. HydroTurf CS geomembrane component has been seamed, tested, approved, and is released for further component deployment by the Engineer; and
 - 2. The supporting surface (e.g., the geomembrane) is substantially free of debris or large scraps.
- B. During deployment of Engineered Turf, the construction quality assurance personnel must observe the following:
 - 1. Observe the turf as it is deployed and record defects and disposition of the defects (i.e., panel rejected, patch installed, etc.);
 - 2. That repairs are made in accordance with specified herein and the HydroTurf installation guidelines;
 - 3. Equipment used does not damage the turf or underlying geomembrane;
 - 4. That all panels are deployed from the top of the slope in a way that the Engineered Turf filaments are pointing upslope after deployment is complete;
 - 5. That the turf is anchored to prevent movement by the wind (the geosynthetics Installer is responsible for any damage resulting to or from windblown Engineered Turf);
 - 6. That the turf remains substantially free of contaminants;
 - 7. That the turf is laid substantially smooth;
 - 8. That on slopes, the turf is secured with sandbag anchoring at the top of the slope after deployment;
 - 9. Fusion Seaming Method

- a. Engineered Turf fusion seaming device will be a DemTech VM20/4/A (Model No. VM-20/4/A Pro-Wedge Welder 120V, VM20 Outfitted with 100-KIT/4S/VC/A.2 Welding Kit, 4-in, 220V, S.S.) fusion welder only.
- b. Fusion seams require a minimum of 5 inches of overlap.
- c. Demonstrate the preparation methods and equipment utilized for removal of the salvage from the outside edge of the rolls of turf (i.e. trimming & cutting devices). Mechanical trimming and cutting devices will be utilized for salvage trimming. Box blades and knives shall not be utilized for salvage preparations. Fraying of geotextile strands when performing the removal of salvage is not acceptable.
- d. Frayed or loose edges and/or geotextile strands shall be cut off or removed.
- e. Since the temperature and speed controls of the DemTech VM-20 wedge welder are variable and can be increased / decreased depending on weather and environment conditions, the temperature and speed shall be confirmed with a trial seam. This trial seam shall be field tested. Trial seams shall be performed at the being of each day and during the day when the weather (i.e., temperature, humidity, etc.) conditions change.
- f. Trial seams shall be performed as outlined in the HydroTurf Installation Guidelines (most recent revision).
- g. Production field seaming shall be performed and verified in the same manner as trial seams. The field seams shall be inspected every hour at a minimum. This inspection of the field seams shall be the same as the inspection for the trial seams.
- h. Production fusion seams shall be continuous and have no gaps.
- i. Any damage and defects (including burnouts) that occur during production seaming will be repaired as outlined in Section 3.05 and HydroTurf Installation Guidelines (most recent revision).
- j. All seams not passing the visual inspection shall be repaired.
- k. After seaming operations, the edges of the synthetic turf panels shall be sufficiently anchored with sandbags in the top of slope perimeter anchor trenches unless otherwise noted on the construction drawings.

3.05 EQUIPMENT ON THE TURF

- A. Construction equipment on the deployed synthetic turf shall be minimized to reduce the potential for synthetic turf material puncture. Small equipment such as generators shall be placed on scrap synthetic turf / geosynthetic material (rub sheets) above engineered synthetic turf.
- B. During Construction:
 1. On slopes exceeding 15%
 - a. No equipment will be allowed until HydroBinder Infill is in place.

2. On slopes less than 15%
 - a. ATV type vehicles and/or rubber tracked skid steer machines will be allowed prior to infill placement if the tire / track ground pressure is less than 5 psi.
 3. Equipment operators shall inspect equipment rubber tires or tracks for sharp protrusions from foreign matter or tire/track damage, embedded rocks, or other foreign materials protruding from tires/track prior to driving on the synthetic turf. Equipment travel paths driven on synthetic turf shall be as straight as possible with no sharp turns, sudden stops or quick starts.
 4. Damage caused by having equipment on the engineered synthetic turf (i.e., tears, rips, punctures, wrinkles, ripples, movement, etc.) shall be the responsibility of the installer to repair.
- C. Post installation, no equipment shall be allowed on the HydroTurf until HydroBinder Infill is fully cured for 28 days:
1. Driving should be limited and only in areas where the subgrade under the HydroTurf is well-compacted, firm and unyielding.
 2. Drivability tire / track (ground) pressures should be limited to less than 35 psi. Rubber tire and/or tracked vehicles or equipment only.
 3. On slopes flatter than 10%, allowable ground pressures may only be increased with the written approval of the Engineer.
- D. Any activity that may be identified during the course of construction by the Engineer, the District's representative, or construction quality assurance personnel as being a possible danger to the integrity of the HydroTurf CS system will be prohibited regardless of any prior approval.

3.06 REPAIR AND TIE-IN PROCEDURES

- A. Engineered Turf Component
1. When Repairs and Tie-Ins of Engineered Turf occur, the construction quality assurance personnel must observe the following:
 - a. Repairs to Engineered Turf are completed by using a 4-in overlapped heat-bonded seam;
 - b. All tie-in seams along flatter slopes (i.e. 15% or less) with length greater than 25 feet will use an approved fusion welding machine so that consistent pressure is achieved throughout the seam; and
 - c. A hand-held heat gun or leister with hand pressure will be used in smaller/concentrated areas. Passing trial seams using the hand-held heat gun shall be performed prior to production seaming. Trial seams shall be performed as outlined in the HydroTurf Installation Guidelines (most recent revision).

2. Geosynthetics Installer may also demonstrate techniques and practices as follows:
 - a. Field demonstration and approval by the District's representative is required before incorporating any alternative technique.

3.07 INSTALLATION ACCEPTANCE

- A. The Geosynthetics Installer retains all ownership and responsibility for the HydroTurf CS system until acceptance by the District.
 1. After HydroTurf CS components are deployed, seamed, has passed required testing successfully, and any repairs are made;
 - a. The completed installation will be inspected by the District's representative and the geosynthetics installer's construction quality control supervisor;
 - b. Damage and/or defects found during this inspection will be repaired by the geosynthetics installer; and
 - c. The installation will not be accepted until it meets the requirements of these specifications and Florida, Federal or Local Regulations.
- B. Installation of the HydroTurf CS system will be accepted by the Engineer only when the following has been completed:
 1. The installation is complete;
 2. Seams have been observed and documented by the construction quality assurance personnel and accepted by the Engineer;
 3. Required independent testing laboratory and field tests have been completed, reviewed and approved;
 4. Required geosynthetics installer supplied documentation has been received, reviewed and approved; and
 5. As built record drawings have been completed and verified by the Engineer.

END OF SECTION

**SECTION 02663
PIPE PRESSURE TESTING**

PART 1 - GENERAL (NOT USED)

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

A. Pressure and Leakage Tests of Pressure Piping

1. General: The Contractor shall perform hydrostatic pressure and leakage tests on all pressure piping. Tests shall be made between valves and shall not exceed 2,000-feet. Each side of all valves shall be pressure tested. Multiple sections of main may be tested simultaneously providing there are non-pressurized sections in between each pressure-tested section.
2. Standard: AWWA C600, Section 4, with the exceptions required herein and the exception that the Contractor shall furnish all gauges, meters, pressure pumps, and other equipment needed to test the lines.
3. Hydrostatic Pressure Test
 - a. Test Pressure: Pressure test at 50% above the normal working pressure, but not less than 10-psi, unless otherwise noted on the Drawings.
 - b. Test Duration: Duration is 2-hours. If during the test, the integrity of the tested line is in question, the District may require a 6-hour pressure test.
 - c. Air Release: Corporation cocks at least 3/4-inch in diameter, pipe riser, and angle globe valves shall be provided at each dead-end to bleed air from the line.
4. Hydrostatic Leakage Test
 - a. General: Following the pressure test, the Contractor shall perform the leakage test. The line shall be filled with water and all air removed for the test. The Contractor shall provide a pump to maintain the test pressure for the entire test period.
 - b. Test Pressure: 1.5 times the maximum operating pressure as determined by the District but not less than 10-psi unless otherwise noted.
 - c. Test duration: 2-hours.
 - d. Allowable leakage:

$$L = \frac{SD(P)0.5}{148,000}$$

148,000

L = Allowable leakage (gallons per hour)

S = Length of pipe tested (feet)

D = Nominal diameter of pipe (inches)

P = Average test pressure maintained (psig)

- e. Visible Leakage: All leaks evident at the surface shall be repaired and leakage eliminated regardless of the measured total leakage.
 - f. Leakage Measurement: The amount of water required to maintain the test pressure is the leakage.
- B. Wire Continuity Check: The Contractor shall perform a continuity check of the 10-gauge locating wire for the entire length of the main by performing a continuity test at each valve test station box.

END OF SECTION

**SECTION 02931
RIPRAP**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The work specified in this section shall consist of the placing of all riprap, including geotextile layer and bedding stone where indicated on the Drawings.

1.02 WORK INCLUDED

- A. The Contractor shall furnish all materials, equipment, tools and labor necessary for the placing of the riprap including geotextile layer and bedding stone as shown on the Drawings.

1.03 REFERENCE SPECIFICATION

- A. Florida Department of Transportation (FDOT) "Standard Specifications for Road and Bridge Construction", latest edition."

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Riprap: Riprap shall be Rubble Riprap (Ditch Lining) meeting the requirements of Section 530-2.1.3.2 FDOT Specifications.
- B. Concrete Recycled Riprap may be substituted per the approval of the District. Concrete recycled riprap shall be clean, free of exposed metal and meet sizing per Rubble Riprap (Ditch Lining) of Section 530-2.1.3.2 FDOT Specifications.
- C. Bedding Stone: Provide Bedding Stone meeting the requirements of Section 530-2.1.4 FDOT Specifications.
- D. Geotextile Fabric: Provide Geotextile Fabric meeting the requirements of Geotextile Fabric Type D-2 per Section 514-3.4 and Section 985 FDOT Specifications. Geotextile fabric shall be Mirafi FW404 or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

- A. Construction methods shall be in accordance with the details shown on all the Drawings, and Section 530-3 FDOT Specifications.

END OF SECTION

**SECTION 03100
CONCRETE FORMWORK**

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and cut, remove, repair or otherwise modify parts of existing concrete structures or appurtenances as shown on the Drawings and as specified herein. Work under this Section shall also include bonding new concrete to existing concrete.
- B. Secure to forms as required or set for embedment as required, all miscellaneous metal items, sleeves, reglets, anchor bolts, inserts and other items furnished under other Sections and required to be cast into concrete, or approved in advance by the Engineer.

1.02 RELATED WORK

- A. Concrete Reinforcement is included in Section 03200.
- B. Concrete Joints and Joint Accessories are included in Section 03150.
- C. Cast-in-Place Concrete is included in Section 03300.
- D. Grout is included in Section 03600.

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01300, shop drawings, and product data showing materials of construction and details of installation for:
 - 1. Form release agent
 - 2. Form ties
 - 3. Form Savers

1.04 SAMPLES

- A. Demonstrate to the Engineer on a designated area of the concrete substructure exterior surface that the form release agent will not adversely affect concrete surfaces to be painted, coated or otherwise finished and will not affect the forming materials.
- B. Certificates
 - 1. Certify that form release agent is suitable for use in contact with potable water after 30 days (non-toxic and free of taste and odor).

1.05 REFERENCE STANDARDS

- A. American Concrete Institute (ACI)
 - 1. ACI 301 – Standard Specification for Structural Concrete

2. ACI 318 – Building Code Requirements for Reinforced Concrete
 3. ACI 347 – Formwork for Concrete
- B. American Plywood Association (APA)
1. Material grades and designations as specified
- C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.06 SYSTEM DESCRIPTION

- A. General: Architectural Concrete is wall, slab, beam or column concrete which will have surfaces exposed to view in the finished work. It includes similar exposed surfaces in water containment structures from the top of walls to 2-ft below the normal water surface in open tanks and basins.
- B. Formwork shall be designed and erected in accordance with the requirements of ACI 301 and ACI 318 and as recommended in ACI 347 and shall comply with all applicable regulations and codes. The design shall consider any special requirements due to the use of plasticized and/or retarded set concrete.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The usage of a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configurations desired.

2.02 MATERIALS

- A. Forms for cast in place concrete shall be made of wood, metal, or other approved material. Construct wood forms of sound lumber or plywood of suitable dimensions and free from knotholes and loose knots. Where used for exposed surfaces, dress and match boards. Sand plywood smooth and fit adjacent panels with tight joints. Metal forms may be used when approved by the Engineer and shall be of an appropriate type for the class of work involved. All forms shall be designed and constructed to provide a flat, uniform concrete surface requiring minimal finishing or repairs.
- B. Wall Forms
1. Forms for all exposed exterior and interior concrete walls shall be "Plyform" exterior grade plywood panels manufactured in compliance with the APA and bearing the trademark of that group, or equal acceptable to the Engineer. Provide B grade or better veneer on all faces to be placed against concrete during forming. The class of material and grades of interior plies shall be of sufficient strength and stiffness to provide a flat, uniform concrete surface requiring minimal finishing and grinding.
 2. All joints or gaps in forms shall be taped, gasketed, plugged, and/or caulked with an approved material so that the joint will remain watertight and will withstand placing pressures without bulging.

- C. Rustication strips shall be at the location and shall conform to the details shown on the Drawings. Moldings for chamfers and rustications shall be milled and planed smooth. Rustications and corner strips shall be of a nonabsorbent material, compatible with the form surface and fully sealed on all sides to prohibit the loss of paste or water between the two surfaces.
- D. Form Release Agent
1. Coat all forming surfaces in contact with concrete using an effective, non-staining, non-residual, water based, bond-breaking form coating unless otherwise noted. Form release agents used in potable water containment structures shall be suitable for use in contact with potable water and shall be non-toxic and free of taste or odor and meet the requirements of NSF/ANSI Standard 61. Form release agent shall be Farm Fresh by Unitex or approved equal.
- E. Form Ties
1. Form ties encased in concrete other than those specified in the following paragraphs shall be designed so that, after removal of the projecting part, no metal shall remain within 1 1/2 in of the face of the concrete. The part of the tie to be removed shall be at least 1/2 in diameter or be provided with a wood or metal cone at least 1/2 in diameter and 1 1/2 in long. Form ties in concrete exposed to view shall be the cone washer type.
 2. Form ties for exposed exterior and interior walls shall be as specified in the preceding paragraph except that the cones shall be of approved wood or plastic.
 3. Flat bar ties for panel forms, is used, shall have plastic or rubber inserts having a minimum depth of 1-1/2-in and sufficient dimensions to permit proper patching of the tie hole.
 4. Ties for liquid containment structures shall have an integral waterstop that is tightly welded to the tie.
 5. Common wire shall not be used for form ties.
 6. Alternate form ties consisting of tapered through-bolts at least 1-in in diameter at smallest end or through-bolts that utilize a removable tapered sleeve of the same minimum size may be used at the Contractor's option. Obtain Engineer's acceptance of system and spacing of ties prior to ordering or purchase of forming. Clean, fill and seal form tie hole with non-shrink cement grout. A vinyl plug shall be inserted into the hole to serve as a waterstop. The Contractor shall be responsible for water-tightness of the form ties and any repairs needed.
- F. Form Savers
1. Form savers shall be Lenton Form Saver or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

- A. Forms shall be used for all cast-in-place concrete including sides of footings. Forms shall be constructed and placed so that the resulting concrete will be of the shape, lines, dimensions and appearance indicated on the drawings.
- B. Forms for walls shall have removable panels at the bottom for cleaning, inspection and joint surface preparation. Forms for walls of considerable height shall have closable intermediate inspection ports. Tremies and hoppers for placing concrete shall be used to allow concrete inspection, to prevent segregation and to prevent the accumulation of hardened concrete on the forms above the fresh concrete.
- C. Molding, bevels, or other types of chamfer strips shall be placed to produce block outs, rustications, or chamfers as shown on the Drawings or as specified herein. Chamfer strips shall be provided at horizontal and vertical projecting corners to produce a $\frac{3}{4}$ -in chamfer. Rectangular or trapezoidal moldings shall be placed in locations requiring sealants where specified or shown on the Drawings. Sizes of moldings shall conform to the sealants manufacturer's recommendations.
- D. Forms shall be sufficiently rigid to withstand construction loads and vibration and to prevent displacement or sagging between supports. Construct forms so that the concrete will not be damaged by their removal. The contractor shall be entirely responsible for the adequacy of the forming system
- E. Before form material is re-used, all surfaces to be in contact with concrete shall be thoroughly cleaned, all damaged places repaired, all projecting nails withdrawn and all protrusions smoothed. Reuse of wooden forms for other than rough finish will be permitted only if a "like new" condition of the form is maintained.

3.02 FORM TOLERANCES

- A. Forms shall be surfaced, designed and constructed in accordance with the recommendations of ACI 347 and shall meet the following additional requirements for the specified finishes.
 - 1. Formed Surface Exposed to View: Edges of all form panels in contact with concrete shall be flush within 1/16-in and forms for plane surfaces shall be such that the concrete will be plane within 3/16-in in 4-ft. Forms shall be tight to prevent the passage of mortar, water and grout. The maximum deviation of the finish wall surface at any point shall not exceed $\frac{1}{4}$ -in from the intended surface as shown on the Drawings. Form panels shall be arranged symmetrically and in an orderly manner to minimize the number of seams.
 - 2. Formed surfaces not exposed to view or buried shall meet requirements of Class "C" Surface in ACI 347.
 - 3. Formed rough surfaces including mass concrete, pipe encasement, electrical duct encasement and other similar installations shall have no minimum requirements for surface smoothness and surface deflections. The overall dimensions of the concrete shall be plus or minus 1-in.

3.03 FORM PREPARATION

- A. Wood forms in contact with the concrete shall be coated with an effective release agent prior to form installation.
- B. Steel forms shall be thoroughly cleaned and mill scale and other ferrous deposits shall be sandblasted or otherwise removed from the contact surface for all forms, except those utilized for surfaces receiving a rough finish. All forms shall have the contact surfaces coated with a release agent.

3.04 REMOVAL OF FORMS

- A. The Contractor shall be responsible for all damage resulting from removal of forms. Forms and shoring for structural slabs or beams shall remain in place in accordance with ACI 301 and ACI 347. Form removal shall conform to the requirements specified in Section 03300 and a curing compound applied.

3.05 INSPECTION

- A. The Engineer on site shall be notified when the forms are complete and ready for inspection at least 6 hours prior to the proposed concrete placement.
- B. Failure of the forms to comply with the requirements specified herein or to produce concrete complying with the requirements of Section 03300 shall be grounds for rejection of that portion of the concrete work. Rejected work shall be repaired or replaced as directed by the Engineer at no additional cost to the District. Such repair or replacement shall be subject to the requirements to this Section and approval of the Engineer.

END OF SECTION

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SECTION 03150
CONCRETE JOINTS AND JOINT ACCESORIES

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install accessories for concrete joints as shown on the Drawings and as specified herein

1.02 RELATED WORK

- A. Concrete Formwork is included in Section 03100.
- B. Concrete Reinforcement is included in Section 03200.
- C. Cast-In-Place Concrete is included in Section 03300.
- D. Concrete Finishes are included in Section 03350.
- E. Grout is included in Section 03600.

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01300, shop drawings and product data. Submittals shall include at least the following:
 - 1. Standard Waterstops: Product data including catalogue cut, technical data, storage requirements, splicing methods and conformity to ASTM standards.
 - 2. Special Waterstops: Product data including catalogue cut, technical data, location of use, storage requirements, splicing methods, installation instructions and conformity to ASTM standards.
 - 3. Premolded joint fillers: Product data including catalogue cut, technical data, storage requirements, installation requirements, location of use and conformity to ASTM standards.
 - 4. Bond breaker: Product data including catalogue cut, technical data, storage requirements, installation requirements, location of use and conformity to ASTM standards.
 - 5. Expansion joint dowels: Product data on the complete assembly including dowels, coatings, lubricants, spacers, sleeves, expansion caps, installation requirements and conformity to ASTM standards.
 - 6. Compressible joint filler: Product data including catalogue cut, technical data, storage requirements, installation requirements, location of use and conformity to ASTM standards.
 - 7. Bonding agents: Product data including catalogue cut, technical data, storage requirements, product life, application requirements and conformity to ASTM standards.

B. Certifications

1. Certification that all materials used within the joint system is compatible with each other.
2. Certifications that materials used in the construction of joints are suitable for use in contact with potable water 30 days after installation.

1.04 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM A675 – Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties.
2. ASTM C881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
3. ASTM C1059 - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
4. ASTM D1751 - Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction. (Nonextruding and Resilient Bituminous Types).
5. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

B. U.S. Army Corps of Engineers (CRD)

1. CRD C572 – Specification for Polyvinylchloride Waterstops.

C. Federal Specifications

1. FS SS-S-210A - Sealing Compound for Expansion Joints.

D. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The use of manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.
- B. All materials used together in a given joint (bond breakers, backer rods, joint fillers, sealants, etc.) shall be compatible with one another. Coordinate selection of suppliers and produce to ensure compatibility. Under no circumstances shall asphaltic bond breakers or joint fillers be used in joints receiving sealant.
- C. All chemical sealant type waterstops shall be products specifically manufactured for the purpose for which they will be used and the products shall have been successfully used on similar structures for more than five years.

2.02 MATERIALS

A. Standard Waterstops

1. PVC Waterstops - The waterstop shall be made by extruding elastomeric plastic compound with virgin polyvinylchloride as the basic resins. The compound shall contain no reprocessed materials. Minimum tensile strength of waterstop shall be 1750 psi. The waterstop shall conform to CRD-C572. The waterstop shall be Greenstreak Group, Inc. model No. 679 or approved equal for construction joints. The waterstop shall be Greenstreak Group Inc. model No.732 or approved equal for control joints and Greenstreak Group Inc. Model No. 738 for expansion joints. Provide grommets or pre-punched holes spaced at 12 inches on center along length of waterstop.
2. Factory Fabrications: Provide factory made waterstop fabrications for all changes of direction, transitions, and intersections, leaving only straight butt joints of sufficient length for splicing in the field.

B. Special Waterstops

1. Retrofit Waterstop - The waterstop shall be made by extruding elastomeric plastic compound with virgin polyvinylchloride as the basic resins. The compound shall contain no reprocessed materials. Minimum tensile strength of waterstop shall be 1750 psi. The waterstop shall conform to CRD-C572. Waterstops shall be style581 for locations shown on the Drawings by Greenstreak Plastic Products, St. Louis, MO or equal. All hardware shall be SS type 316.
2. Hydrophillic Waterstop (Swelling) – Hydrotite as manufactured by Sika Greenstreak, or approved equal.
3. Preformed adhesive waterstops - The waterstop shall be a rope type preformed plastic waterstop meeting the requirements of Federal Specification SS-S-210A. The rope shall have a cross-section of approximately one square inch unless otherwise specified or shown on the Drawings. The waterstop shall be Synko-Flex waterstop as manufactured by Synko-Flex Products of Houston, TX, Lockstop by Greenstreak Group Inc., or approved equal. Primer for the material shall be as recommended by the waterstop manufacturer.

C. Premolded Joint Filler

1. Premolded joint filler - Structures. Self-expanding cork, premolded joint filler shall conform to ASTM D1752, Type III. The thickness shall be 3/4-in unless shown otherwise on the Drawings.
2. Premolded joint filler - sidewalk and roadway concrete pavements or where fiber joint filler is specifically noted on the Drawings. The joint filler shall be asphalt-impregnated fiber board conforming to ASTM D1751. Thickness shall be 3/4-in unless otherwise shown on the Drawings.

D. Bond Breaker

1. Bond breaker tape shall be an adhesive-backed glazed butyl or polyethylene tape which will satisfactorily adhere to the premolded joint filler or concrete surface as required. The tape shall be the same width as the joint.
 2. Except where tape is specifically called for on the drawings, bond breaker for concrete shall be either bond breaker tape or a nonstaining type bond prevention coating such as Williams Tilt-up Compound by Williams Distributors Inc.; Silcoseal 77, by SCA Construction Supply Division, Superior Concrete Accessories or equal.
- E. Expansion Joint Dowels
1. Dowels shall be smooth steel conforming to ASTM A675, Grade 70. Dowels must be straight and clean, free of loose flaky rust and loose scale. Dowels may be sheared to length provided deformation from true shape caused by shearing does not exceed 0.04-in on the diameter of the dowel and extends no more than 0.04-in from the end. Bars shall be coated with a bond breaker on the expansion end of the dowel. Expansion caps shall be provided on the expansion end. Caps shall allow for at least 1-1/2-in of expansion.
 2. Dowel Bar Sleeves: Provide Greenstreak two component Speed Dowel System, to accept 1" diameter x 12" long slip dowels. The Greenstreak Group, Inc. Speed Dowel System is comprised of a reusable base and a plastic sleeve. Both pieces shall be manufactured from polypropylene plastic.
- F. Bonding Agent
1. Epoxy bonding agent shall be a two-component, solvent-free, moisture insensitive, epoxy resin material conforming to ASTM C881, Type II. The bonding agent shall be Sikadur 32 Hi-Mod by Sika Corporation of Lyndhurst, N.J.; Concesive Liquid (LPL) by Master Builders of Cleveland, OH or equal. Acrylic may be used if approved by the Engineer.
- G. Compressible Joint Filler
1. The joint filler shall be a non-extruded watertight strip material use to fill expansion joints between structures. The material shall be capable of being compressed at least 40 percent for 70 hours at 68 degrees F and subsequently recovering at least 20 percent of its original thickness in the first 1/2 hour after unloading. Compressible Joint filler shall be Evasote 380 E.S.P, by E-Poxy Industries, Inc., Ravena, NY, Sikaflex 1a by Sika or equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Standards Waterstops

1. Install waterstops for all joints where indicated on the Drawings. Waterstops shall be continuous around all corners and intersections so that a continuous seal is provided. Provide factory made waterstop fabrications for all changes in

direction, intersections and transitions leaving only straight butt joints splices for the field.

2. Horizontal waterstops in slabs shall be clamped in position by the bulkhead (unless previously set in concrete).
3. Waterstops shall be installed so that half of the width will be embedded on each side of the joint. Care shall be exercised to ensure that the waterstop is completely embedded in void-free concrete.
4. Waterstops shall be terminated 3-in below the exposed top of walls. Expansion joint waterstop center bulbs shall be plugged with foam rubber, 1-in deep, at point of termination.

B. Special Waterstops

1. Install special waterstops at joints where specifically noted on the Drawings. Waterstops shall be continuous around all corners and intersections so that a continuous seal is provided. Provide factory made waterstop fabrications for all changes in direction, intersections and transitions leaving only straight butt joints splices for the field.
2. Each piece of the waterstop shall be of maximum practicable length to provide a minimum number of connections or splices. Connections and splices shall conform to the manufacturer's recommendations and as specified herein.
3. Waterstops shall be terminated 3-in below the exposed top of walls.

C. Construction Joints

1. Make construction joints only at locations shown on the Drawings or as approved by the Engineer. Any additional or relocation of construction joints proposed by the Contractor, must be submitted to the Engineer for written approval.
2. Additional or relocated joints should be located where they least impair strength of the member. In general, locate joints within the middle third of spans of slabs, beams and girders. However, if a beam intersects a girder at the joint, offset the joint a distance equal to twice the width of the member being connected. Locate joints in walls and columns at the underside of floors, slabs, beams or girders and at tops of footings or floor slabs. Do not locate joints between beams, girders, column capitals, or drop panels and the slabs above them. Do not locate joints between brackets or haunches and walls or columns supporting them.
3. All joints shall be perpendicular to main reinforcement. Continue reinforcing steel through the joint as indicated on the Drawings. When joints in beams are allowed, provide a shear key and inclined dowels as approved by the Engineer.
4. Provide sealant grooves for joint sealant where indicated on the Drawings.
5. At all construction joints and at concrete joints designated on the Drawings to be "roughened", uniformly roughen the surface of the concrete to a full amplitude (distance between high and low points or side to side) of

approximately 1/4-in to expose a fresh face. Thoroughly clean joint surfaces of loose or weakened materials by water-blasting or sandblasting and prepare for bonding.

6. Provide waterstops in all wall and slab construction joints in liquid containment structures and at other locations shown on the Drawings.
7. Keyways shall not be used in construction joints unless specifically shown on the Drawings or approved by the Engineer.

D. Expansion Joints

1. Do not extend through expansion joints, reinforcement or other embedded metal items that are continuously bonded to concrete on each side of joint.
2. Position premolded joint filler material accurately. Secure the joint filler against displacement during concrete placement and compaction. Place joint filler over the face of the joint, allowing for sealant grooves as detailed on the Drawings. Tape all joint filler splices to prevent intrusion of mortar. Seal expansion joints as shown on the Drawings.
3. Expansion joints shall be 3/4-in in width unless otherwise noted on the Drawings.
4. Where indicated on Drawings, install smooth dowels at right angles to expansion joints. Align dowels accurately with finished surface. Rigidly hold in place and support during concrete placement. Unless otherwise shown on the Drawings, apply oil or grease to one end of all dowels through expansion joints. Provide plastic expansion caps on the lubricated ends of expansion dowels.
5. Provide center bulb type waterstops in all wall and slab expansion joints in liquid containment structures and at other locations shown on the Drawings.

E. Control Joints

1. Provide sealant grooves, sealants and waterstops at control joints in slabs on grade or walls as detailed. Provide waterstops at all wall and slab control joints in water containment structures and at other locations shown on the Drawings.
2. Control joints may be sawed if specifically approved by the Engineer. If control joint grooves are sawed, properly time the saw cutting with the time of the concrete set. Start cutting as soon as concrete has hardened sufficiently to prevent aggregates from being dislodged by the saw. Complete cutting before shrinkage stresses have developed sufficiently to induce cracking. No reinforcing shall be cut during sawcutting.
3. Extend every other bar of reinforcing steel through control joints or as indicated on the Drawings. Where specifically noted on the Drawings, coat the concrete surface with a bond breaker prior to placing new concrete against it. Avoid coating reinforcement or waterstops with bond breaker at these locations.

END OF SECTION

**SECTION 03200
CONCRETE REINFORCEMENT**

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install all concrete reinforcement complete as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A. Concrete Formwork is included in Section 03100.
- B. Cast-in-place Concrete is included in Section 03300.

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01300, shop drawings and product data showing materials of construction and details of installation for:
 - 1. Reinforcing steel. Placement drawings shall conform to the recommendations of ACI 315. All reinforcement in a concrete placement shall be included on a single placement drawing or cross referenced to the pertinent main placement drawing. The main drawing shall include the additional reinforcement (around openings, at corners, etc) shown on the standard detail sheets. Bars to have special coatings and/or to be of special steel or special yield strength are to be clearly identified. For all cast-in-place concrete tanks, retaining walls, building stem walls, wall sections shall be included in the drawings.
 - 2. Bar bending details. The bars shall be referenced to the same identification marks shown on the placement drawings.
 - 3. Schedule of all placements to contain synthetic reinforcing fibers. The amount of fibers per cubic yard to be used for each of the placements shall be noted on the schedule. The name of the manufacturer of the fibers and the product data shall be included with the submittal.
- B. Submit Test Reports, in accordance with Section 01300, of each of the following items.
 - 1. Certified copy of mill test on each steel proposed for use showing the physical properties of the steel and the chemical analysis.
 - 2. Welder's certification. The certification shall be in accordance with AWS D1.4 when welding of reinforcement is required.

1.04 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)

1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 2. ASTM A184 - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
 3. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
 4. ASTM A496 - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement
 5. ASTM A497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
 6. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 7. ASTM A616 - Standard Specification for Rail-Steel Deformed and Plain Bars for Concrete Reinforcement
 8. ASTM A617 - Standard Specification for Axle-Steel Deformed and Plain Bars for Concrete Reinforcement
 9. ASTM A706 - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 10. ASTM A767 - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
 11. ASTM A775 - Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
 12. ASTM A884 - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement.
 13. ASTM A934 - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
- B. American Concrete Institute (ACI)
1. ACI 301 - Standard Specification for Structural Concrete
 2. ACI 315 - Details and Detailing of Concrete Reinforcement.
 3. ACI 318 - Building Code Requirements for Structural Concrete
 4. ACI SP-66 - ACI Detailing Manual
- C. Concrete Reinforcing Steel Institute (CRSI)
1. Manual of Standard Practice
- D. American Welding Society (AWS)
1. AWS D1.4 - Structural Welding Code Reinforcing Steel
- E. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

- A. Provide services of a manufacturer's representative, with at least 2 years experience in the use of the reinforcing fibers for a preconstruction meeting and assistance during the first placement of the material.

1.06 DELIVERY, HANDLING AND STORAGE

- A. Reinforcing steel shall be substantially free from mill scale, rust, dirt, grease, or other foreign matter.
- B. Reinforcing steel shall be shipped and stored with bars of the same size and shape fastened in bundles with durable tags, marked in a legible manner with waterproof markings showing the same "mark" designations as those shown on the submitted Placing Drawings.
- C. Reinforcing steel shall be stored off the ground and kept free from dirt, oil, or other injurious contaminants

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials shall be new, of domestic manufacture and shall comply with the following material specifications.
- B. Deformed Concrete Reinforcing Bars: ASTM A615, Grade 60 deformed bars.
- C. Concrete Reinforcing Bars required on the Drawings to be Welded: ASTM A706.
- D. Welded Steel Wire Fabric: ASTM A185. Provide in flat sheets.
- E. Welded Deformed Steel Wire Fabric: ASTM A497.
- F. Welded Plain Bar Mats: ASTM A704 and ASTM A615 Grade 60 plain bars.
- G. Fabricated Deformed Steel Bar Mats: ASTM A184 and ASTM A615 Grade 60 deformed bars.
- H. The following alternate materials are allowed:
 - 1. ASTM A615 Grade 60 may be used for ASTM A706 provided the following requirements are satisfied:
- I. The actual yield strength of the reinforcing steel based on mill tests shall not exceed the specified yield strength by more than 18,000 psi. Retests shall not exceed this value by more than an additional 3000 psi.
- J. The ratio of the actual ultimate tensile strength to the actual tensile yield strength of the reinforcement shall not be less than 1.25.
- K. The carbon equivalency (CE) of bars shall be 0.55 or less.
- L. Reinforcing Steel Accessories
 - 1. Plastic Protected Bar Supports: CRSI Bar Support Specifications, Class 1 - Maximum Protection.

2. Stainless Steel Protected Bar Supports: CRSI Bar Support Specifications, Class 2 - Moderate Protection.
 3. Precast Concrete Block Bar Supports: CRSI Bar Support Specifications, Precast Blocks. Blocks shall have equal or greater strength than the surrounding concrete.
 4. Steel Protected Bar Supports: #4 Steel Chairs with plastic or rubber tips.
- M. Tie Wire
1. Tie Wires for Reinforcement shall be 16-gauge or heavier, black annealed wire or stranded wire.
- N. Mechanical reinforcing steel butt splices shall be positive connecting taper threaded type employing a hexagonal coupler such as Lenton rebar splices as manufactured by Erico Products Inc., Solon, OH or equal. They shall meet all ACI 318 Building Code requirements. Bar ends must be taper threaded with coupler manufacturer's bar threader to ensure proper taper and thread engagement. Bar couplers shall be torqued to manufacturer's recommended value.
1. Unless otherwise noted on the Drawings, mechanical tension splices shall be designed to produce a splice strength in tension or compression of not less than 125 percent of the ASTM specified minimum yield strength of the rebar.
 2. Compression type mechanical splices shall provide concentric bearing from one bar to the other bar and shall be capable of developing the ultimate strength of the rebar in compression.
- O. Fiber Reinforcement
1. Synthetic reinforcing fiber for concrete shall be 100 percent polypropylene collated, fibrillated fibers as manufactured by Propex Concrete Systems Chattanooga, TN - Propex or equal. Fiber length and quantity for the concrete mix shall be in strict compliance with the manufacturer's recommendations as approved by the Engineer.

2.02 FABRICATION

- A. Fabrication of reinforcement shall be in compliance with the CRSI Manual of Standard Practice.
- B. Bars shall be cold bent. Bars shall not be straightened or rebent.
- C. Bars shall be bent around revolving collar having a diameter of not less than that recommended by the ACI 318.
- D. Bar ends that are to be butt spliced, placed through limited diameter holes in metal, or threaded, shall have the applicable end(s) saw-cut. Such ends shall terminate in flat surfaces within 1-1/2 degrees of a right angle to the axis of the bar.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Surface condition, bending, spacing and tolerances of placement of reinforcement shall comply with the CRSI Manual of Standard Practice. The Contractor shall be solely responsible for providing and adequate number of bars and maintaining the spacing and clearances shown on the Drawings.
- B. Except as otherwise indicated on the Drawings, the minimum concrete cover of reinforcement shall be as follows:
 - 1. Concrete cast against and permanently exposed to earth: 3-in
 - 2. Concrete exposed to soil, water, sewage, sludge and/or weather: 2-in (Including bottom cover of slabs over water or sewage)
 - 3. Concrete not exposed to soil, water, sewage, sludge and/or weather:
 - a. Slabs (top and bottom cover), walls, joists, shells and folded plate members – 3/4 in.
 - b. Beams and columns (principal reinforcement, ties, spirals and stirrups) – 1-1/2 in.
- C. Reinforcement which will be exposed for a considerable length of time after being placed shall be coated with a heavy coat of neat cement slurry.
- D. No reinforcing steel bars shall be welded either during fabrication or erection unless specifically shown on the Drawings or specified herein, or unless prior written approval has been obtained from the Engineer. All bars that have been welded, including tack welds, without such approval shall be immediately removed from the work. When welding of reinforcement is approved or called for, it shall comply with AWS D1.4.
- E. Reinforcing steel interfering with the location of other reinforcing steel, conduits or embedded items, may be moved within the specified tolerances or one bar diameter, whichever is greater. Greater displacement of bars to avoid interference shall only be made with the approval of the Engineer. Do not cut reinforcement to install inserts, conduits, mechanical openings or other items without the prior approval of the Engineer.
- F. Securely support and tie reinforcing steel to prevent movement during concrete placement. Secure dowels in place before placing concrete.
- G. Reinforcing steel bars shall not be field bent except where shown on the Drawings or specifically authorized in writing by the Engineer. If authorized, bars shall be cold-bent around the standard diameter spool specified in the CRSI. Do not heat bars. Closely inspect the reinforcing steel for breaks. If the reinforcing steel is damaged, replace, Cadweld or otherwise repair as directed by the Engineer. Do not bend reinforcement after it is embedded in concrete unless specifically shown otherwise on the Drawings.

3.02 REINFORCEMENT AROUND OPENINGS

- A. Unless specific additional reinforcement around openings is shown on the Drawings, provide additional reinforcing steel on each side of the opening equivalent to one half

of the cross-sectional area of the reinforcing steel interrupted by an opening. The bars shall have sufficient length to develop bond at each end beyond the opening or penetration.

3.03 SPLICING OF REINFORCEMENT

- A. Splices designated as compression splices on the Drawings, unless otherwise noted, shall be 30 bar diameters, but not less than 12-in. The lap splice length for column vertical bars shall be based on the bar size in the column above.
- B. Tension lap splices shall be provided at all laps in compliance with ACI 318. Splices in adjacent bars shall be staggered. Class A splices may be used when 50 percent or less of the bars are spliced within the required lap length. Class B splices shall be used at all other locations.
- C. Splicing of reinforcing steel in concrete elements noted to be "tension members" on the Drawings shall be avoided whenever possible. However, if required for constructability, splices in the reinforcement subject to direct tension shall be welded to develop, in tension, at least 125 percent of the specified yield strength of the bar. Splices in adjacent bars shall be offset the distance of a Class B splice.
- D. Install wire fabric in as long lengths as practicable. Wire fabric from rolls shall be rolled flat and firmly held in place. Splices in welded wire fabric shall be lapped in accordance with the requirements of ACI-318 but not less than 12-in. The spliced fabrics shall be tied together with wire ties spaced not more than 24-in on center and laced with wire of the same diameter as the welded wire fabric. Do not position laps midway between supporting beams, or directly over beams of continuous structures. Offset splices in adjacent widths to prevent continuous splices.
- E. Mechanical reinforcing steel splicers shall be used only where shown on the Drawings. Splices in adjacent bars shall be offset by at least 30 bar diameters. Mechanical reinforcing splices are only to be used for special splice and dowel conditions approved by the Engineer.

3.04 ACCESSORIES

- A. Determine, provide and install accessories such as chairs, chair bars and the like in sufficient quantities and strength to adequately support the reinforcement and prevent its displacement during the erection of the reinforcement and the placement of concrete.
- B. Use precast concrete blocks where the reinforcing steel is to be supported over soil.
- C. Stainless steel bar supports or steel chairs with stainless steel tips shall be used where the chairs are set on forms for a concrete surface that will be exposed to weather, high humidity, or liquid (including bottom of slabs over liquid containing areas). Use of galvanized or plastic tipped metal chairs is permissible in all other locations unless otherwise noted on the Drawings or specified herein.
- D. Alternate methods of supporting top steel in slabs, such as steel channels supported on the bottom steel or vertical reinforcing steel fastened to the bottom and top mats, may be used if approved by the Engineer.

3.05 INSPECTION

- A. In no case shall any reinforcing steel be covered with concrete until the installation of the reinforcement, including the size, spacing and position of the reinforcement has been observed by the Engineer and the Engineer's release to proceed with the concreting has been obtained. The Engineer shall be given ample prior notice of the readiness of placed reinforcement for observation. The forms shall be kept open until the Engineer has finished his/her observations of the reinforcing steel.

END OF SECTION

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**SECTION 03300
CAST-IN-PLACE CONCRETE**

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor and materials required and install cast-in-place concrete complete as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A. Concrete Formwork is included in Section 03100.
- B. Concrete Reinforcement is included in Section 03200.
- C. Concrete Joints and Joint Accessories are included in Section 03150.
- D. Concrete Finishes are included in Section 03350.
- E. Grout is included in Section 03600.
- F. Modifications and Repair to Concrete are included in section 03740.

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01300, shop drawings and product data including the following:
 - 1. Sources of cement, pozzolan and aggregates.
 - 2. Material Safety Data Sheets (MSDS) for all concrete components and admixtures.
 - 3. Air-entraining admixture. Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations and conformity to ASTM standards.
 - 4. Water-reducing admixture. Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations and conformity to ASTM standards.
 - 5. High-range water-reducing admixture (plasticizer). Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations, retarding effect, slump range and conformity to ASTM standards. Identify proposed locations of use.
 - 6. Concrete mix for each formulation of concrete proposed for use including constituent quantities per cubic yard, water-cementitious materials ratio, concrete slump, type and manufacturer of cement. Provide either a. or b. below for each mix proposed.

- A. Standard deviation data for each proposed concrete mix based on statistical records.
 - B. The curve of water-cementitious materials ratio versus concrete cylinder strength for each formulation of concrete proposed based on laboratory tests. The cylinder strength shall be the average of the 28 day cylinder strength test results for each mix. Provide results of 7 and 14 day tests if available.
7. Sheet curing material. Product data including catalogue cut, technical data and conformity to ASTM standard.
 8. Liquid curing compound. Product data including catalogue cut, technical data, storage requirements, product life, application rate and conformity to ASTM standards. Identify proposed locations of use.
- B. Samples
 1. Fine and coarse aggregates if requested by the Engineer.
- C. Test Reports
 1. Fine aggregates – sieve analysis, physical properties, and deleterious substance.
 2. Coarse aggregates – sieve analysis, physical properties, and deleterious substances.
 3. Cements – chemical analysis and physical properties for each type.
 4. Pozzolans – chemical analysis and physical properties.
 5. Proposed concrete mixes – compressive strength, slump and air content.
 - D. Certifications
 1. Certify admixtures used in the same concrete mix are compatible with each other and the aggregates.
 2. Certify admixtures are suitable for use in contact with potable water after 30 days of concrete curing.
 3. Certify curing compound is suitable for use in contact with potable water after 30 days (non-toxic and free of taste or odor).

1.04 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 1. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 2. ASTM C33 - Standard Specification for Concrete Aggregates.
 3. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 4. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

5. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
 6. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete
 7. ASTM C150 - Standard Specification for Portland Cement
 8. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete
 9. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 10. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 11. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
 12. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 13. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
 14. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
 15. ASTM C1017 - Standard Specification for Chemical Admixtures for use in Producing Flowing Concrete.
- B. American Concrete Institute (ACI).
1. ACI 304 - Guide for Measuring, Mixing, Transporting and Placing Concrete.
 2. ACI 305 - Hot Weather Concreting.
 3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
 4. ACI 318 - Building Code Requirements for Structural Concrete.
 5. ACI 350 - Environmental Engineering Concrete Structures.
 6. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.
- C. QUALITY ASSURANCE
1. Reinforced concrete shall comply with ACI 318, the recommendations of ACI 350R and other stated requirements, codes and standards. The most stringent requirement of the codes, standards and this Section shall apply when conflicts exist.
 2. Only one source of cement and aggregates shall be used on any one structure. Concrete shall be uniform in color and appearance.
 3. Well in advance of placing concrete, discuss with the Engineer the sources of individual materials and batched concrete proposed for use. Discuss placement methods, waterstops and curing. Propose methods of hot and cold weather concreting as required. Prior to the placement of any concrete containing a high-range water-reducing admixture (plasticizer), the Contractor,

accompanied by the plasticizer manufacturer, shall discuss the properties and techniques of batching and placing plasticized concrete.

4. If, during the progress of the work, it is impossible to secure concrete of the required workability and strength with the materials being furnished, the Engineer may order such changes in proportions or materials, or both, as may be necessary to secure the desired properties. All changes so ordered shall be made at the Contractor's expense.
 5. If, during the progress of the work, the materials from the sources originally accepted change in characteristics, the Contractor shall, at his/her expense, make new acceptance tests of aggregates and establish new design mixes.
 6. Testing of the following materials shall be furnished by Contractor to verify conformity with this Specification Section and the stated ASTM Standards.
 - A. Fine aggregates for conformity with ASTM C33 - sieve analysis, physical properties, and deleterious substances.
 - B. Coarse aggregates for conformity with ASTM C33 - sieve analysis, physical properties, and deleterious substances.
 - C. Cements for conformity with ASTM C150 - chemical analysis and physical properties.
 - D. Pozzolans for conformity with ASTM C618 - chemical analysis and physical properties.
 - E. Proposed concrete mix designs - compressive strength, slump and air content.
- D. Field testing and inspection services will be provided by the District. The cost of such work, except as specifically stated otherwise, shall be paid by the District. Testing of the following items shall be by the District to verify conformity with this Specification Section.
1. Concrete placements - compressive strength (cylinders), compressive strength (cores), slump, and air content.
 2. Other materials or products that may come under question.
- E. All materials incorporated in the work shall conform to accepted samples.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Cement: Store in weather-tight buildings, bins or silos to provide protection from dampness and contamination and to minimize warehouse set.
- B. Aggregate: Arrange and use stockpiles to avoid excessive segregation or contamination with other materials or with other sizes of like aggregates. Build stockpiles in successive horizontal layers not exceeding 3-ft in thickness. Complete each layer before the next is started. Do not use frozen or partially frozen aggregate.
- C. Sand: Arrange and use stockpiles to avoid contamination. Allow sand to drain to uniform moisture content before using. Do not use frozen or partially frozen aggregates.

- D. Admixtures: Store in closed containers to avoid contamination, evaporation or damage. Provide suitable agitating equipment to assure uniform dispersion of ingredients in admixture solutions which tend to separate. Protect liquid admixtures from freezing and other temperature changes which could adversely affect their characteristics.
- E. Pozzolan: Store in weather-tight buildings, bins or silos to provide protection from dampness and contamination.
- F. Sheet Curing Materials: Store in weather-tight buildings or off the ground and under cover.
- G. Liquid Curing Compounds: Store in closed containers.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The use of manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.
- B. Cement: U.S. made Portland cement complying with ASTM C150. Air entraining cements shall not be used. Cement brand shall be subject to approval by the Engineer and one brand shall be used throughout the work.

2.02 MATERIALS

- A. Materials shall comply with this Section and any applicable State or local requirements.
- B. Cement: The following cement type(s) shall be used:
 - 1. All Classes – Type I/II or Type II
- C. Fine Aggregate: Washed inert natural sand conforming to the requirements of ASTM C33.
- D. Coarse Aggregate: Well-graded crushed stone or washed gravel conforming to the requirements of ASTM C33. Grading requirements shall be as listed in ASTM C33 Table 2 for the specified coarse aggregate size number. Limits of Deleterious Substances and Physical Property Requirements shall be as listed in ASTM C33 Table 3 for severe weather regions. Size numbers for the concrete mixes shall be as shown in Table 1 herein.
- E. Water: Potable water free from injurious amounts of oils, acids, alkalis, salts, organic matter, or other deleterious substances.
- F. Admixtures: Admixtures shall be free of chlorides and alkalis (except for those attributable to water). When it is required to use more than one admixture in a concrete mix, the admixtures shall be from the same manufacturer. Admixtures shall be compatible with the concrete mix including other admixtures and shall be suitable for use in contact with potable water after 30 days of concrete curing.
 - 1. Air-Entraining Admixture: The admixture shall comply with ASTM C260. Proportioning and mixing shall be in accordance with manufacturer's recommendations.

2. Water-Reducing Agent: The admixture shall comply with ASTM C494, Type A. Proportioning and mixing shall be in accordance with manufacturer's recommendations.
 3. High-Range Water-Reducer (Plasticizer): The admixture shall comply with ASTM C494, Type F and shall result in non-segregating plasticized concrete with little bleeding and with the physical properties of low water/cement ratio concrete. The treated concrete shall be capable of maintaining its plastic state in excess of 2 hours. Proportioning and mixing shall be in accordance with manufacturer's recommendations. Where walls are 14" thick or less and the wall height exceeds 12 ft a mix including a plasticizer must be used.
 4. Admixtures causing retarded or accelerated setting of concrete shall not be used without written approval from the Engineer. When allowed, the admixtures shall be retarding or accelerating water reducing or high range water reducing admixtures.
- G. Pozzolan (Fly Ash): Pozzolan shall be Class C or Class F fly ash complying with ASTM C618 except the Loss on Ignition (LOI) shall be limited to 3 percent maximum.
- H. Sheet Curing Materials. Waterproof paper, polyethylene film or white burlap-polyethylene sheeting all complying with ASTM C171.
- I. Liquid Curing Compound. Liquid membrane-forming curing compound shall comply with the requirements of ASTM C309, Type 1-D (clear or translucent with fugitive dye) and shall contain no wax, paraffin, or oil. Curing compound shall be approved for use in contact with potable water after 30 days (non-toxic and free of taste or odor). Curing compound shall comply with Federal, State and local VOC limits.

2.03 MIXES

- A. Development of mix designs and testing shall be by an independent testing laboratory acceptable to the Engineer engaged by and at the expense of the Contractor.
- B. Select proportions of ingredients to meet the design strength and materials limits specified in Table 1 and to produce concrete having proper placability, durability, strength, appearance and other required properties. Proportion ingredients to produce a homogenous mixture which will readily work into corners and angles of forms and around reinforcement without permitting materials to segregate or allowing excessive free water to collect on the surface.
- C. The design mix shall be based on standard deviation data of prior mixes with essentially the same proportions of the same constituents or, if such data is not available, be developed by a testing laboratory, acceptable to the Engineer, engaged by and at the expense of the Contractor. Acceptance of mixes based on standard deviation shall be based on the modification factors for standard deviation tests contained in ACI 318. The water content of the concrete mix, determined by laboratory testing, shall be based on a curve showing the relation between water cementitious ratio and 7 and 28 day compressive strengths of concrete made using the proposed materials. The curves shall be determined by four or more points, each representing an average value of at least three test specimens at each age. The curves shall have a range of values sufficient to

yield the desired data, including the specified design strengths as modified below, without extrapolation. The water content of the concrete mixes to be used, as determined from the curve, shall correspond to strengths 16 percent greater than the specified design strengths. The resulting mix shall not conflict with the limiting values for maximum water cementitious ratio and net minimum cementitious content as specified in Table 1.

- D. Compression Tests: Provide testing of the proposed concrete mix or mixes to demonstrate compliance with the specified design strength requirements in conformity with the above paragraph.
- E. Entrained air, as measured by ASTM C231, shall be as shown in Table 1.
 - 1. If the air-entraining agent proposed for use in the mix requires testing methods other than ASTM C231 to accurately determine air content, make special note of this requirement in the admixture submittal.
- F. Slump of the concrete as measured by ASTM C143, shall be as shown in Table 1. If a high-range water-reducer (plasticizer) is used, the slump indicated shall be that measured before plasticizer is added. Plasticized concrete shall have a slump ranging from 5 to 8-in.
- G. Proportion admixtures according to the manufacturer's recommendations. Two or more admixtures specified may be used in the same mix provided that the admixtures in combination retain full efficiency and have no deleterious effect on the concrete or on the properties of each other.

TABLE 1
CONCRETE MIX REQUIREMENTS

Class	Design Strength (1)	Cement (2)	Fine Aggregate (2)	Coarse Aggregate (3)	Cementitious Content (4)
A	2500	C150 Type II	C33	57	440 min.
B	3000	C150 Type II	C33	57	480 min.
C	4000	C150 Type II	C33	57	560 min.
D	5000	C150 Type II	C33	57	600 min.

Class	W/cm Ratio (5)	Fly Ash	AE Range (6)	WR (7)	HRWR (8)	Slump Range Inches
A	0.63 max.	--	3.5 to 5	Yes	*	1-4
B	0.54 max.	--	3.5 to 5	Yes	*	1-3
C	0.44 max.	25% max	3.5 to 5	Yes	*	3-5
D	0.40 max.	--	3.5 to 5	Yes	*	3-5

NOTES:

(1) Minimum compressive strength in psi at 28 days

(2) ASTM designation

(3) Size Number in ASTM C33

(4) Cementitious content in lbs/cu yd

(5) W/Cm is Water-Cementitious ratio by weight

(6) AE is percent air-entrainment

(7) WR is water-reducer admixture

(8) HRWR is high-range water-reducer admixture

* HRWR used at contractor's option except where walls are 14" thick or less and the wall height exceeds 12 ft a mix including a plasticizer must be used.

PART 3 - EXECUTION

3.01 MEASURING MATERIALS

- A. Concrete shall be composed of portland cement, fine aggregate, coarse aggregate, water and admixtures as specified and shall be produced by a plant acceptable to the Engineer. All constituents, including admixtures, shall be batched at the plant except a high-range water-reducer may also be added in the field.
- B. Measure materials for batching concrete by weighing in conformity with and within the tolerances given in ASTM C94 except as otherwise specified. Scales shall have been certified by the local Sealer of Weights and Measures within 1 year of use.
- C. Measure the amount of free water in fine aggregates within 0.3 percent with a moisture meter. Compensate for varying moisture contents of fine aggregates. Record the number of gallons of water as-batched on printed batching tickets.
- D. Admixtures shall be dispensed either manually using calibrated containers or measuring tanks, or by means of an automatic dispenser approved by the manufacturer of the specific admixture.
 - 1. Charge air-entraining and chemical admixtures into the mixer as a solution using an automatic dispenser or similar metering device.
 - 2. Inject multiple admixtures separately during the batching sequence.

3.02 MIXING AND TRANSPORTING

- A. Batch plants shall have a current NRMCA Certification or equal.
- B. Concrete shall be ready-mixed concrete produced by equipment acceptable to the Engineer. No hand-mixing will be permitted. Clean each transit mix truck drum and reverse drum rotation before the truck proceeds under the batching plant. Equip each transit-mix truck with a continuous, nonreversible, revolution counter showing the number of revolutions at mixing speeds.
- C. Ready-mix concrete shall be transported to the site in watertight agitator or mixer trucks loaded not in excess of their rated capacities as stated on the name plate.
- D. Keep the water tank valve on each transit truck locked at all times. Any addition of water above the appropriate W/Cm ratio must be directed by the Engineer. Added water shall be incorporated by additional mixing of at least 35 revolutions. All added water shall be metered and the amount of water added shall be shown on each delivery ticket.
- E. All central plant and rolling stock equipment and methods shall comply with ACI 318 and ASTM C94.
- F. Select equipment of size and design to ensure continuous flow of concrete at the delivery end. Metal or metal-lined non-aluminum discharge chutes shall be used and shall have slopes not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20-ft long and chutes not meeting slope requirements may be used if concrete is discharged into a hopper before distribution.

- G. Retempering (mixing with or without additional cement, aggregate, or water) of concrete or mortar which has reached initial set will not be permitted.
- H. Handle concrete from mixer to placement as quickly as practicable while providing concrete of required quality in the placement area. Dispatch trucks from the batching plant so they arrive at the work site just before the concrete is required, thus avoiding excessive mixing of concrete while waiting or delays in placing successive layers of concrete in the forms.
- I. Furnish a delivery ticket for ready mixed concrete to the Engineer as each truck arrives. Each ticket shall provide a printed record of the weight of cement and each aggregate as batched individually. Use the type of indicator that returns for zero punch or returns to zero after a batch is discharged. Clearly indicate the weight of fine and coarse aggregate, cement and water in each batch, the quantity delivered, the time any water is added, and the numerical sequence of the delivery. Show the time of day batched and time of discharge from the truck. Indicate the number of revolutions of the truck mixer.
- J. Temperature and Mixing Time Control
 - 1. In cold weather, do not allow the as-mixed temperature of the concrete and concrete temperatures at the time of placement in the forms to drop below 40 degrees F.
 - 2. If water or aggregate has been heated, combine water with aggregate in the mixer before cement is added. Do not add cement to mixtures of water and aggregate when the temperature of the mixture is greater than 90 degrees F.
 - 3. In hot weather, cool ingredients before mixing to maintain temperature of the concrete below the maximum placing temperature of 90 degrees F. If necessary, substitute well-crushed ice for all or part of the mixing water.
 - 4. The maximum time interval between the addition of mixing water and/or cement to the batch and the placing of concrete in the forms shall not exceed the values shown in Table 2.

TABLE 2

MAXIMUM TIME TO DISCHARGE OF CONCRETE

<u>Air or Concrete Temperature (whichever is higher)</u>	<u>Maximum Time</u>
80 to 90 Degree F (27 to 32 Degree C).....	45 minutes
70 to 79 Degree F (21 to 26 Degree C).....	60 minutes
40 to 69 Degree F (5 to 20 Degree C).....	.90 minutes

If an approved high-range water-reducer (plasticizer) is used to produce plasticized concrete, the maximum time interval shall not exceed 90 minutes.

3.03 CONCRETE APPARANCE

- A. Concrete mix showing either poor cohesion or poor coating of the coarse aggregate with paste shall be remixed. If this does not correct the condition, the concrete shall be rejected. If the slump is within the allowable limit, but excessive bleeding, poor workability, or poor finishability are observed, changes in the concrete mix shall be obtained only by adjusting one or more of the following:
 - 1. The gradation of aggregate.
 - 2. The proportion of fine and coarse aggregate.
 - 3. The percentage of entrained air, within the allowable limits.
- B. Concrete for the work shall provide a homogenous structure which, when hardened, will have the required strength, durability and appearance. Mixtures and workmanship shall be such that concrete surfaces, when exposed, will require no finishing. When concrete surfaces are stripped, the concrete, when viewed in good lighting from 10-ft away, shall be pleasing in appearance, and at 20-ft shall show no visible defects.

3.04 PLACING AND COMPACTING

- A. Placing
 - 1. Verify that all formwork completely encloses concrete to be placed and is securely braced prior to concrete placement. Remove ice, excess water, dirt and other foreign materials from forms. Confirm that reinforcement and other embedded items are securely in place. Have a competent workman at the location of the placement who can assure that reinforcing steel and embedded items remain in designated locations while concrete is being placed. Sprinkle semi-porous subgrades or forms to eliminate suction of water from the mix. Seal extremely porous subgrades in an approved manner.
 - 2. Deposit concrete as near its final position as possible to avoid segregation due to rehandling or flowing. Place concrete continuously at a rate which ensures the concrete is being integrated with fresh plastic concrete. Do not deposit concrete which has partially hardened or has been contaminated by foreign materials or on concrete which has hardened sufficiently to cause formation of seams or planes of weakness within the section. If the section cannot be placed continuously, place construction joints as specified or as approved.
 - 3. Pumping of concrete will be permitted. Use a mix design and aggregate sizes suitable for pumping and submit for approval.
 - 4. Remove temporary spreaders from forms when the spreader is no longer useful. Temporary spreaders may remain embedded in concrete only when made of galvanized metal or concrete and if prior approval has been obtained.
 - 5. Do not place concrete for supported elements until concrete previously placed in the supporting element (columns, slabs and/or walls) has reached adequate strength.

6. Where surface mortar is to form the base of a finish, especially surfaces designated to be painted, work coarse aggregate back from forms with a suitable tool to bring the full surface of the mortar against the form. Prevent the formation of excessive surface voids.
7. Slabs
 - A. After suitable bulkheads, screeds and jointing materials have been positioned, the concrete shall be placed continuously between construction joints beginning at a bulkhead, edge form, or corner. Each batch shall be placed into the edge of the previously placed concrete to avoid stone pockets and segregation.
 - B. Avoid delays in casting. If there is a delay in casting, the concrete placed after the delay shall be thoroughly spaded and consolidated at the edge of that previously placed to avoid cold joints. Concrete shall then be brought to correct level and struck off with a straightedge. Bullfloats or darbies shall be used to smooth the surface, leaving it free of humps or hollows.
 - C. Where slabs are to be placed integrally with the walls below them, place the walls and compact as specified. Allow 1 hour to pass between placement of the wall and the overlying slab to permit consolidation of the wall concrete. Keep the top surface of the wall moist so as to prevent cold joints.
8. Formed Concrete
 - A. Place concrete in forms using tremie tubes and taking care to prevent segregation. Bottom of tremie tubes shall preferably be in contact with the concrete already placed. Do not permit concrete to drop freely more than 4-ft. Place concrete for walls in 12 to 24-in lifts, keeping the surface horizontal. If plasticized concrete is used, the maximum lift thickness may be increased to 4-ft.
9. Underwater concreting shall be performed in conformity with the recommendations of ACI 304R. The tremie system shall be used to place underwater concrete. Tremie pipes shall be in the range of 8 to 12-in in diameter and be spaced at not more than 16-ft on centers nor more than 8-ft from an end form. Where concrete is being placed around a pipe, there shall be at least one tremie pipe on each side of each pipe. Where the tremie system is not practical, direct pumped concrete for underwater placement may be used subject to approval of the system including details by the Engineer.
 - B. Compacting
 1. Consolidate concrete by vibration, puddling, spading, rodding or forking so that concrete is thoroughly worked around reinforcement, embedded items and openings and into corners of forms. Puddling, spading, etc, shall be continuously performed along with vibration of the placement to eliminate air or stone pockets which may cause honeycombing, pitting or planes of weakness.

2. All concrete shall be placed and compacted with mechanical vibrators. The number, type and size of the units shall be approved by the Engineer in advance of placing operations. No concrete shall be ordered until sufficient approved vibrators (including standby units in working order) are on the job.
3. A minimum frequency of 7000 rpm is required for mechanical vibrators. Insert vibrators and withdraw at points from 18 to 30-in apart. At each insertion, vibrate sufficiently to consolidate concrete, generally from 5 to 15 seconds. Do not over vibrate so as to segregate. Keep a spare vibrator on the site during concrete placing operations.
4. Concrete Slabs: Concrete for slabs less than 8-in thick shall be consolidated with vibrating screeds; slabs 8 to 12-in thick shall be compacted with internal vibrators and (optionally) with vibrating screeds. Vibrators shall always be placed into concrete vertically and shall not be laid horizontally or laid over.
5. Walls and Columns: Internal vibrators (rather than form vibrators) shall be used unless otherwise approved by the Engineer. In general, for each vibrator needed to melt down the batch at the point of discharge, one or more additional vibrators must be used to densify, homogenize and perfect the surface. The vibrators shall be inserted vertically at regular intervals, through the fresh concrete and slightly into the previous lift, if any.
6. Amount of Vibration: Vibrators are to be used to consolidate properly placed concrete but shall not be used to move or transport concrete in the forms. Vibration shall continue until:
 - A. Frequency returns to normal.
 - B. Surface appears liquefied, flattened and glistening.
 - C. Trapped air ceases to rise.
 - D. Coarse aggregate has blended into surface, but has not disappeared.

3.05 CURING AND PROTECTION

- A. Protect all concrete work against injury from the elements and defacements of any nature during construction operations.
- B. Curing Methods
 1. Curing Methods for Concrete Surfaces: Cure concrete to retain moisture and maintain specified temperature at the surface for a minimum of 7 days after placement. Curing methods to be used are as follows:
 - A. Water Curing: Keep entire concrete surface wet by ponding, continuous sprinkling or covered with saturated burlap. Begin wet cure as soon as concrete attains an initial set and maintain wet cure 24 hours a day.
 - B. Sheet Material Curing: Cover entire surface with sheet material. Securely anchor sheeting to prevent wind and air from lifting the sheeting or entrapping air under the sheet. Place and secure sheet as soon as initial concrete set occurs.
 - C. Liquid Membrane Curing: Apply over the entire concrete surface except for surfaces to receive additional concrete. Curing compound

shall NOT be placed on any concrete surface where additional concrete is to be placed, where concrete sealers or surface coatings are to be used, or where the concrete finish requires an integral floor product. Curing compound shall be applied as soon as the free water on the surface has disappeared and no water sheen is visible, but not after the concrete is dry or when the curing compound can be absorbed into the concrete. Application shall be in compliance with the manufacturer's recommendations.

2. Specified applications of curing methods.
 - A. Slabs for Water Containment Structures: Water curing only.
 - B. Slabs on Grade and Footings (not used to contain water): Water curing, sheet material curing or liquid membrane curing.
 - C. Structural Slabs (other than water containment): Water curing or liquid membrane curing.
 - D. Horizontal Surfaces which will Receive Additional Concrete, Coatings, Grout or Other Material that Requires Bond to the substrate: Water curing.
 - E. Formed Surfaces: None if nonabsorbent forms are left in place 7 days. Water cure if absorbent forms are used. Sheet cured or liquid membrane cured if forms are removed prior to 7 days. Exposed horizontal surfaces of formed walls or columns shall be water cured for 7 days or until next placement of concrete is made.
 - F. Surfaces of Concrete Joints: Water cured or sheet material cured.
 - G. Finished surfaces and slabs shall be protected from the direct rays of the sun to prevent checking and crazing.
 - H. Cold Weather Concreting:
3. "Cold weather" is defined as a period when for more than 3 successive days, the average daily outdoor temperature drops below 40 degrees F. The average daily temperature shall be calculated as the average of the highest and the lowest temperature during the period from midnight to midnight.
4. Cold weather concreting shall conform to ACI 306.1 and the additional requirements specified herein. Temperatures at the concrete placement shall be recorded at 12 hour intervals (minimum).
5. Discuss a cold weather work plan with the Engineer. The discussion shall encompass the methods and procedures proposed for use during cold weather including the production, transportation, placement, protection, curing and temperature monitoring of the concrete. The procedures to be implemented upon abrupt changes in weather conditions or equipment failures shall also be discussed. Cold weather concreting shall not begin until the work plan is acceptable to the Engineer.
6. During periods of cold weather, concrete shall be protected to provide continuous warm, moist curing (with supplementary heat when required) for a total of at least 350 degree-days of curing.

- A. Degree-days are defined as the total number of 24 hour periods multiplied by the weighted average daily air temperature at the surface of the concrete (eg: 5 days at an average 70 degrees F = 350 degree-days).
 - B. To calculate the weighted average daily air temperature, sum hourly measurements of the air temperature in the shade at the surface of the concrete taking any measurement less than 50 degrees F as 0 degrees F. Divide the sum thus calculated by 24 to obtain the weighted average temperature for that day.
7. Salt, manure or other chemicals shall not be used for protection.
8. The protection period for concrete being water cured shall not be terminated during cold weather until at least 24 hours after water curing has been terminated.
- C. Hot Weather Concreting
- 1. "Hot weather" is defined as any combination of high air temperatures, low relative humidity and wind velocity which produces a rate of evaporation estimated in accordance with ACI 305R, approaching or exceeding 0.2 lbs/sqft/hr).
 - 2. Concrete placed during hot weather, shall be batched, delivered, placed, cured and protected in compliance with the recommendations of ACI 305R and the additional requirements specified herein.
 - A. Temperature of concrete being placed shall not exceed 90 degrees F and every effort shall be made to maintain a uniform concrete mix temperature below this level. The temperature of the concrete shall be such that it will cause no difficulties from loss of slump, flash set or cold joints.
 - B. All necessary precautions shall be taken to promptly deliver, to promptly place the concrete upon its arrival at the job and to provide vibration immediately after placement.
 - c. The Engineer may direct the Contractor to immediately cover plastic concrete with sheet material.
 - 3. Discuss with the Engineer a work plan describing the methods and procedures proposed to use for concrete placement and curing during hot weather periods. Hot weather concreting shall not begin until the work plan is acceptable to the Engineer.

3.06 REMOVAL OF FORMS

- A. Except as otherwise specifically authorized by the Engineer, forms shall not be removed before the concrete has attained a strength of at least 70 percent of its specified design strength for beams and slabs and at least 30 percent of its specified design strength for walls and vertical surfaces, nor before reaching the following number of day-degrees of curing (whichever is the longer)

Table 3
Minimum Time to Form Removal

<u>Forms for</u>	<u>Degree Days</u>
Beams and slabs	500
Walls and vertical surfaces	100

(See definition of degree-days in Paragraph 3.05D above).

- B. Shores shall not be removed until the concrete has attained at least 70 percent of its specified design strength and also sufficient strength to support safely its own weight and construction live loads.

3.07 INSPECTION AND FIELD TESTING

- A. The batching, mixing, transporting, placing and curing of concrete shall be subject to the inspection of the Engineer at all times. The Contractor shall advise the Engineer of his/her readiness to proceed at least 24 hours prior to each concrete placement. The Engineer will inspect the preparations for concreting including the preparation of previously placed concrete, the reinforcing steel and the alignment, cleanliness and tightness of formwork. No placement shall be made without the inspection and acceptance of the Engineer.
- B. Sets of field control cylinder specimens will be taken by the Engineer (or inspector) during the progress of the work, in compliance with ASTM C31. The number of sets of concrete test cylinders taken of each class of concrete placed each day shall not be less than one set per day, nor less than one set for each 150 cu yds of concrete nor less than one set for each 5,000 sq ft of surface area for slabs or walls.
 1. A "set" of test cylinders consists of four cylinders: one to be tested at 7 days and two to be tested and their strengths averaged at 28 days. The fourth may be used for a special test at 3 days or to verify strength after 28 days if 28 day test results are low.
 2. When the average 28 day compressive strength of the cylinders in any set falls below the specified design strength or below proportional minimum 7 day strengths (where proper relation between seven and 28 day strengths have been established by tests), proportions, water content, or temperature conditions shall be changed to achieve the required strengths.
- C. Cooperate in the making of tests by allowing free access to the work for the selection of samples, providing an insulated closed curing box for specimens, affording protection to the specimens against injury or loss through the operations and furnish material and labor required for the purpose of taking concrete cylinder samples. All shipping of specimens will be paid for by the District. Curing boxes shall be acceptable to the Engineer.
- D. Slump tests will be made in the field immediately prior to placing the concrete. Such tests shall be made in accordance with ASTM C143. If the slump is greater the specified range, the concrete shall be rejected.

- E. Air Content: Test for air content shall be made on fresh concrete samples. Air content for concrete made of ordinary aggregates having low absorption shall be made in compliance with either the pressure method complying with ASTM C231 or by the volumetric method complying with ASTM C173.
- F. The Engineer may have cores taken from any questionable area in the concrete work such as construction joints and other locations as required for determination of concrete quality. The results of tests on such cores shall be the basis for acceptance, rejection or determining the continuation of concrete work.
- G. Cooperate in obtaining cores by allowing free access to the work and permitting the use of ladders, scaffolding and such incidental equipment as may be required. Repair all core holes. The work of cutting and testing the cores will be at the expense of the District.
- H. See Specification Section 03900 for Leak Testing.

3.08 FAILURE TO MEET REQUIREMENTS

- A. Should the strengths shown by the test specimens made and tested in compliance with the previous provisions fall below the values given in Table 1, the Engineer shall have the right to require changes in proportions outlined to apply to the remainder of the work. Furthermore, the Engineer shall have the right to require additional curing on those portions of the structure represented by the test specimens which failed. The cost of such additional curing shall be at the Contractor's expense. In the event that such additional curing does not give the strength required, as evidenced by core and/or load tests, the Engineer shall have the right to require strengthening or replacement of those portions of the structure which fail to develop the required strength. The cost of all such core borings and/or load tests and any strengthening or concrete replacement required because strengths of test specimens are below that specified, shall be entirely at the expense of the Contractor. In such cases of failure to meet strength requirements the Contractor and Engineer shall confer to determine what adjustment, if any, can be made in compliance with Sections titled "Strength" and "Failure to Meet Strength Requirements" of ASTM C94. The "purchaser" referred to in ASTM C94 is the Contractor in this Section.
- B. When the tests on control specimens of concrete fall below the specified strength, the Engineer will permit check tests for strengths to be made by means of typical cores drilled from the structure in compliance with ASTM C42 and C39. In the case of cores not indicating adequate strength, the Engineer, in addition to other recourses, may require, at the Contractor's expense, load tests on any one of the slabs, beams, piles, caps, and columns in which such concrete was used. Tests need not be made until concrete has aged 60 days.
- C. Should the strength of test cylinders fall below 60 percent of the required minimum 28 day strength, the concrete shall be rejected and shall be removed and replaced.

3.09 PATCHING AND REPAIRS

- A. It is the intent of this Section to require quality work including adequate forming, proper mixture and placement of concrete and curing so completed concrete surfaces will require no patching.
- B. Defective concrete and honeycombed areas as determined by the Engineer shall be repaired as specified by the Engineer.
- C. As soon as the forms have been stripped and the concrete surfaces exposed, fins and other projections shall be removed; recesses left by the removal of form ties shall be filled; and surface defects which do not impair structural strength shall be repaired. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to approval of the Engineer.
- D. Immediately after removal of forms remove plugs and break off metal ties as required by Section 03100. Promptly fill holes upon stripping as follows: Moisten the hole with water, followed by a 1/16-in brush coat of neat cement slurry mixed to the consistency of a heavy paste. Immediately plug the hole with a 1 to 1.5 mixture of cement and concrete sand mixed slightly damp to the touch (just short of "balling"). Hammer the grout into the hole until dense, and an excess of paste appears on the surface in the form of a spiderweb. Trowel smooth with heavy pressure. Avoid burnishing.
- E. When patching exposed surfaces the same source of cement and sand as used in the parent concrete shall be employed. Adjust color if necessary by addition of proper amounts of white cement. Rub lightly with a fine Carborundum stone at an age of 1 to 5 days if necessary to bring the surface down with the parent concrete. Exercise care to avoid damaging or staining the virgin skin of the surrounding parent concrete. Wash thoroughly to remove all rubbed matter.

3.10 SCHEDULE

- A. The following (Table 4) are the general applications for the various concrete classes and design strengths:

Table 4
Concrete Schedule Design Strength

<u>Class</u>	<u>(psi)</u>	<u>Description</u>
A	2,500	Concrete fill and duct encasement
B	3,000	Concrete overlay slabs and pavements
C	4,000	Walls, slabs on grade, suspended slab and beam systems, columns, grade beams and all other structural concrete.
D	5,000	Prestressed concrete

END OF SECTION

**SECTION 03350
CONCRETE FINISHES**

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and finish cast-in-place concrete surfaces as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A. Concrete Formwork is included in Section 03100.
- B. Cast-In-Place Concrete is included in Section 03300.
- C. Grout is included in Section 03600

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01300, shop drawings and product data showing materials of construction and details of installation for:
 - 1. Concrete sealer. Confirmation that the sealer is compatible with additionally applied coatings shall also be submitted.

1.04 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM C33 – Standard Specification for Concrete Aggregates.
- B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

- A. Finishes
 - 1. For concrete which will receive additional applied finishes or materials, the surface finish specified is required for the proper application of the specified manufacturer's products. Where alternate products are approved for use, determine if changes in finishes are required and provide the proper finishes to receive these products.
 - 2. Changes in finishes made to accommodate products different from those specified shall be performed at no additional cost to the District. Submit the proposed new finishes and their construction methods to the Engineer for approval.
 - 3. Services of Manufacturer's Representative

- A. Make available at no extra cost to the District, upon 72 hours notification, the services of a qualified field representative of the manufacturer of curing compound, sealer or hardener to instruct the user on the proper application of the product under prevailing job conditions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Chemical hardener shall be Lapidolith by Sonneborn; Hornolith by A.C. Horn; Penalith by W.R. Meadows or equal fluosilicate base material.
- B. Concrete sealer shall be "MasterKure CC 180 WB", by Master Builders Solutions, Shakopee, MN or equal.

PART 3 - EXECUTION

3.01 FORMED SURFACES

- A. Forms shall not be removed before the requirements of Section 03300, have been satisfied.
- B. Exercise care to prevent damaging edges or obliterating the lines of chamfers, rustications or corners when removing the forms or performing any other work adjacent thereto.
- C. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete.
 - 1. Rough-Form Finish
 - A. Immediately after stripping forms and before concrete has changed color, carefully remove all fins and projections.
 - B. Promptly fill holes left by tie cones and defects as specified in Section 03300.
- D. Rubbed Finish
 - 1. Immediately upon stripping forms and before concrete has changed color, carefully remove all fins. While the wall is still damp apply a thin coat of medium consistency neat cement slurry by means of bristle brushes to provide a bonding coat within all pits, air holes or blemishes in the parent concrete. Avoid coating large areas with the slurry at one time.
 - 2. Before the slurry has dried or changed color, apply a dry (almost crumbly) grout proportioned by volume and consisting of 1 part cement to 1-1/2 parts of clean masonry sand having a fineness modulus of approximately 2.3 and complying with the gradation requirements of ASTM C33 for such a material. Grout shall be uniformly applied by means of damp pads of coarse burlap approximately 6-in square used as a float. Scrub grout into the pits and air holes to provide a dense mortar in all imperfections.
 - 3. Allow the mortar to partially harden for 1 or 2 hours depending upon the weather. If the air is hot and dry, keep the wall damp during this period using

a fine, fog spray. When the grout has hardened sufficiently so it can be scraped from the surface with the edge of a steel trowel without damaging the grout in the small pits or holes, cut off all that can be removed with a trowel. (Note: Grout allowed to remain on the wall too long will harden and will be difficult to remove.)

4. Allow the surface to dry thoroughly and rub it vigorously with clean dry burlap to completely remove any dried grout. No visible film of grout shall remain after this rubbing. The entire cleaning operation for any area must be completed the day it is started. Do not leave grout on surfaces overnight. Allow sufficient time for grout to dry after it has been cutoff with the trowel so it can be wiped off clean with the burlap.
 5. On the day following the repair of pits, air holes and blemishes, the walls shall again be wiped off clean with dry, used pieces of burlap containing old hardened mortar which will act as a mild abrasive. After this treatment, there shall be no built-up film remaining on the parent surface. If, however, such a film is present, a fine abrasive stone shall be used to remove all such material without breaking through the surface film of the original concrete. Such scrubbing shall be light and sufficient only to remove excess material without changing the texture of the concrete.
 6. A thorough wash-down with stiff bristle brushes shall follow the final bagging or stoning operation. No extraneous materials shall remain on the surface of the wall. The wall shall be sprayed with a fine fog spray periodically to maintain a continually damp condition for at least 3 days after the application of the repair grout.
 7. It is the intent of this finish to provide a surface that is uniform in appearance with no blemishes, imperfections, discolorations, etc.
- E. Abrasive Blast Finish
1. Coordinate with Rubbed Finish application. Do not begin until Rubbed Finish operation is complete or before concrete has reached minimum 7-day strength. The Rubbed Finish application may be deleted by the Engineer if the unfinished concrete surface is of superior quality. Apply the abrasive blast finish only where indicated on Drawings.
 2. Prepare a sample area of minimum 4-ft high by 16-ft wide Blast Finish as directed by Engineer on a portion of new wall construction which will not be exposed in the final work. Sample area shall contain a variety of finishes obtained with different nozzles, nozzle pressures, grit materials and blasting techniques for selection by Engineer. Final accepted sample shall remain exposed until completion of all Blast Finish operations.
 3. Blast finish operation shall meet all regulatory agency requirements. Blast Finish contractor shall be responsible for obtaining all required permits and/or licenses.
 4. Perform abrasive blast finishing in as continuous an operation as possible, utilizing the same work crew to maintain continuity of finish on each surface or

area of work. Maintain patterns or variances in depths of blast as present on the accepted sample.

5. Use an abrasive grit of proper type and gradation as well as equipment and technique to expose aggregate and surrounding matrix surfaces as follows:
6. Medium: Generally expose coarse aggregate - 1/4-in to 3/8-in reveal.
7. Abrasive blast corners and edge of patterns carefully, using back-up boards, to maintain uniform corner or edge line. Determine type of nozzle, nozzle pressure and blasting techniques required to match Architect's samples.
8. Upon completion of the Blast Finish operation, thoroughly flush finished surfaces with clean clear water to remove residual dust and grit. Allow to air dry until curing of concrete is complete.
9. After the concrete has cured for a minimum of 28 days, apply a clear acrylic sealer as directed by manufacturer.

3.02 FLOORS AND SLABS

A. Floated Finish

1. Machine Floating

- A. Screed floors and slabs with straightedges to the established grades shown on the Drawings. Immediately after final screeding, a dry cement/sand shake in the proportion of two sacks of portland cement to 350 lbs of coarse natural concrete sand shall be sprinkled evenly over the surface at the rate of approximately 500 lbs /1,000 sq ft of floor. Do not sprinkle neat, dry cement on the surface.
- B. The application of the cement/sand shake may be eliminated at the discretion of the Engineer if the base slab concrete exhibits adequate fattiness and homogeneity and the need is not indicated. When the concrete has hardened sufficiently to support the weight of a power float without its digging into or disrupting the level surface, thoroughly float the shake into the surface with a heavy revolving disc type power compacting machine capable of providing a 200 lb compaction force distributed over a 24-in diameter disc.
- C. Start floating along walls and around columns and then move systematically across the surface leaving a matte finish.
- D. The compacting machine shall be the "Kelly Power Float with Compaction Control" as manufactured by Kelley Industries of SSP Construction Equipment Inc., Pomona, CA or equal. Troweling machines equipped with float (shoe) blades that are slipped over the trowel blades may be used for floating. Floating with a troweling machine equipped with normal trowel blades will not be permitted. The use of any floating or troweling machine which has a water attachment for wetting the concrete surface during finishing will not be permitted.

2. Hand Floating

- A. In lieu of power floating, small areas may be compacted by hand floating. The dry cement/sand shake previously specified shall be used unless specifically eliminated by the Engineer. Screed the floors and slabs with straightedges to the established grades shown on the Drawings. While the concrete is still green, but sufficiently hardened to support a finisher and kneeboards with no more than 1/4-in indentation, wood float to a true, even plane with no coarse aggregate visible. Use sufficient pressure on the wood floats to bring moisture to the surface.
3. Finishing Tolerances
- A. Level floors and slabs to a tolerance of plus or minus 1/8-in when checked with a 10-ft straightedge placed anywhere on the slab in any direction. Where drains occur, pitch floors to drains such that there are no low spots left undrained. Failure to meet either of the above requirements shall be cause for removal, grinding, or other correction as directed by the Engineer.
4. Broom Finish
- A. Screed slabs with straightedges to the established grades indicated on the Drawings. When the concrete has stiffened sufficiently to maintain small surface indentations, draw a stiff bristle broom lightly across the surface in the direction of drainage, or, in the case of walks and stairs, perpendicular to the direction of traffic to provide a non-slip surface.
- B. Steel Trowel Finish
- 1. Finish concrete as specified in Paragraph 3.04 and 3.05. Then, hand steel trowel to a perfectly smooth hard even finish free from high or low spots or other defects.
- C. Concrete Sealer
- 1. Prepare and seal surfaces indicated on the room finish schedule to receive a sealer as follows:
 - A. Finish concrete as specified in the preceding paragraphs and in accordance with the Schedule in Paragraph 3.05 below.
 - B. Newly Placed Concrete: Surface must be sound and properly finished. Surface is application-ready when it is damp but not wet and can no longer be marred by walking workmen.
 - C. Newly-Cured Bare Concrete: Level any spots gouged out by trades. Remove all dirt, dust, droppage, oil, grease, asphalt and foreign matter. Cleanse with caustics and detergents as required. Rinse thoroughly and allow to dry so that surface is no more than damp, and not wet.
 - D. Aged Concrete: Restore surface soundness by patching, grouting, filling cracks and holes, etc. Surface must also be free of any dust, dirt and other foreign matter. Use power tools and/or strippers to remove any incompatible sealers or coatings. Cleanse as required, following the procedure indicated under cured concrete.

- E. Methods: Apply sealer so as to form a continuous, uniform film by spray, soft-bristle pushbroom, long-nap roller or lambswool applicator. Ordinary garden-type sprayers, using neoprene hose, are recommended for best results.
- F. Applications: For curing only, apply first coat evenly and uniformly as soon as possible after final finishing at the rate of 200 to 400 sq ft per gallon. Apply second coat when all trades are completed and structure is ready for occupancy at the rate of 400 to 600 sq ft per gallon.
- G. To meet guarantee and to seal and dustproof, two coats are required. For sealing new concrete, both coats shall be applied full-strength. On aged concrete, when renovating, dustproofing and sealing, the first coat should be thinned 10 to 15 percent with reducer per manufacturer's directions.

3.03 CONCRETE RECEIVING CHEMICAL HARDENER

- A. After 28 days, minimum, concrete cure, apply chemical hardener in three applications to a minimum total coverage of the undiluted chemical of 100 sq ft per gallon and in accordance with manufacturer's recommendations as reviewed.

3.04 APPROVAL OF FINISHES

- A. All concrete surfaces, when finished, will be inspected by the Engineer.
- B. Surfaces which, in the opinion of the Engineer, are unsatisfactory shall be refinished or reworked.
- C. After finishing horizontal surfaces, regardless of the finishing procedure specified, the concrete shall be cured in compliance with Section 03300 unless otherwise directed by the Engineer.

3.05 SCHEDULE OF FINISHES

- A. Concrete shall be finished as specified either to remain as natural concrete to receive an additional applied finish or material under another section.
- B. Concrete for the following conditions shall be finished as noted on the Drawings and as further specified herein:
 1. Concrete to Receive Dampproofing: Rough-form finish. See Paragraph 3.01D above.
 2. Concrete Not Exposed to View and Not Scheduled to Receive an Additional Applied Finish or Material: Rough-form finish. See Paragraph 3.01D above.
 3. Exterior Vertical Concrete Above Grade Exposed to View: Rubbed finish. See Paragraph 3.01E above.
 4. Interior Vertical Concrete Exposed to View Except in Water Containment Areas: Rubbed finish. See Paragraph 3.01E above.
 5. Vertical Concrete in Water Containment Areas. Rubbed finish on exposed surfaces and extending to two feet below normal operating water level:

Rough-form finish on remainder of submerged areas. See Paragraphs 3.01E and 3.01D above.

6. Interior and Exterior Underside of Concrete Exposed to View: Rubbed finish. See Paragraph 3.01E above.
7. Exterior surfaces exposed to view and indicated to have an abrasive blast finish. See Paragraph 3.01F above.
8. Interior or Exterior Horizontal Concrete not Requiring Floor Hardener or Sealer: Floated finish. See Paragraph 3.02A above.
9. Concrete for Exterior Walks, Interior and Exterior Stairs: Broomed finish perpendicular to direction of traffic. See Paragraph 3.02B above.
10. Concrete Slabs On Which Process Liquids Flow or In Contact with Sludge: Steel trowel finish. See Paragraph 3.02C above.
11. Concrete to Receive Hardener: See Paragraph 3.03 above.
12. Concrete to Receive Floor Sealer: See Paragraph 3.02D above.
13. Concrete tank bottoms to be covered with grout: See Section 03600.

END OF SECTION

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SECTION 03600 GROUT

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install grout complete as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A. Formwork is included in Section 03100.
- B. Concrete Reinforcement is included in Section 03200.
- C. Cast-in-Place Concrete is included in Section 03300.
- D. Concrete Joints and Joint Accessories are included in Section 03350.

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01300, shop drawings and product data showing materials of construction and details of installation for:
 - 1. Commercially manufactured nonshrink cementitious grout. The submittal shall include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature consideration, conformity to required ASTM standards and Material Safety Data Sheet.
 - 2. Commercially manufactured nonshrink epoxy grout. The submittal shall include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to required ASTM standards and Material Safety Data Sheet.
 - 3. Cement grout. The submittal shall include the type and brand of the cement, the gradation of the fine aggregate, product data on any proposed admixtures and the proposed mix of the grout.
 - 4. Concrete grout. The submittal shall include data as required for concrete as delineated in Section 03300 and for fiber reinforcement as delineated in Section 03200. This includes the mix design, constituent quantities per cubic yard and the water/cement ratio.
- B. Laboratory Test Reports
 - 1. Submit laboratory test data is required under Section 03300 for concrete to be used as concrete grout.
- C. Certifications

1. Certify that commercially manufactured grout products and concrete grout admixtures are suitable for use in contact with potable water after 30 days curing.

D. Qualifications

1. Grout manufacturers shall submit documentation that they have at least 10 years experience in the production and use of the proposed grouts which they will supply.

1.04 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM C531 - Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical Resistant Mortars, Grouts and Monolithic Surfacing and Polymer Concretes
2. ASTM C579 - Standard Test Method for Compressive Strength of Chemical Resistant Mortars, Grouts and Monolithic Surfacing and Polymer Concretes
3. ASTM C827 - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
4. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

B. U.S. Army Corps of Engineers Standard (CRD)

1. CRD C-621 - Corps of Engineers Specification for Nonshrink Grout

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

A. Qualifications

1. Grout manufacturer shall have a minimum of 10 years experience in the production and use of the type of grout proposed for the work.

B. Pre-installation Conference

1. Well in advance of grouting, hold a pre-installation meeting to review the requirements for surface preparation, mixing, placing and curing procedures for each product proposed for use. Parties concerned with grouting shall be notified of the meeting at least 10 days prior to its scheduled date.

C. Services of Manufacturer's Representative

1. A qualified field technician of the nonshrink grout manufacturer, specifically trained in the installation of the products, shall attend the pre-installation conference and shall be present for the initial installation of each type of nonshrink grout. Additional services shall also be provided, as required, to correct installation problems.

D. Field Testing

1. All field testing and inspection services required shall be provided by the District. The Contractor shall assist in the sampling of materials and shall provide any ladders, platforms, etc, for access to the work. The methods of testing shall comply in detail with the applicable ASTM Standards.
2. The field testing of Concrete Grout shall be as specified for concrete in Section 03300.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the jobsite in original, unopened packages, clearly labeled with the manufacturer's name, product identification, batch numbers and printed instructions.
- B. Store materials in full compliance with the manufacturer's recommendations. Total storage time from date of manufacture to date of installation shall be limited to 6 months or the manufacturer's recommended storage time, whichever is less.
- C. Material which becomes damp or otherwise unacceptable shall be immediately removed from the site and replaced with acceptable material at no additional expense to the District.
- D. Nonshrink cement-based grouts shall be delivered as preblended, prepackaged mixes requiring only the addition of water.
- E. Nonshrink epoxy grouts shall be delivered as premeasured, prepackaged, three component systems requiring only blending as directed by the manufacturer.

1.07 DEFINITIONS

- A. Nonshrink Grout: A commercially manufactured product that does not shrink in either the plastic or hardened state, is dimensionally stable in the hardened state and bonds to a clean base plate.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The use of a manufacturer's name and product or catalog number is for the purpose of establishing the standard of quality desired.
- B. Like materials shall be the products of one manufacturer or supplier in order to provide standardization of appearance.

2.02 MATERIALS

A. Nonshrink Cementitious Grout

1. Nonshrink cementitious grouts shall meet or exceed the requirements of ASTM C1107, Grades B or C and CRD C-621. Grouts shall be portland cement based, contain a pre-proportioned blend of selected aggregates and shrinkage compensating agents and shall require only the addition of water. Nonshrink cementitious grouts shall not contain expansive cement or metallic particles.

The grouts shall exhibit no shrinkage when tested in conformity with ASTM C827.

- A. General purpose nonshrink cementitious grout shall conform to the standards stated above and shall be SikaGrout 212 by Sika Corp.; Set Grout by Master Builders, Inc.; Gilco Construction Grout by Gifford Hill & Co.; Euco NS by the Euclid Chemical Co.; NBEC Grout by U.S. Grout Corp. or equal.
- B. Flowable (Precision) nonshrink cementitious grout shall conform to the standards stated above and shall be Masterflow 928 by Master Builders, Inc.; Hi-Flow Grout by the Euclid Chemical Co.; SikaGrout 212 by Sika Corp. ; Supreme Grout by Gifford Hill & Co. ; Five Star Grout by U.S. Grout Corp. or equal.

B. Nonshrink Epoxy Grout

- 1. Nonshrink epoxy-based grout shall be a pre-proportioned, three component, 100 percent solids system consisting of epoxy resin, hardener, and blended aggregate. It shall have a compressive strength of 14,000 psi in 7 days when tested in conformity with ASTM D695 and have a maximum thermal expansion of 30×10^{-6} when tested in conformity with ASTM C531. The grout shall be Ceilcote 648 CP by Master Builders Inc.; Five Star Epoxy Grout by U.S. Grout Corp.; Sikadur 42 Grout-Pak by Sika Corp.; High Strength Epoxy Grout by the Euclid Chemical Co. or equal.

C. Cement Grout

- 1. Cement grouts shall be a mixture of one part portland cement conforming to ASTM C150, Types I, II, or III and 1 to 2 parts sand conforming to ASTM C33 with sufficient water to place the grout. The water content shall be sufficient to impart workability to the grout but not to the degree that it will allow the grout to flow.

D. Concrete Grout

- 1. Concrete grout shall conform to the requirements of Section 03300 except as specified herein. It shall be proportioned with cement, coarse and fine aggregates, water, water reducer and air entraining agent to produce a mix having an average strength of 2900 psi at 28 days, or 2500 psi nominal strength. Coarse aggregate size shall be 1/2-in maximum. Slump should not exceed 5-in and should be as low as practical yet still retain sufficient workability.
- 2. Synthetic reinforcing fibers as specified in Section 03200 shall be added to the concrete grout mix at the rate of 1.5 lbs of fibers per cubic yard of grout. Fibers shall be added from the manufacturer's premeasured bags and according to the manufacturer's recommendations in a manner which will ensure complete dispersion of the fiber bundles as single monofilaments within the concrete grout.

E. Water

1. Potable water, free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Grout shall be placed over cured concrete which has attained its full design strength unless otherwise approved by the Engineer.
- B. Concrete surfaces to receive grout shall be clean and sound; free of ice, frost, dirt, grease, oil, curing compounds, laitance and paints and free of all loose material or foreign matter which may effect the bond or performance of the grout.
- C. Roughen concrete surfaces by chipping, sandblasting, or other mechanical means to a minimum of ¼" amplitude or provide a raked finish in order to ensure bond of the grout to the concrete. Remove loose or broken concrete. Irregular voids or projecting coarse aggregate need not be removed if they are sound, free of laitance and firmly embedded into the parent concrete.
 1. Air compressors used to clean surfaces in contact with grout shall be the oilless type or equipped with an oil trap in the air line to prevent oil from being blown onto the surface.
- D. Remove all loose rust, oil or other deleterious substances from metal embedments or bottom of baseplates prior to the installation of the grout.
- E. Concrete surfaces shall be washed clean and then kept moist for at least 24 hours prior to the placement of cementitious or cement grout. Saturation may be achieved by covering the concrete with saturated burlap bags, use of a soaker hose, flooding the surface, or other method acceptable to the Engineer. Upon completion of the 24 hour period, visible water shall be removed from the surface prior to grouting. The use of an adhesive bonding agent in lieu of surface saturation shall only be used when approved by the Engineer for each specific location of grout installation.
- F. Epoxy-based grouts do not require the saturation of the concrete substrate. Surfaces in contact with epoxy grout shall be completely dry before grouting.
- G. Construct grout forms or other leakproof containment as required. Forms shall be lined or coated with release agents recommended by the grout manufacturer. Forms shall be of adequate strength, securely anchored in place and shored to resist the forces imposed by the grout and its placement.
- H. Forms for epoxy grout shall be designed to allow the formation of a hydraulic head and shall have chamfer strips built into forms.
- I. Level and align the structural or equipment bearing plates in accordance with the structural requirements and the recommendations of the equipment manufacturer.
- J. Equipment shall be supported during alignment and installation of grout by shims, wedges, blocks or other approved means. The shims, wedges and blocking devices shall be prevented from bonding to the grout by appropriate bond breaking coatings and removed after grouting unless otherwise approved by the Engineer.

3.02 INSTALLATION – GENERAL

- A. Mix, apply and cure products in strict compliance with the manufacturer's recommendations and this Section.
- B. Have sufficient manpower and equipment available for rapid and continuous mixing and placing. Keep all necessary tools and materials ready and close at hand.
- C. Maintain temperatures of the foundation plate, supporting concrete, and grout between 40 and 90 degrees F during grouting and for at least 24 hours thereafter or as recommended by the grout manufacturer, whichever is longer. Take precautions to minimize differential heating or cooling of baseplates and grout during the curing period.
- D. Take special precautions for hot weather or cold weather grouting as recommended by the manufacturer when ambient temperatures and/or the temperature of the materials in contact with the grout are outside of the 60 and 90 degrees F range.
- E. Install grout in a manner which will preserve the isolation between the elements on either side of the joint where grout is placed in the vicinity of an expansion or control joint.
- F. Reflect all existing underlying expansion, control and construction joints through the grout.

3.03 INSTALLATION - CEMENT GROUTS AND NONSHRINK CEMENTITIOUS GROUTS

- A. Mix in accordance with manufacturer's recommendations. Do not add cement, sand, pea gravel or admixtures without prior approval by the Engineer.
- B. Avoid mixing by hand. Mixing in a mortar mixer (with moving blades) is recommended. Pre-wet the mixer and empty excess water. Add premeasured amount of water for mixing, followed by the grout. Begin with the minimum amount of water recommended by the manufacturer and then add the minimum additional water required to obtain workability. Do not exceed the manufacturer's maximum recommended water content.
- C. Placements greater than 3-in in depth shall include the addition of clean, washed pea gravel to the grout mix when approved by the manufacturer. Comply with the manufacturer's recommendations for the size and amount of aggregate to be added.
- D. Place grout into the designated areas in a manner which will avoid segregation or entrapment of air. Do not vibrate grout to release air or to consolidate the material. Placement should proceed in a manner which will ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.
- E. Place grout rapidly and continuously to avoid cold joints. Do not place cement grouts in layers. Do not add additional water to the mix (retemper) after initial stiffening.

- F. Just before the grout reaches its final set, cut back the grout to the substrate at a 45 degree angle from the lower edge of bearing plate unless otherwise approved by the Engineer. Finish this surface with a wood float (brush) finish.
- G. Begin curing immediately after form removal, cutback, and finishing. Keep grout moist and within its recommended placement temperature range for at least 24 hours after placement or longer if recommended by the manufacturer. Saturate the grout surface by use of wet burlap, soaker hoses, ponding or other approved means. Provide sunshades as necessary. If drying winds inhibit the ability of a given curing method to keep grout moist, erect wind breaks until wind is no longer a problem or curing is finished.

3.04 INSTALLATION - NONSHRINK EPOXY GROUTS

- A. Mix in accordance with the procedures recommended by the manufacturer. Do not vary the ratio of components or add solvent to change the consistency of the grout mix. Do not overmix. Mix full batches only to maintain proper proportions of resin, hardener and aggregate.
- B. Monitor ambient weather conditions and contact the grout manufacturer for special placement procedures to be used for temperatures below 60 or above 90 degrees F.
- C. Place grout into the designated areas in a manner which will avoid trapping air. Placement methods shall ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.
- D. Minimize "shoulder" length (extension of grout horizontally beyond base plate). In no case shall the shoulder length of the grout be greater than the grout thickness.
- E. Finish grout by puddling to cover all aggregate and provide a smooth finish. Break bubbles and smooth the top surface of the grout in conformity with the manufacturer's recommendations.
- F. Epoxy grouts are self curing and do not require the application of water. Maintain the formed grout within its recommended placement temperature range for at least 24 hours after placing, or longer if recommended by the manufacturer.

3.05 INSTALLATION - CONCRETE GROUT

- A. Screed underlying concrete to the grade shown on the Drawings. Prepare the surface according to 3.01B. Protect and keep the surface clean until placement of concrete grout.
- B. Remove the debris and clean the surface by sweeping and vacuuming of all dirt and other foreign materials. Wash the tank slab using a strong jet of water. Flushing of debris into tank drain lines will not be permitted.
- C. Saturate the concrete surface for at least 24 hours prior to placement of the concrete grout. Saturation may be maintained by ponding, by the use of soaker hoses, or by other methods acceptable to the Engineer. Remove excess water just prior to placement of the concrete grout. Place a cement slurry immediately ahead of the concrete grout so that the slurry is moist when the grout is placed. Work the slurry over the surface

with a broom until it is coated with approximately 1/16 to 1/8-in thick cement paste. (A bonding grout composed of 1 part portland cement, 1.5 parts fine sand, an approved bonding admixture and water, mixed to achieve the consistency of thick paint, may be substituted for the cement slurry.)

- D. Place concrete grout to final grade using the scraper mechanism as a guide for surface elevation and to ensure high and low spots are eliminated. Unless specifically approved by the equipment manufacturer, mechanical scraper mechanisms shall not be used as a finishing machine or screed.
- E. Provide grout control joints as indicated on the Drawings.
- F. Finish and cure the concrete grout as specified for cast-in-place concrete.

3.06 SCHEDULE

- A. The following list indicates where the particular types of grout are to be used:
- B. General purpose nonshrink cementitious grout: Use at all locations where non shrink grout is called for on the plans except for base plates greater in area than 3-ft wide by 3-ft long and except for the setting of anchor rods, anchor bolts or reinforcing steel in concrete.
- C. Flowable nonshrink cementitious grout: Use under all base plates greater in area than 3-ft by 3-ft. Use at all locations indicated to receive flowable nonshrink grout by the Drawings. The Contractor, at his/her option and convenience, may also substitute flowable nonshrink grout for general purpose nonshrink cementitious grout.
- D. Nonshrink epoxy grout: Use for the setting of anchor rods, anchor bolts and reinforcing steel in concrete and for all locations specifically indicated to receive epoxy grout.
- E. Cement grout: Cement grout may be used for grouting of incidental base plates for structural and miscellaneous steel such as post base plates for platforms, base plates for beams, etc. It shall not be used when nonshrink grout is specifically called for on the Drawings or for grouting of primary structural steel members such as columns and girders.
- F. Concrete grout: Use for overlaying the base concrete under scraper mechanisms of clarifiers to allow more control in placing the surface grade.

END OF SECTION

**SECTION 03740
MODIFICATIONS AND REPAIR TO CONCRETE**

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and cut, remove, repair or otherwise modify parts of existing concrete structures or appurtenances as shown on the Drawings and as specified herein. Work under this Section shall also include bonding new concrete to existing concrete.

1.02 RELATED WORK

- A. Concrete Formwork is included in Section 03100.
- B. Concrete Reinforcement is included in Section 03200.
- C. Concrete Joints and Accessories are included in Section 03150.
- D. Cast-in-Place Concrete is included in Section 03300.
- E. Concrete Finishes are included in Section 03350.
- F. Grout is included in Section 03600.

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01300, a schedule of Demolition and the detailed methods of demolition to be used at each location.
- B. Submit manufacturer's technical literature on all product brands proposed for use, to the Engineer for review. The submittal shall include the manufacturer's installation and/or application instructions.
- C. When substitutions for acceptable brands of materials specified herein are proposed, submit brochures and technical data of the proposed substitutions to the Engineer for approval before delivery to the project.

1.04 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM C881 – Standards Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 - 2. ASTM C882 – Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
 - 3. ASTM C883 – Standard Test Method for Effective Shrinkage of Epoxy-Resin Systems Used with Concrete.
 - 4. ASTM D570 – Standard Test Method for Water Absorption of Plastics

5. ASTM D638 – Standard Test Method for Tensile Properties of Plastics.
 6. ASTM D695 – Standard Test Method for Compressive Properties of Rigid Plastics.
 7. ASTM D732 – Standard Test Method for Shear Strength of Plastics by Punch Tool.
 8. ASTM D790 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

- A. No existing structure or concrete shall be shifted, cut, removed, or otherwise altered until authorization is given by the Engineer.
- B. When removing materials or portions of existing structures and when making openings in existing structures, all precautions shall be taken and all necessary barriers, shoring and bracing and other protective devices shall be erected to prevent damage to the structures beyond the limits necessary for the new work, protect personnel, control dust and to prevent damage to the structures or contents by falling or flying debris. Unless otherwise permitted, shown or specified, line drilling will be required in cutting existing concrete.
- C. **Manufacturer Qualifications:** The manufacturer of the specified products shall have a minimum of 10 years experience in the manufacture of such products and shall have an ongoing program of training, certifying and technically supporting the Contractor's personnel.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver the specified products in original, unopened containers with the manufacturer's name, labels, product identification and batch numbers.
- B. Store and condition the specified product as recommended by the manufacturer.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General
 1. Materials shall comply with this Section and any state or local regulations.
- B. Epoxy Bonding Agent
 1. General
 - A. The epoxy bonding agent shall be a two-component, solvent-free, asbestos-free moisture insensitive epoxy resin material used to bond plastic concrete to hardened concrete complying with the requirements

of ASTM C881, Type II and the additional requirements specified herein.

2. Material
 - A. Properties of the cured material
 - I. Compressive Strength (ASTM D695): 8500 psi minimum at 28 days.
 - II. Tensile Strength (ASTM D638): 4000 psi minimum at 14 days.
 - III. Flexural Strength (ASTM D790 - Modulus of Rupture): 6,300 psi minimum at 14 days.
 - IV. Shear Strength (ASTM D732): 5000 psi minimum at 14 days.
 - V. Water Absorption (ASTM D570 - 2 hour boil): One percent maximum at 14 days.
 - VI. Bond Strength (ASTM C882) Hardened to Plastic: 1500 psi minimum at 14 days moist cure.
 - VII. Effective Shrinkage (ASTM C883): Passes Test.
 - VIII. Color: Gray.
 3. Approved manufacturers include: Sika Corporation, Lyndhurst, NJ - Sikadur 32, Hi-Mod; Master Builder's, Cleveland, OH - Concreative Liquid (LPL) or equal.

C. Epoxy Paste

1. General
 - A. Epoxy Paste shall be a two-component, solvent-free, asbestos free, moisture insensitive epoxy resin material used to bond dissimilar materials to concrete and shall comply with the requirements of ASTM C881, Type I, Grade 3 and the additional requirements specified herein. It may also be used to patch existing surfaces where the glue line is 1/8-in or less.
2. Material
 - A. Properties of the cured material:
 - I. Compressive Properties (ASTM D695): 10,000 psi minimum at 28 days.
 - II. Tensile Strength (ASTM D638): 3,000 psi minimum at 14 days. Elongation at Break - 0.3 percent minimum.
 - III. Flexural Strength (ASTM D790 - Modulus of Rupture): 3,700 psi minimum at 14 days.
 - IV. Shear Strength (ASTM D732): 2,800 psi minimum at 14 days.
 - V. Water Absorption (ASTM D570): 1.0 percent maximum at 7 days.
 - VI. Bond Strength (ASTM C882): 2,000 psi at 14 days moist cure.
 - VII. Color: Concrete grey.
 3. Approved manufacturer's include:

- A. Sika Corporation, Lyndhurst, N.J. - Sikadur Hi-mod LV 32; Master Builders, Inc., Cleveland, OH - Concrecive 1438 or equal.
 - B. Overhead applications: Sika Corporation, Lyndhurst, NJ - Sikadur Hi-mod LV 31; Master Builders, Inc., Cleveland, OH - Concrecive 1438 or equal.
- D. Repair Mortar
- 1. General
 - A. Repair mortal shall be a two-component, polymer modified, cement based, fast-setting, trowel grade, structural repair mortar suitable for use on horizontal, vertical and overhead surfaces prepackaged product specifically formulated for the repair of concrete surface defects.
 - 2. Material
 - A. Properties of the cured material:
 - I. Compressive Strength (2 hours 50 percent RH) – 150 psi minimum
 - II. Compressive Strength (28 days 50 percent RH) – 150 psi minimum
 - III. Bond Strength (pull off method) – 100 percent concrete substrate failure
 - IV. This system shall conform with ANSI/NSF standards for surface contact with potable water.
 - 3. Approved manufacturer's include:
 - A. Sika Corporation, Lyndhurst, N.J. – SikaTop 122 PLUS or equal.
 - B. Overhead applications: Sika Corporation, Lyndhurst, N.J. – SikaTop 123 PLUS or equal.
- E. Non-Shrink Precision Cement Grout, Non-Shrink Cement Grout, Non-Shrink Epoxy Grout and Polymer Modified mortar are included in Section 03600 GROUT.
- F. Adhesive Capsule type anchor system shall be equal to the HVA adhesive Anchoring System by Hilti Fastening Systems, Tulsa, OK. The capsule shall consist of a sealed glass capsule containing premeasured amounts of polyester or vinylester resin, quartz sand aggregate and a hardener contained in a separate vial within the capsule. Where the adhesive anchor is under sustained tensile loading (i.e. vertically installed anchors) the anchor system shall be Hilti HIT RE-500 SD by Hilti Fastening Systems, Tulsa, OK.
- G. Acrylic Latex Bonding Agents shall not be used for this project.
- H. Crack Repair Epoxy Adhesive
- 1. General
 - A. Crack Repair Epoxy Adhesive shall be a two-component, solvent-free, moisture insensitive epoxy resin material suitable for crack grouting by

injection or gravity feed. It shall be formulated for the specific size of opening or crack being injected.

- B. All concrete surfaces containing potable water or water to be treated for potable use that are repaired by the epoxy adhesive injection system shall be coated with an acceptable epoxy coating system that conforms with ANSI/NSF standards for surface contact with potable water.

2. Material

A. Properties of the cured material

- I. Compressive Properties (ASTM D695): 10,000 psi minimum at 28 days.
- II. Tensile Strength (ASTM D638): 5,300 psi minimum at 14 days. Elongation at Break - 2 to 5 percent.
- III. Flexural Strength (ASTM D790 - Modulus of Rupture): 12,000 psi minimum at 14 days (gravity); 4,600 psi minimum at 14 days (injection)
- IV. Shear Strength (ASTM D732): 3,700 psi minimum at 14 days.
- V. Water Absorption (ASTM D570 - 2 hour boil): 1.5 percent maximum at 7 days.
- VI. Bond Strength (ASTM C882): 2,000 psi at 2 days dry; 1,400 psi at 14 days dry plus 12 days moist.
- VII. Effective Shrinkage (ASTM 883): Passes Test.

3. Approved manufacturer's include:

- A. For standard applications: Sika Corporation, Lyndhurst, NJ - Sikadur Hi-Mod; Master Builders Inc., Cleveland, OH - Concessive 1380 or equal.
- B. For very thin applications; Sika Corporation, Lyndhurst, NJ - Sikadur Hi-Mod LV; Master Builders Inc., Cleveland, OH - Concessive 1468 or equal.

PART 3 - EXECUTION

3.01 GENERAL

- A. Cut, repair, reuse, demolish, excavate or otherwise modify parts of the existing structures or appurtenances, as indicated on the Drawings, specified herein, or necessary to permit completion of the Work. Finishes, joints, reinforcements, sealants, etc, are specified in respective Sections. All work shall comply with other requirements of this of Section and as shown on the Drawings.
- B. All commercial products specified in this Section shall be stored, mixed and applied in strict compliance with the manufacturer's recommendations.
- C. In all cases where concrete is repaired in the vicinity of an expansion joint or control joint the repairs shall be made to preserve the isolation between components on either side of the joint.

- D. When drilling holes for dowels/bolts at new or existing concrete, drilling shall stop if rebar is encountered. As approved by the Engineer, the hole location shall be relocated to avoid rebar. Rebar shall not be cut without prior approval by the Engineer. Where possible, rebar locations shall be identified prior to drilling using "rebar locators" so that drilled hole locations may be adjusted to avoid rebar interference.

3.02 CONCRETE REMOVAL

- A. Concrete designated to be removed to specific limits as shown on the Drawings or directed by the Engineer, shall be done by line drilling at limits followed by chipping or jack-hammering as appropriate in areas where concrete is to be taken out. Remove concrete in such a manner that surrounding concrete or existing reinforcing to be left in place and existing in place equipment is not damaged. Sawcutting at limits of concrete to be removed shall only be done if indicated on the Drawings, or after obtaining written approval from the Engineer.
- B. Where existing reinforcing is exposed due to saw cutting/core drilling and no new material is to be placed on the sawcut surface, a coating or surface treatment of epoxy paste shall be applied to the entire cut surface to a thickness of 1/4-in.
- C. In all cases where the joint between new concrete or grout and existing concrete will be exposed in the finished work, except as otherwise shown or specified, the edge of concrete removal shall be a 1-in deep saw cut on each exposed surface of the existing concrete.
- D. Concrete specified to be left in place which is damaged shall be repaired by approved means to the satisfaction of the Engineer.
- E. The Engineer may from time to time direct the Contractor to make additional repairs to existing concrete. These repairs shall be made as specified or by such other methods as may be appropriate.

3.03 SURFACE PREPARATION

- A. Connection surfaces shall be prepared as specified below for concrete areas requiring patching, repairs or modifications as shown on the Drawings, specified herein, or as directed by the Engineer.
- B. Remove all deteriorated materials, dirt, oil, grease, and all other bond inhibiting materials from the surface by dry mechanical means, i.e. - sandblasting, grinding, etc, as approved by the Engineer. Be sure the areas are not less than 1/2-in in depth. Irregular voids or surface stones need not be removed if they are sound, free of laitance, and firmly embedded into parent concrete, subject to the Engineer's final inspection.
- C. If reinforcing steel is exposed, it must be mechanically cleaned to remove all contaminants, rust, etc, as approved by the Engineer. If half of the diameter of the reinforcing steel is exposed, chip out behind the steel. The distance chipped behind the steel shall be a minimum of 1/2-in. Reinforcing to be saved shall not be damaged during the demolition operation.
- D. Reinforcing from existing demolished concrete which is shown to be incorporated in new concrete shall be cleaned by mechanical means to remove all loose material and

products of corrosion before proceeding with the repair. It shall be cut, bent or lapped to new reinforcing as shown on the Drawings and provided with a minimum cover all around as specified on the contract drawings or 2-in.

- E. The following are specific concrete surface preparation "methods" are to be used where called for on the Drawings, specified herein or as directed by the Engineer. All installation of anchors shall be according to the manufacturer's recommendations.
1. Method A: After the existing concrete surface at connection has been roughened and cleaned, thoroughly moisten the existing surface with water. Brush on a 1/16-in layer of cement and water mixed to the consistency of a heavy paste. Immediately after application of cement paste, place new concrete or grout mixture as detailed on the Drawings.
 2. Method B: After the existing concrete surface has been roughened and cleaned, apply epoxy bonding agent at connection surface. The field preparation and application of the epoxy bonding agent shall comply strictly with the manufacturer's recommendations. Place new concrete or grout mixture to limits shown on the Drawings within time constraints recommended by the manufacturer to ensure bond.
 3. Method C: Drill a hole 1/4-in larger than the diameter of the dowel. The hole shall be blown clear of loose particles and dust just prior to installing epoxy. The drilled hole shall first be filled with epoxy paste, and then dowels/bolts shall be buttered with paste then inserted by tapping. Unless otherwise shown on the Drawings, deformed bars shall be drilled and set to a depth of ten bar diameters and smooth bars shall be drilled and set to a depth of fifteen bar diameters. If not noted on the Drawings, the Engineer will provide details regarding the size and spacing of dowels.
 4. Method D: Combination of Method B and C.
 5. Method E: Capsule anchor system shall be set in existing concrete by drilling holes to the required depth to develop the full tensile and shear strengths of the anchor material being used. The anchor bolts system shall be installed per the manufacturer's recommendation in holes sized as required. The anchor stud bolt, rebar or other embedment item shall be tipped with a double 45 degree chamfered point, securely fastened into the chuck of all rotary percussion hammer drill and drilled into the capsule filled hole.

3.04 GROUTING

- A. Grouting shall be as specified in Section 03600.

3.05 CRACK REPAIR

- A. Cracks on horizontal surfaces shall be repaired by gravity feeding crack sealant into cracks per manufacturer's recommendations. If cracks are less than 1/16-in in thickness they shall be pressure injected.

- B. Cracks on vertical surfaces shall be repaired by pressure injecting crack sealant through valves sealed to surface with crack repair epoxy adhesive per manufacturer's recommendations.

END OF SECTION

**SECTION 05500
MISCELLANEOUS METAL**

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and cut, remove, repair or otherwise modify parts of existing concrete structures or appurtenances as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A. Concrete joint accessories are included in Section 03150.

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01300, shop drawings and product data showing materials of construction and details of installation for:

- 1. Shop drawings, showing sizes of members, method of assembly, anchorage and connection to other members.

- B. Samples

- 1. Submit samples as requested by the Engineer during the course of construction.

- C. Design Data

- 1. Submit calculations sealed by a professional engineer registered in the State of Florida or submit load tables and test data demonstrating that the railing and their attachments will resist the loads specified in the 2017 Florida Building Code at the post spacing provided.

- 2. Submit manufacturer's load and deflection tables for grating.

- D. Test Reports

- 1. Certified copy of mill test reports on each aluminum proposed for use showing the physical properties and chemical analysis.

- E. Certificates

- 1. Submit certification that the railing system is in compliance with OSHA requirements and the 2017 Florida Building Code.

- 2. Certify that welders have been qualified under AWS, within the previous 12 months, to perform the welds required under this Section.

1.04 REFERENCE STANDARDS

- A. Aluminum Association (AA)

1. ABH-21 Aluminum Brazing Handbook
 2. ASD-1 Aluminum Standards and Data
 3. DAF-45 Designation System for Aluminum Finishes
 4. SAA-46 Standards for Anodized Architectural Aluminum
- B. American Society for Testing and Materials (ASTM)
1. ASTM A36 – Standard Specification for Carbon Structural Steel.
 2. ASTM A48 – Standard Specification for Gray Iron Castings.
 3. ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 4. ASTM A108 – Standard Specification for Steel Bars, Carbon, Cold Finished, Standard Quality.
 5. ASTM A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 6. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 7. ASTM A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels.
 8. ASTM A276 – Standard Specification for Stainless Steel Bars and Shapes.
 9. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 Psi Tensile Strength.
 10. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 11. ASTM A366 - Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality.
 12. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 13. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
 14. ASTM A536 - Standard Specification for Ductile Iron Castings.
 15. ASTM A570 - Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.
 16. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 17. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
 18. ASTM B429 - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.

19. ASTM F593 – Standard Specification for Stainless Steel Bolts, Hex Caps Screws, and Studs.
 20. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
- C. American Iron and Steel Institute (AISI).
1. Specification for Structural Steel Buildings.
- D. American Welding Society (AWS)
1. AWS D1.1 - Structural Welding Code Steel.
 2. AWS D1.2 - Structural Welding Code Aluminum.
 3. AWS D1.6 - Structural Welding Code Stainless Steel.
- E. Occupational Safety and Health Administration (OSHA)
- F. 2017 Florida Building Code. (FBC)
- G. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

- A. The work of this Section shall be completely coordinated with the work of other Sections. Verify, at the site, both the dimensions and work of other trades adjoining items of work in this Section before fabrication and installation of items herein specified.
- B. Furnish to the pertinent trades all items included under this Section that are to be built into the work of other Sections.
- C. All welding shall be performed by qualified welders and shall conform to the applicable AWS welding code. Welding of steel shall conform to AWS D1.1 and welding of aluminum shall conform to AWS D1.2.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver items to be incorporated into the work of other trades in sufficient time to be checked prior to installation.
- B. Repair items which have become damaged or corroded to the satisfaction of the Engineer prior to incorporating them into the work.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The use of manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.
- B. Like items of materials shall be the end products of one manufacturer in order to provide standardization for appearance, maintenance and manufacturer's service.

2.02 MATERIALS

A. Unless otherwise noted, materials for miscellaneous metals shall conform to the following standards:

1. Structural Steel
 - A. W Shapes: ASTM A992, Gr.50
 - B. M Shapes: ASTM A36
 - C. S, C and MC Shapes: ASTM A36
 - D. L Shapes: ASTM A36
 - E. Plates, rods and Bars: ASTM A36
2. HSS Rectangular Shapes: ASTM A500, Grade B, 42 ksi
3. HSS Round Shapes: ASTM A500, Grade B, 35 ksi
4. Welded and Seamless Steel Pipe: ASTM A501 or ASTM A53,
5. Type E or S, Grade B Schedule 40. Use standard malleable iron fittings, galvanized for exterior work
6. Steel Sheets: ASTM A366
7. Gray Iron Castings: ASTM A48, Class 35
8. Ductile Iron Castings: ASTM A536, Grade 65-45-12
9. Aluminum Extruded Pipe: ASTM B429, Alloy 6063 T6
10. Aluminum Extruded Shapes: ASTM B221, Alloy 6061 T6
11. Aluminum Sheet and Plate: ASTM B209, Alloy 6061 T6
12. Stainless Steel Plates, Sheets, and Structural Shapes
 - A. Exterior, Submerged or Industrial Use: ASTM A240, Type 316 (Type 316L for welded)
 - B. Interior and Architectural Use: ASTM A240, Type 304
13. Stainless Steel Bolts, Nuts, and Washers: ASTM A276, Type 316
14. Carbon Steel Bolts and Studs: ASTM A307, Grade A or ASTM F1154, Gr. 36 (galvanized unless noted otherwise)
15. High Strength Steel Bolts, Nuts and washers: ASTM A325 (mechanically Galvanized per ASTM B695, Class 50, where noted)
 - a. Elevated Temperature Exposure: Type I
 - B. General Application: Type I or Type II
16. Galvanizing: ASTM A123 Zn w/0.5
17. Percent minimum Ni

- I. Connection bolts for wood members shall be ASTM A307, galvanized where specified.
- J. Toggle bolts shall be Hilti, Toggler Bolt or equal.

2.04 METAL GRATING

- A. Grating shall have rectangular, 3/16-in thick, bearing bars spaced 1-3/16-in on center with cross bars spaced at 4-in on center. All grating panels shall be banded with a bar the same size as the bearing bars.
 - 1. Grating shall not exceed the fabricator's maximum recommended span, and meet or exceed the following load and deflection criteria for the maximum span length at the opening being covered by the grating.
 - A. The grating shall produce a deflection of 1/360 of the span or less under a uniform live load of 100 lbs/sq ft on the maximum span.
 - B. The grating shall produce a deflection of 1/360 of the span or less under a concentrated live load of 300 lbs applied at the mid point of the maximum span.
 - 2. Openings 2-in or greater in diameter/dimension and grating edges shall be banded with a bar of the same depth and thickness as the bearing bars. Cut bearing bars or cross bars shall be welded to the banding bar.
 - 3. Provide trench grating with symmetrical cross bar arrangement.
 - 4. Grating clamps, nuts, bolts, washers and other fastening devices for grating and grating supports shall be Type 316 stainless steel. All grating shall be anchored to the supporting system using saddle clips.
- B. Aluminum grating material shall be aluminum alloy 6063-T6 with a mill finish. Cross bars shall be attached to the bearing bars with interlocked swaged joints. The grating shall be Type BS by IKG Borden, Houston, TX; Type 19 SG-4 by Ohio Gratings, Inc., Canton, OH; Type 19S4 by Seidelhuber Metal Products, San Carlos, CA or equal.
- C. Metal frames and supports for grating shall be of the same material as the grating unless otherwise shown on the Drawings. Where aluminum supports are used, they shall be fabricated from aluminum alloy 6061-T6.

2.05 RAILINGS

- A. Guardrails and railing systems shall comply with the requirements of OSHA and the FBC and shall be custom pre-engineered, mechanically fastened or welded pipe aluminum railing systems. Mechanically fastened railing system shall be TUFrail as provided by Thomson Fabrication Company or equal.
- B. Rails and posts shall be 6061-T6, 6063-T6 or 6105-T5. Splice and reinforcing sleeves, brackets, end caps, toeboards, etc, shall be aluminum alloy 6061-T6, 6063-T6 or 6105-T5 alloy. Cast fittings shall be aluminum alloy No. 214. Railing system fastening hardware shall be Type 316 stainless steel. After welding, aluminum shall be anodized. All railing, posts, toeboards and exposed aluminum shall be anodized with a clear architectural Class I satin finish providing a minimum coating thickness of 0.7 mils and

a minimum coating weight of 32 milligrams per square inch in compliance with AA M10C22A41.

- C. Railings shall be 2 rail welded railing systems, as shown on the Drawings, fabricated with 1-1/2-in nominal diameter pipe. Posts shall be Schedule 80 pipe, and railing shall be Schedule 40 pipe, minimum. Posts and top rails shall be continuous. The top surface of the top railing at all points, including corners and terminations, shall be smooth and shall not be interrupted by projected fittings or posts. Spacing of posts shall not exceed 5-ft on center and shall be uniformly spaced except as otherwise shown on the Drawings. Posts will be required on each side of structure expansion joints. All railing posts shall be vertical.
- D. Welds shall be circumferential welds ground smooth and even to produce a railing that is neat in appearance and structurally sound. Welding methods shall be in conformity with AWS standards for the materials being joined. All rail to post connections shall be coped and fastened by continuous welds. There shall be no burrs, sharp edges or protrusions on any weld on any part of the handrail system. After fabrication, the welds and surrounding area shall be cleaned and hand buffed to blend with the adjacent finish. All mechanical fasteners shall be unobtrusively located in countersunk holes with the top flush with the surface of the rail. Bends in the railing shall be as indicated by the Drawings. No distortion of the circular railing shape will be allowed. Bends and terminal sections shall be made without the use of fittings. Corner bends shall be mitered and welded bends.
- E. Railing shall be assembled in sections as long as practical but shall not be greater than 24-ft in length. A field splice shall be used when an assembled section is to be attached to another section. Field splices shall be used in all railing panels that cross over structure expansion joints.
 - 1. Field splices shall use internal splice sleeves located within 8-in of railing posts. The sleeve shall be welded to the rail on one side and fastened with a set screw to the rail on other side. The field splice shall be detailed to take the differential expansion between the railing system and the supporting structure.
 - 2. When the field splice occurs in a railing panel crossing a structure expansion joint, the sleeve shall be welded to the rail on one side and be free to slide in the rail on other side. The field splice shall be detailed to take the same movement as the structure expansion joint.
- F. The bases or supports for railing posts and handrail shall be the types indicated on the Drawings.
 - 1. Where non-removable railing is set in concrete, the posts shall be placed in 2-1/2-in diameter formed concrete openings and firmly caulked with a nonsulphur compound, hydraulic cement equal to Por-Rok by Minwax Construction Products Division Sterling Drug, Montvale, NJ. Collars shall be placed around the post bases and fastened in place with set screws on the side of the post away from the walkway. Posts shall be placed with the centerline 4-in from the edge of the concrete except that posts shall be set at the centerline of concrete curbs.

2. Aluminum railing posts, which may collect condensation, shall have a 3/16-in drain hole drilled immediately above the concrete encased area, the base flange, or supporting socket on the side away from the walking area. The bottom of the rail post between the drain hole and the bottom of the post shall be filled with an inert material such as a compressed closed cell neoprene rod.
- G. Toeboards shall be provided on all railing adjacent to a drop in elevation of 4-ft or more. Toeboards are not required on the inclined portion of stairway railings or where concrete or steel curbs, 4-in or more in height, are present. Toeboards shall be 4-in high channels of the same material as the railing. The channels shall have a minimum thickness of 1/8-in and have flanges of not less than 3/4-in nor more than 1-1/2-in in width. Toeboards shall be positioned with a maximum clearance of 1/4-in from the floor and fastened to railing posts with 1/4-in stainless steel U-bolts, with J-bolts at corner posts and with clip angles and two 1/4-in stainless steel expansion bolts at walls. Toeboards shall not be welded to the posts. Connection to post shall allow expansion and contracting movements.
- H. All railings shall be properly protected by paper, or by an approved coating or by both against scratching, splashes or mortar, paint, or other defacements during transportation and erection and until adjacent work by other trades has been completed. After protective materials are removed, the surfaces shall be made clean and free from stains, marks, or defects of any kind.
- I. Aluminum shapes, including mounting brackets, in contact with concrete or a different type of metal shall be separated by a 1/32" neoprene gasket or provided with a heavy coating of protective zinc chromate for separation of dissimilar materials.
- J. Safety gates, for railing openings, shall be fabricated of matching pipe and rail material and configuration. The gates shall be self-closing gates with approved stop, latch and stainless steel closure spring and hinges.
- K. Barrier chains, for railing openings, shall be fabricated of stainless steel chains. Chain shall be 1/4-in stainless steel links, with eleven links per foot as manufactured by Eastern Chain Works, Inc., NY; Lawrence Metal Products, Inc. or equal. Chains shall be fastened to the handrail posts at the elevation of each rail. One end of each chain shall be connected to one post with a 1/4-in diameter stainless steel eye bolt and the other end shall be connected to the other post by means of a heavy chromium plated bronze swivel eye slide harness snap and a similar eye bolt.

2.06 ACCESS HATCHES

- A. Access hatches shall have single or double leaf doors as indicated by the Drawings. The doors shall be 1/4-in aluminum diamond pattern plate with welded stiffeners, as necessary, to withstand a live load of 300 lbs/sq ft with a maximum deflection of 1/150th of the span. Hatches shall have a 1/4-in aluminum channel frame with a perimeter anchor flange or strap anchors for concrete embedment around the perimeter. Where hatch is supported by steel framing members, these members shall be modified as needed to support the hatch chosen. This includes the addition of angles, tube members, etc. Unless otherwise noted on the Drawings, use pivot torsion bars for counterbalance or spring operators for easy operation along with automatic door hold

open. Hardware shall be durable and corrosion resistant with Type 316 stainless steel hardware used throughout. Provide removable lock handle. Finish shall be the factory mill finish for aluminum doors and frames with bituminous coating on the exterior of the frames in contact with concrete. Hatches shall be watertight and have a 1-1/2-in drainage coupling to the channel frame. Access hatches shall be Types as indicated on the Drawings by Bilco Company, New Haven, CT or equal.

2.07 MISCELLANEOUS ALUMINUM

- A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability. Holes shall be drilled or punched. Edges shall be smooth and without burrs. Fabricate supplementary pieces necessary to complete each item though such pieces are not definitely shown or specified.
- B. Connections and accessories shall be of sufficient strength to safely withstand the stresses and strains to which they will be subjected. Exposed joints shall be close fitting and jointed where least conspicuous. Threaded connections shall have the threads concealed where practical. Welded connections shall have continuous welds or intermittent welds as specified or shown. The face of welds shall be dressed flush and smooth. Welding shall be on the unexposed side as much as possible in order to prevent pitting or discoloration of the aluminum exposed surface. Grind smooth continuous welds that will be exposed. Provide holes for temporary field connections and for attachment of the work of other trades.
- C. Miscellaneous aluminum items shall include: beams, angles, closure angles, grates, hatches, floor plates, stop plates, stair nosings, and any other miscellaneous aluminum called for on the Drawings and not otherwise specified.
- D. Angle frames for hatches, beams, grates, etc, shall be complete with welded strap anchors attached.
- E. Aluminum diamond plate and floor plate shall have a minimum thickness of 3/8-in. Frames and supports shall be of aluminum construction. Fastening devices and hardware shall be Type 304 stainless steel. Plates shall have a mill finish.
- F. Stair treads for aluminum stairs shall have abrasive non-slip nosing as approved.
- G. Aluminum nosing at concrete stairs shall be Wooster Products, Inc.; Alumogrit Treads, Type 116; similar by Barry Pattern and Foundry Co.; Andco or equal. Furnish with wing type anchors and flat head stainless steel machine screws, 12-in on center. Nosing shall also be used at concrete ladder openings. Nosing shall a single piece for each step extending to within 3-in at each side of stair or full ladder width. Set nosing flush with stair tread finish at concrete stairs. Furnish treads with heavy duty protective tape cover.
- H. Miscellaneous aluminum items shall have a cleaned and degreased mill finish.

2.08 MISCELLANEOUS STEEL

- A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from

defects impairing strength or durability. Holes shall be drilled or punched. Edges shall be smooth and without burrs. Fabricate supplementary pieces necessary to complete each item though such pieces are not definitely shown or specified.

- B. Connections and accessories shall be of sufficient strength to safely withstand the stresses and strains to which they will be subjected. Exposed joints shall be close fitting and jointed where least conspicuous. Threaded connections shall have the threads concealed where practical. Welded connections shall have continuous welds or intermittent welds as specified or shown. The face of welds shall be dressed flush and smooth. Grind smooth continuous welds that will be exposed. Provide holes for temporary field connections and for attachment of the work of other trades.
- C. Miscellaneous steel items shall include: beams, angles, lintels, metal stairs, support brackets, base plates for other than structural steel or equipment, closure angles, bridge crane rails, monorail hoist beams, holddown straps and lugs, door frames, splice plates, subframing at roof openings and any other miscellaneous steel called for on the Drawings and not otherwise specified.
- D. Structural steel angle and channel door frames shall be shop coated with primer. Frames shall be fabricated with not less than three anchors on each jamb.
- E. Steel pipe pieces for sleeves, lifting attachments and other functions shall be Schedule 40 pipe unless otherwise shown on the Drawings. Wall and floor sleeves, of steel pipe, shall have welded circumferential steel waterstops at mid-length.
- F. Lintels, relief angles or other steel supporting masonry or embedded in masonry shall be shop coated with primer.
- G. All steel finish work shall be thoroughly cleaned, by effective means, of all loose mill scale, rust and foreign matter and shall be given one shop coat of primer compatible with the finish coat after fabrication but before shipment. Paint shall be omitted within 3-in of proposed field welds. Paint shall be applied to dry surfaces and shall be thoroughly and evenly spread and well worked into joints and other open spaces.
- H. Galvanizing, where required, shall be the hot-dip zinc process after fabrication. Coating shall be not less than 2 oz/sq ft of surface.

2.09 MISCELLANEOUS STAINLESS STEEL

- A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability. Holes shall be drilled or punched. Edges shall be smooth and without burrs. Fabricate supplementary pieces necessary to complete each item though such pieces are not definitely shown or specified.
- B.
- C. Connections and accessories shall be of sufficient strength to safely withstand the stresses and strains to which they will be subjected. Exposed joints shall be close fitting and jointed where least conspicuous. Threaded connections shall have the threads concealed where practical. Welded connections shall have continuous welds or intermittent welds as specified or shown. The face of welds shall be dressed flush and

smooth. Grind smooth continuous welds that will be exposed. Provide holes for temporary field connections and for attachment of the work of other trades.

- D. Miscellaneous stainless steel items shall include: beams, angles, bar racks and any other miscellaneous stainless steel called for on the Drawings and not otherwise specified.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install all items except those to be embedded in concrete or other masonry which shall be installed under Division 3 and Division 4 respectively. Items to be attached to concrete or masonry after such work is completed shall be installed in accordance with the details shown. Fastening to wood plugs in masonry will not be permitted.
- B. Abrasions in the shop primer shall be touched up immediately after erection. Areas left unprimed for welding shall be painted with primer after welding.
- C. Zinc coating which has been burned by welding, abraded, or otherwise damaged shall be cleaned and repaired after installation. The damage area shall be thoroughly cleaned by wire brushing and all traces of welding flux and loose or cracked zinc coating removed prior to painting. The cleaned area shall be painted with two coats of zinc oxide-zinc dust paint conforming to the requirements of Military Specifications MIL-P-15145. The paint shall be properly compounded with a suitable vehicle in the ratio of one part zinc oxide to four parts zinc dust by weight.
- D. Specialty products shall be installed in accordance with the manufacturer's recommendations.
- E. Expansion bolts shall be checked for tightness a minimum of 24 hours after initial installation.
- F. Install adhesive capsule anchors using manufacture's recommended drive units and adapters and in compliance with the manufacturer's recommendations.
- G. Headed anchor studs shall be welded in accordance with manufacturer's recommendations.
- H. All railings shall be erected to line and plumb with tightly fitted joints proving smooth transitions. For mechanically fastened systems provide gaps between connecting members no greater than 1/8" unless at designated expansion joints.
- I. All steel surfaces that come into contact with exposed concrete or masonry shall receive a protective coating of an approved heavy bitumastic troweling mastic applied in accordance with the manufacturer's instructions prior to installation.
- J. Where aluminum contacts a dissimilar metal, apply a heavy brush coat of zinc-chromate primer followed by two coats of aluminum metal and masonry paint to the dissimilar metal.

- K. Where aluminum contacts masonry or concrete, apply a heavy coat of approved alkali resistant paint to the masonry or concrete.
- L. Where aluminum contacts wood, apply two coats of aluminum metal and masonry paint to the wood.
- M. Between aluminum grating, aluminum stair treads, or aluminum handrail brackets and steel supports, insert 1/4-in thick neoprene isolator pads, 85 plus or minus 5 Shore A durometer, sized for full width and length of bracket or support.

END OF SECTION

**SECTION 11201
FABRICATED ALUMINUM SLIDE GATES**

PART 1 - GENERAL

1.01 SCOPE

- A. The work covered by this section includes furnishing all labor, materials, equipment and incidentals as shown on the Drawings, specified herein and required to supply and install fabricated aluminum slide gates, electric motor actuator and all appropriate appurtenances in full conformance with the Contract Drawings and as specified herein.
- B. Gates and operators shall be supplied with all the necessary parts and accessories indicated on the Drawings, specified herein or otherwise required for a complete, properly operating installation.

1.02 DESIGN REQUIREMENTS

A. Gate Manufacturer Qualifications

- 1. Manufacturer of fabricated aluminum slide gates shall have a minimum of 10 years of experience in the production of substantially similar size and type equipment in the United States, and shall show evidence of satisfactory operation in at least 25 project installations. Fabricated aluminum slide gates and operators shall be the products of a manufacturer regularly engaged in the production of fabricated gates. The gate manufacturer's plant fabricating the gates shall be ISO 9001 certified.
- 2. The gate manufacturer shall assume unit responsibility for all items specified in this section. Unit responsibility shall require that all items be products of, or warranted by, the manufacturer. The slide gate manufacturer shall be responsible for all coordination between components and provide all submittals, installation and start-up assistance and certifications on the equipment as a unit.
- 3. Slide gate and appurtenances shall be the product of one manufacturer.
- 4. The manufacturer shall provide written certification to the Engineer that all equipment furnished complies with all applicable requirements of these Specifications.

1.03 SUBMITTALS

- A. Shop Drawings: Submit for approval the following in accordance with Section 01300 - Submittals. Shop drawings for fabricated slide gates shall be prepared and assembled by the approved manufacturer. Shop drawings prepared and assembled by manufacturer's sales representatives, fabrication shops or other than the listed manufacturers will not be accepted. Submittals for fabricated slide gates shall include the following:
 - 1. Certified fabrication, assembly and installation drawings and diagrams. Shop drawings shall include a complete description of all materials including the

material thickness of all structural components of the frame and slide. Installation drawings showing all details of construction, details required for installation, dimensions and anchor bolt locations.

2. Provide the maximum bending stress and deflection of the slide under the maximum design head for each slide gate.
 3. Manufacturer's literature, illustrations, specifications and engineering data.
 4. Setting drawings, templates, and directions for the installation of anchor bolts and other anchorages.
 5. Wiring diagrams for electric motor actuators.
 6. Submittals shall clearly identify the location, method of installation and type of operator to be provided.
- B. Field Test Results: Submit a written report giving the results of the field tests required.
- C. Operation and Maintenance Manuals
1. Submit complete manuals including copies of all approved Shop Drawings, test reports, maintenance data and schedules, description of operation, and spare parts information and a lubricant specification for the type and grade necessary to meet the requirements of the equipment.
 2. Furnish Operation and Maintenance Manuals in conformance with the requirements of Section 01730, Operating and Maintenance Data.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Fabricated slide gates shall be stored and protected in accordance with the requirements of Section 01600 of these Specifications, in addition to the following.
- B. Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the Engineer.
- C. Finished surfaces of all exposed openings shall be protected by wooden blanks, strongly built and securely bolted thereto.
- D. Each box, crate or package shall be properly marked to show its net weight in addition to its contents.
- E. Deliver materials to the site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete in ample time to not delay the Work.
- F. Handle and protect slide gates and appurtenances properly during delivery, storage and installation in a manner to prevent damage of any nature, in strict accordance with manufacturer's recommendations. Slide gates that are distorted or otherwise damaged will not be acceptable. Protect all bolt threads and ends from damage.
- G. Store all mechanical equipment in covered storage off the ground and prevent condensation.

1.05 QUALITY ASSURANCE

- A. The manufacturer shall provide written certification to the Engineer that all equipment furnished complies with all applicable requirements of these Specifications.
- B. The gate manufacturer shall provide unit responsibility for all items specified in this section. Unit responsibility shall require that all items be products of, or warranted by, the gate manufacturer. The gate manufacturer shall be responsible for all coordination between components and provide all submittals, installation and start-up assistance, and certification on the equipment as a unit.

1.06 WARRANTY AND GUARANTEES

- A. The Contractor shall provide a warranty against defective materials and workmanship in accordance with the requirements of Section 01730 of these Specifications. The Contractor shall warrant trouble-free operation for a period of not less than one year, which shall commence from the date of final written acceptance by the District. The equipment shall be warranted during the one year period to be free from defects in workmanship, design and materials, specifically including leakage and sticking due to corrosion. If any part of the equipment should fail during the warranty period, it shall be replaced at no expense to the District.
- B. The manufacturer's warranty period shall run concurrently with the Contractor's warranty period regardless of when the equipment was shipped. No exception to this provision shall be allowed.
- C. In addition to the one year Contractor's warranty period, the fabricated gate manufacturer shall warrant each fabricated gate being supplied to the District against defects in workmanship and materials for a minimum period of 24 months from the date of Final Acceptance by the District, under normal use, operation, and service, up to a maximum of 36 months from the date of delivery to the job site. This warranty shall be held in effect regardless of pre-commissioning conditions in a typical indoor or outdoor environment as long as the fabricated gates have not been abused or disassembled.
- D. The fabricated gate manufacturer shall also provide factory-authorized service and parts stock either within the state of Florida or at other locations within the United States available to ship to the job site within 24 hours of notification by the District. The factory-authorized service center's location and the telephone number shall be indicated in the shop drawing submittal and the O&M manuals for the gates

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Fabricated aluminum slide gates shall be:
 - 1. Waterman Industries Model A-250-1.
 - 2. Or Engineer approved equal.

2.02 FABRICATED ALUMINUM SLIDE GATE

A. The gate shall be constructed of the following materials unless noted otherwise:

Component:	Material:
Frames, Rails, Cover Slides, Yokes	Aluminum - ASTM B-209 and B-211 Alloy 6061 T-6
Fasteners and Anchor Bolts	Stainless Steel - ASTM F-593 and 594, Type 304CW or 316CW
Stems	Stainless Steel - ASTM A-276, Type 304 or 316
Flushbottom Seals	Rubber - ASTM D-2000 BC 615/625 Grade BE 625
Seats and Slides	Ultra High Molecular Weight Polyethylene (UHMW)
Finish	Mill finish on all aluminum and stainless steel surfaces

- A. The gate frame shall be a rigid unit composed of aluminum guide rails with UHMW seats upstream and downstream. These shall form a tight seal between the frame and the slide (disc). Gate shall meet AWWA C562 leakage requirements. This tight seal shall provide an allowable leakage rate of no more than 0.1 gallons per minute (GPM) per peripheral foot of perimeter opening for seating heads and 0.1 GPM per peripheral foot for unseating heads. Stainless steel retainer bars, cross bars and head rails (for self-contained gate only) shall be provided. The clear opening shall be the same size as the waterway, unless otherwise specified. The guides shall be of sufficient length to support two-thirds of the height of the slide when in the full open position.
- B. The slide cover (disc) shall be aluminum plate reinforced with structural shapes welded to the plate. The slide cover shall not deflect more than 1/720th of the span of the gate under the maximum head. The stem connection shall be either the clevis type, with structural members welded to the slide and a bolt to act as a pivot pin, or a threaded and bolted (or keyed) thrust nut supported in a welded nut pocket. The clevis or pocket and yoke of the gate shall be capable of taking, without damage, at least twice the rated thrust output of the operator at 40 pounds pull.
- C. Gates shall be furnished with a flush seal arrangement. A resilient seal with a minimum width of exposed face of 3/4" shall be securely attached to the frame along the invert, and shall extend to the depth of the guide groove.
- D. All welds for gate and frame fabrication shall be performed by welders with AWS certification. All welds shall be continuous. No stitch welding shall be allowed.
- E. The fabricated aluminum slide gate shall be 48" and 60" as shown on the Drawings, able to withstand 15 feet of seating head and 10 feet of unseating head.

2.03 ELECTRIC MOTOR ACTUATORS

- A. General: Electric motor actuators shall comply with the fabricated aluminum slide gate of these Specifications. Electric motor actuators shall be provided by the fabricated aluminum slide gate manufacturer with the slide gate as a complete assembly.
- B. Approved Manufacturers: AUMA Actuators, Inc. of Canonsburg, PA or Engineer approved equal.

- C. Equipment Requirements: The actuators shall be suitable for use on a 240 volt, 1 phase, 60 Hz power supply and must include motor, reversing starters, local controls and terminals for remote control and indication housed within a self-contained, sealed enclosure. Set-up of the actuator shall be carried out without the removal of any covers. Actuator calibration shall be by integral pushbuttons and selector switch. No separate special commissioning tools shall be required. In addition, provision shall be made for the protection of configured actuator settings by means of a password.
- D. Actuator Sizing: The actuator shall be sized to guarantee valve closure at the specified torque and/or thrust requirement as indicated by the valve manufacturer or supplier. The actuator must be adequately sized to provide the torque required to operate the slide gate at 90% of the nominal voltage with the option of operation at up to -30% undervoltage conditions. The operating speed shall provide valve closing and opening at approximately 12 inches per minute for slide gates or sluice gates.
- E. Environmental: Actuators shall be suitable for indoor and outdoor use. The actuator shall be capable of functioning in an ambient temperature ranging from -13°F to +158°F (-25°C to +70°C), up to 100% relative humidity.
- F. Enclosure: Actuators shall be 0-ring sealed, watertight to NEMA 4X/6 and submersible to IP 68-8 (26 feet for 96 hours)) in accordance with EN 60529. During submersion it must be possible to operate the actuator at least 10 times. Enclosure must allow for temporary site storage without the need for electrical supply connection. All external fasteners shall be of stainless steel. Gear case shall be cast iron. In order to prevent condensation, a heater must be installed inside the actuator, suitable for continuous operation. Actuator must provide an alarm signal in case of failure of anti-condensation heater.
- G. Motor: The electric motor shall be Class F insulated, with a duty rating of at least 15 minutes at 104°F (40°C) ambient temperature at an average load of at least 35% of rated actuator torque. Motor shall be specifically designed and built by the actuator manufacturer for electric actuator service characterized by high starting torque, low stall torque and low inertia. Commercially available motors shall not be acceptable. Electrical disconnection of the motor shall be by means of a plug and socket and motor removal shall be possible without loss of lubricant. The actuator must include a device to ensure that the motor runs with the correct rotation for the required direction of valve travel regardless of the connection sequence of the power supply.
- H. Motor Protection: The following criteria shall be provided for motor protection:
 - 1. The motor shall be de-energized without damage in the event of a stall condition when attempting to move a jammed valve
 - 2. The motor shall be de-energized in the event of an overtorque condition
 - 3. Thermal devices (one for each phase of power) shall be imbedded in the motor windings to de-energize the motor in case of overheating.
 - 4. Lost phase protection.

- I. Gearing: The actuator gearing shall be totally enclosed in a grease-filled cast iron gearcase suitable for operation in any orientation. Actuator gearing shall be hardened steel with alloy bronze worm wheel. The design should permit the opening of the gearcase for inspection or disassembly without releasing the stem thrust or taking the valve out of service. Where required per application, electric actuators can be provided with worm gearboxes. The worm gearboxes shall be supplied with full 360° bronze worm wheels.
- J. Manual operator shall be provided on each electrical actuator. Manual operation shall be by side mounted handwheel which shall not rotate during motor operation. Handwheel declutch mechanism shall include an output contact to indicate actuator manual operation. Manual operation shall utilize the actuator worm shaft/worm wheel to maintain self-locking gearing and to facilitate changeover from motor to manual operation when the actuator is under load. Actuator designs that bypass electric actuator worm gears when declutched are unacceptable. The declutching from motor operation shall be at the motor shaft to minimize declutching effort. The amount of force required to declutch the actuator shall be the same regardless of the size of the actuator. Designs that break the valve load at the worm and worm gear are unacceptable. Return from manual to electric mode of operation will be automatic upon motor operation. A seized or inoperable motor shall not prevent manual operation.
- K. Drive nut and thrust base assembly: For multi-turn rising stem applications, the drive nut shall be installed in a detachable thrust base. The design shall allow actuator removal from the thrust base, leaving the thrust base attached to the valve to retain valve position. Thrust bearings shall be lubricated by means of an easily accessible grease fitting.
- L. Actuator status indication: Six contacts shall be provided. The contacts shall have a minimum rating of 5A, 250VAC.
 - 1. One contact dedicated for collective fault (phase failure, motor protection tripped, torque fault) or one of eight other fault groups
 - 2. Five additional indication contacts selectable from a list of at least 45 parameters including, but not limited to: end position CLOSED, end position OPEN, selector switch in REMOTE mode, torque fault in CLOSED direction, and torque fault in OPEN direction.
- M. Local indication: The actuator shall include a digital position indicator with a display from fully open to fully close in 1% increments. Six indicating lights shall be included. Five of which are programmable local indicating lights to indicate functions including, but not limited to: end position CLOSED, end position OPEN, fault, selector switch in REMOTE and actuator moving. The sixth light shall indicate Bluetooth® interface connectivity.
- N. Controls: All actuators shall be furnished with integral motor controls consisting of reversing starters, control transformer, automatic phase correction, monitor relay (to signal fault conditions such as thermal switch trip, torque switch tripped in mid-travel,

wrong phase sequence or phase failure) and be capable of mounting up to 330ft from the valve/vault.

- O. Remote position and torque feedback: Actuator shall provide a 4 to 20 mA analog position feedback signal. Actuator shall provide a 4 to 20 mA analog torque feedback signal corresponding to required valve torque for diagnostics and preventive maintenance.
- P. Starter and transformer: The starter shall be suitable for up to 60 starts per hour for open/close service. Control power transformer shall provide 120 VAC control power for remote control from the remote SCADA telemetry panel.
- Q. Controls and Control Mode Selector: The actuator shall include local Open/Stop/Close/Reset pushbuttons and a Local/Off/Remote selector switch lockable in any of the three positions. The Reset pushbutton shall be provided to facilitate actuator commissioning. It shall be possible to select maintained or non-maintained control independently for either the local or remote modes. It shall be possible to program the output direction of the actuator (clockwise or counterclockwise to close) without removal of any covers. It shall be possible to re-orient local pushbutton controls in 90° increments
- R. The following electrical actuator control capabilities for control by contact closure/discrete signals must be available:
 - 1. Input remote control signals for:
 - a. open/stop/close (maintained contacts) or emergency
 - b. open/close 'push to run' (momentary)
 - c. programmable emergency input for fail to any intermediate or end of travel positions when required.
 - 2. Programmable electronic torque switch bypass initialized in end and intermediate positions. Settable from 0-5 seconds.
 - 3. Separate open and close direction pulse timer (stepping mode) circuits capable of initializing at any position (open, close or intermediate).
 - 4. It shall be possible to reverse valve travel without the necessity of stopping the actuator. The starter contactors shall be protected from excessive current surges during travel reversal by an automatic time delay on energization of the contactor coils.
 - 5. The internal circuits associated with the remote control and monitoring functions are to be designed to withstand simulated lightning impulses of up to 1.1 kV.
- S. The following electrical actuator control capabilities for analog signal input must be available:
- T. The following electrical actuator monitoring capabilities shall be provided:
 - 1. Liquid Crystal Display (LCD) – minimum four lines back-lit for setting menu showing status indication and diagnostic information.

2. Retrievable (lifetime and re-settable) data logs including:
 - a. motor run time
 - b. total number of cycles
 - c. number of torque trips in each direction of travel
 - d. number of limit switch trips at each end of travel
 - e. total torque trip faults
 - f. motor thermal overloads.
 3. Diagnostic capability, which will store and enable download of historical actuator operation, torque data to permit analysis of actuator, valve in-service performance and status signals according to NAMUR recommendation NE 107 via local display. Data download shall be carried out without removing any covers and all shall be available locally at the actuator or accessible via laptop computer.
 4. Actuator controls shall have a real time clock for event recording to support asset management functions and life cycle analysis.
- U. Wiring and terminals: Internal wiring shall be tropical grade insulated stranded cable of appropriate size for the control and main power. All external wiring shall terminate in a removable double-sealed plug and socket connection, which allows easy disconnection of all power and control voltages. Actuators furnished without plug and socket terminal connections must have power and control disconnect switches for ease of maintenance and safety

2.04 ANCHORS AND BOLTING HARDWARE

- A. Anchors and bolting hardware shall be provided by the gate manufacturer for mounting the gates and appurtenances to 8-inch thick precast walls or bolting hardware to mount the gates to wall mounted brackets.
1. Quantity, size and location of anchors and bolting hardware shall be determined by the gate manufacturer.
 2. Epoxy-type anchors shall be provided.
 3. Anchors and bolting hardware shall be Type 316 stainless steel.
 4. Anchors shall be of ample length and diameter to safely withstand all forces expected to be created by operation of the gate, with a minimum safety factor of 1.5. The minimum diameter for anchors shall be 1/2-inch.
 5. All bolts and nuts for slide gates shall have hexagonal heads. Anchors shall be furnished with two nuts each to attach gates to concrete.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Slide gates and appurtenances shall be installed as shown on the Drawings and/or specified herein, and in strict accordance with the manufacturer's installation instructions.
- B. Gates and appurtenances shall be installed with sufficient clearance for proper operation of any external mechanisms, and with sufficient clearance to dismantle the gate for maintenance.
- C. Gates shall be installed so that frame members and anchor bolts do not rest upon or contact steel reinforcing bars. Anchor bolts shall be set using a template.
- D. All anchors shall be set in accordance with approved manufacturer's drawings. All bolts shall be tightened and all items requiring lubrication, including pivot pins, shall be lubricated. Anti-seize thread lubricant shall be liberally applied to the threaded portion of stainless steel anchor bolts during the installation and tightening of nuts. Excess lubricant shall be thoroughly removed following final tightening.
- E. Slide gate frames and plates shall be checked, prior to installation, for projections or warpage that would promote excessive leakage. Defective gates and plates shall be removed and replaced.
- F. Each fabricated slide gate shall be carefully installed and adjusted for proper operation. Each gate shall be adjusted so that it does not bind or leak in excess of specified requirements. Slide gate frames shall be installed in a true vertical plane, square and plumb, with 90 degree corners to the lines and elevations shown and accurately aligned and adjusted for correct operation. Frames shall be internally braced and adequately supported during concrete placement and/or installation. Care shall be taken to avoid warping the gate frames and to maintain tolerances between seating faces.
- G. Any voids between the gate frame and existing concrete walls shall be filled with non-shrink grout as shown on the installation drawings and in accordance with the manufacturer's recommendations.
- H. The actuator shall be accurately set and plumbed and shall be in proper alignment with the gate and stem before the actuator is grouted in place. Operating stems shall be installed in proper alignment and shall not bind in the lift nut or stem guides.
- I. Limit switches for electric actuators shall be adjusted following a complete installation of the slide gate in strict accordance with the actuator manufacturer's written installation instructions.

3.02 INSPECTION AND FIELD TESTING

- A. Following installation, operating tests will be performed to demonstrate to the District and the Engineer that all slide gates will perform in a satisfactory manner and that all items of equipment are in full compliance with this Section. The Contractor shall make,

at Contractor's expense, all necessary modifications, changes and/or adjustments required to ensure satisfactory operation.

- B. After Contractor and Engineer have mutually agreed that the equipment installation is complete and ready for continuous operation, Contractor and a qualified field service representative of the manufacturer shall conduct a functional field test and a leakage test of each slide gate in the presence of Engineer.
 - 1. Functional Tests: Each slide gate with appurtenances shall be field tested. Tests shall demonstrate to Engineer that each part and all parts together function in the manner intended. All necessary testing equipment and manpower shall be provided by Contractor at his expense.
 - 2. Each gate shall be operated through at least two complete open/close cycles to confirm that it operates without sticking, binding, scraping, or distorting. The effort to open and close manual operators shall be measured using a torque wrench or other similar measuring device, and shall not exceed the maximum operating effort specified above.
 - 3. Electric motor actuators shall function smoothly and without interruption.
- C. Deficient equipment will be rejected. If gates, operators and appurtenances do not meet the specified requirements after corrective measures have been attempted by the Contractor, the equipment shall be removed and replaced with equipment that satisfies the conditions specified and tested to verify compliance. Replacement and retesting of defective equipment shall be made at no additional cost to the District.

3.03 MANUFACTURER'S REPRESENTATIVE SERVICES

- A. The Contractor shall provide the services of a trained, competent, qualified and experienced factory-employed field representative during inspection, testing and start-up of the equipment and for instruction of the District's personnel in the proper operation and maintenance of the equipment. Factory personnel are required for this start-up and training. Manufacturer's sales representatives are not deemed acceptable to provide the start-up service. The factory representative shall have a complete and full knowledge and experience in the installation, start-up procedures, and proper operation and maintenance of the slide gates. The services of the factory technician shall be provided as follows:
 - 1. Two (2) separate trips and a total of two (2) 8-hour days of service to inspect and certify the installation prior to startup, conduct check-out and start-up services, and instruct the District's operation and maintenance personnel in proper operation and maintenance of the equipment.
 - a. One, 8-hour day during the installation phase of the slide gate and electric actuator equipment for consultation to the Contractor,
 - b. One, 8-hour day to inspect the final installation and supervise the Contractor's personnel to check-out of the completed installations, perform initial start-up of the slide gate and electric actuator equipment and perform the functional testing of the slide gate systems. A portion of

the day will be to instruct the District's personnel in the proper operation and maintenance of the slide gate and electric motor actuator equipment in accordance with a training schedule approved by the District.

2. Upon completion of his work, the manufacturer's field service technician shall submit to the Engineer, a written report for the fabricated slide gate installed, as a result of his inspection, adjustments, corrections, repairs, start-up and testing. The report shall include descriptions of the inspection, adjustments, corrections and repairs made, testing and start-up, and training of the District's personnel. The report shall also include a notarized certification signed by the manufacturer's field service technician that each installed fabricated slide gate:
 - a. Has been installed and lubricated per manufacturer's requirements.
 - b. Has been accurately aligned, set and leveled and proper clearances set.
 - c. Is free from undue stress imposed by mounting bolts or setting.
 - d. Each fabricated slide gate has been tested and is in conformance with nominal operating parameters and leakage requirements. Test procedures and results shall be included in the report.
 - e. Each fabricated slide gate is ready for permanent operation on a continuous basis, is free from any known defects and that nothing in the installation will render the manufacturer's warranty null and void.
 3. The Contractor's attention is directed to the fact that the services specified for the manufacturer's field service technician represent an absolute minimum acceptable level of service, and are not intended to limit the responsibilities of the Contractor to comply with all requirements of the Contract Documents. The Contractor shall procure, at no additional cost to the District, all services required, including additional or extended visits to the jobsite by manufacturer's representatives, to comply with said requirements.
- B. Electric Motor Actuator: Each electric actuator will be provided with a commissioning kit consisting of a wiring diagram and installation and operation manual. No special commissioning tools or parts will be required for start-up. In order to prevent loss of screws during commissioning or maintenance, all covers shall be fixed with captive screws. In order to minimize the amount of spare parts required, parts such as covers, plug and sockets, parts must be interchangeable throughout all model sizes.
- C. Each electric motor actuator shall be performance tested. Test documentation shall be provided indicating the following:
1. torque sensing tripping points in both the open and closed directions of travel.
 2. current at the maximum torque tripping point.
 3. actuator output speed.
 4. high voltage test.

3.04 CLEANING

- A. Prior to acceptance of the work of this Section, thoroughly clean all installed materials and related areas in accordance with the requirements of Section 01710 of these Specifications.

END OF SECTION

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**SECTION 11261
ANGLED LINE SHAFT AXIAL FLOW PUMPS**

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to install and test, and make ready for operation two (2) angled line shaft, single stage axial flow impeller pumps, with motors, discharge flap gates, and controls as shown in the Contract Documents and as specified herein.
- B. All necessary and desirable accessory equipment and auxiliaries whether specifically mentioned in this Section or not shall be furnished and installed as required for an installation incorporating the highest standards for this type of service. Also included shall be supervisory services during installation and field testing of each unit and instructing the regular operating personnel in the proper care, operation and maintenance of the equipment.

1.02 RELATED WORK

- A. Concrete work and the installation of anchor bolts are included in Sections 03300 and 05500; however, anchor bolts for these units as recommended by the pump manufacturer shall be furnished by the Contractor under this Section.
- B. Electrical work as shown on the Drawings and as specified herein and in Section 16000.
- C. Instrumentation and control work as shown on the Drawings and specified herein and in Section 16000.

1.03 SUBMITTALS

- A. Submit, in accordance with Section 01300, shop drawings and product data. Shop drawings must be approved by the Engineer prior to manufacture of the pump(s). Submittals shall include the following:
 - 1. Certified by the Manufacturer, dimensional drawings of each item of equipment and auxiliary apparatus to be furnished.
 - 2. Certified by the Manufacturer, installation and cross-sectional drawings including pump support and mounting bolt plans and details complete with all dimensions and written description of procedure for the installation and mounting the pump(s).

3. Schematic electrical wiring diagram and other data as required for complete pump installation if a change from the wiring diagram shown on the Drawings is proposed.
4. Literature and drawings describing the equipment in sufficient detail, including parts list and materials of construction, to indicate full conformance with the detail specifications.
5. Total weight of pumping unit and of the motor.

B. Design Data

1. Manufacturer's certified rating curves, to satisfy the specified design conditions, showing pump characteristics of discharge, anticipated field head, brake horsepower, bowl efficiency and guaranteed net positive suction head required (NPSHR). Curves shall show the full recommended range of performance and include shut-off head. This information shall be prepared specifically for the pump proposed. Catalog sheets showing a family of curves will not be acceptable.

C. Test Reports

1. Certified motor test data.
2. Tabulated data for the drive motors including rated Hp, full load rpm, power factor and efficiency curves at 1/2, 3/4 and full load, service factor and kW input, including when the pump is at its design point.
3. A schedule of the date of shop testing and delivery of the equipment to the job site.
4. Description of pump factory test procedures, equipment and results, including but not limited to, performance curves.

D. Operation and Maintenance Data

1. Complete operating and maintenance instructions shall be furnished for all equipment included under this Section as provided in Section 01730. The maintenance instructions shall include troubleshooting data and full preventative maintenance schedules and complete replacement parts lists with ordering information.

1.04 REFERENCE STANDARDS

A. Design, manufacturing and assembly of elements of the equipment specified herein shall be in accordance with, the following:

1. American Institute of Steel Construction (AISC)

2. American Iron and Steel Institute (AISI)
3. American Society of Mechanical Engineers (ASME)
4. American National Standards Institute (ANSI)
5. American Society for Testing Materials (ASTM)
6. American Water Works Association (AWWA)
7. American Welding Society (AWS)
8. American Bearing Manufacturers Association (ABMA)
9. Hydraulic Institute Standards for Centrifugal, Rotary and Reciprocating Pumps; Hydraulic Institute, Vertical Pump Standards; and Hydraulic Institute Test Standards, Rotodynamic Pumps for Hydraulic Performance Acceptance Tests – 14.6
10. Institute of Electrical and Electronics Engineers (IEEE)
11. National Electrical Code (NEC)
12. National Electrical Manufacturers Association (NEMA)
13. Occupational Safety and Health Administration (OSHA)
14. Society for Protective Coatings (SSPC)
15. Underwriters Laboratories (UL)

- B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

- A. To assure unity of responsibility, the motors, supporting sole plates, discharge head, shafting and column pipe assembly shall be furnished by the pump manufacturer. The Contractor and manufacturer shall assume responsibility for the satisfactory installation and operation of the entire pumping system including pumps, motors, sole plates and associated items, as specified. The person or persons responsible for carrying out the pump installation shall be a licensed Contractor in the State of Florida.
- B. The equipment specified herein is intended to be standard pumping equipment of proven ability as manufactured by concerns having extensive experience in the production of such equipment similar to the applications stated in Paragraphs 1.01 and 1.06. Units specified herein shall be furnished by a single manufacturer. The equipment furnished shall be designed, constructed and installed to operate satisfactorily when installed as shown on the Drawings.

- C. Pumps shall be manufactured in accordance with the Hydraulic Institute Standards, except where otherwise specified herein.
- D. The pump manufacturer shall be fully responsible for the design, arrangement, and operation of all connected rotating components, including supporting pump mounting pad(s), if any, of the assembled pumping unit mounted as shown on the Drawings, to ensure that neither harmful nor damaging vibrations occur at any speed within the specified operating range.
- E. The supplied pump shall be manufactured such that the NPSHR in the manufacturer's allowable operating region is not more than 80% of the NPSHA.

1.06 SYSTEM DESCRIPTION

- A. The pumps will pump surface water from a drainage canal to an adjacent drainage canal. The pumps may be started and stopped either locally or by remote signal. The pumps will be controlled and powered by a pump station control panel specified herein. Other system controls and instrumentation related to pump operation shall be furnished and installed per the Drawings.
- B. The pumps will be controlled by the remote SCADA telemetry panel as programmed by SJRWMD.

1.07 DELIVERY STORAGE AND HANDLING

- A. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the unit and equipment are ready for operation.
- B. All equipment and parts must be properly protected against any damage during shipment. Store the equipment in accordance with manufacturer's recommendations.
- C. Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the Engineer.
- D. The finished surfaces of all exposed flanges shall be protected by wooden or equivalent blank flanges, strongly built and securely bolted thereto.
- E. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.
- F. No shipment shall be made until approved by the Engineer in writing.

1.08 MAINTENANCE

- A. All spare parts shall be properly protected for long periods of storage and packed in containers that are clearly identified with indelible markings as to contents.

1.09 WARRANTY

- A. Provide warranty and guarantee for all equipment and work in accordance with General Requirements, Section 01000.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The pumping units shall be Model NW320x30 as manufactured by MWI Pumps (33rd NW 2nd Street, Deerfield Beach, FL 33441); no exceptions. The pumping units shall all be supplied by one manufacturer and shall be complete including pumps, motors, belts, pulleys, and appurtenances such as, but not limited to lifting inlet screen, mounting pads, connecting flanges, and hardware.
- B. The pumps and motors shall be designed and built for 24-hour continuous service at any and all points within the required range of operation, without overheating, without cavitation and without excessive vibration or strain. All parts shall be so designed and proportioned as to have liberal strength, stability and stiffness and to be especially constructed to meet the specified requirements. Ample room and facilities shall be provided for inspection, repairs and adjustment.
- C. All necessary mounting bolts, nuts and washers shall be furnished and shall be Type 316 stainless steel.
- D. Each major piece of equipment shall be furnished with a stainless steel nameplate (with embossed data) securely mounted to the body of the equipment. As a minimum, the nameplate for the pumps shall include the manufacturer's name and model number, serial number, rated flow capacity, head, speed and all other pertinent data. As a minimum, nameplates for motors shall include the manufacturer's name and model number, serial number, horsepower, speed, input voltage, amps, number of cycles and power and service factors.

2.02 CONDITIONS OF OPERATION

- A. The pumps must be able to be operated individually or operated simultaneously as installed in the drainage canal and mounted in the configuration shown on the Drawings.
- B. Each pump shall be designed for the conditions of service as shown in **Table 11261-A**. All pumps shall have a rising head capacity curve for stable pump operation from the minimum head operating point to the shut-off head.

2.03 PUMP CONSTRUCTION

- A. Pump bowl assembly shall be manufactured from corrosion resistant ASTM A242 "COR-TEN". The suction bell shall be bolted to the discharge bowl with heavy flanges accurately machine faced and drilled. Both the intake bell and the pump bowl shall have

straightening vanes. Intake bell diameter shall be 1 ½ times the impeller diameter and shall be constructed to minimize vortex tendencies by maintaining equal pressure and velocities across the bell entrance.

- B. The impeller hub shall be manufactured from ASTM A242 “COR-TEN” steel. The hub shall be bored with a taper and keyed for positive locking to the pump shaft and shall be equipped with propeller pulling nuts for easy removal. The impeller shall have three blades manufactured from ASTM A242 “COR-TEN” steel. The impeller blades shall be formed with rounded leading edges and tapered trailing edges and have smooth contours for hydraulic efficiency. Blades shall be chamfered both sides at the root for full penetration welding to the hub. The periphery of the blades shall be machined for a close running fit with the impeller casing. After manufacturing, the complete impeller shall be statically balanced.
- C. The entire weight of the rotating element of the pump and the hydraulic thrust imposed by the impeller and any radial load created by a belt drive shall be carried by the thrust bearing located in the bearing housing at the top of the pump hood. The bearing housing shall be packed with grease and the bearing shall have a life of not less than 20,000 B10 hours. The thrust bearing housing shall be sealed top and bottom and the bearing readily removable in the field.
- D. Pump discharge column and discharge elbow shall be manufactured from ASTM A242 “COR-TEN” steel. The elbow shall be long radius type with centerline radius not less than 1 times the nominal pipe diameter. Discharge flanges shall be ASTM A242 “COR-TEN” steel and shall safely withstand all operating heads without distortion or leakage.
- E. The pump shaft shall be of sufficient diameter to transmit full load torque and to prevent vibration according to the applicable ASME code for transmission shafting. The shaft shall be manufactured from pump shaft quality (PSQ) cold rolled AISI 1045 steel. At areas in contact with seals or bearings, the shaft shall have hardened nickel-chrome-boron shaft sleeves with a 6-8 RMS finish and a Rockwell "C" hardness.
- F. A line shaft enclosing tube shall be provided between the discharge bowl and the pump thrust bearing housing. The tube shall be ASTM A53 Schedule 80 pipe and sealed at both ends with lip seals to prevent leakage of lubricant and entrance of water or foreign material.
- G. Bronze bearings shall be provided in the shaft enclosing tube. Bearings shall be of the threaded coupling type. Bearings shall be oiled from the top of the tube by means of a one gallon steel oil reservoir which will keep the tube constantly filled, thereby continually covering the contact surfaces of the bearings.
- H. The pump mounting pad shall be manufactured from ASTM A36 steel. It shall be of adequate thickness and strength to prevent excessive vibration and deflection. It shall have mounting holes for anchorage of the complete pump assembly.

- I. Pump and pipe welding shall be continuous and full penetration inside and out. All flanges shall be welded inside and out. All slag shall be removed and undercutting shall not exceed 15% of the material thickness.
- J. The pump and pump parts shall be cleaned by sandblasting according to method SSPC-SP10 "Bare White Metal" before applying two coats of 4-8 mils DFT each Sherwin Williams Dura-Plate 235 or approved equal.
- K. All machine bolts, nuts, and cap screws shall be 304 stainless steel of the hex nut head type. Hardware or parts requiring special tools or wrenches shall not be used.

2.04 PUMP DRIVE MOTOR AND EQUIPMENT

- A. The pump shall be driven by means of a squirrel cage induction motor suitable for driving the pump continuously over the entire pumping range without overload or without operating in the service factor. Motor horsepower shall be as specified in Table 11261-A. The motor shall be furnished with thrust bearings having ample capacity to carry the full weight of all rotating parts and hydraulic forces developed by continuous pump operation. The pump drive motor manufacturer shall be Lincoln Electric or approved equal.
- B. The pump electric motor shall be furnished by the pump manufacturer. The pump electric motor and belt and pulley shall be assembled and mounted by the pump manufacturer. The electric motor shall be rated 75 HP at 1800 rpm with a 1.15 service factor with motor space heater and internal t-stat. The pump electric motor shall be rated 460 volts, 3-phase, 60 hertz. The pump electric motor shall have Totally Enclosed Fan Cooled (TEFC) hostile duty enclosures with stainless steel nameplates.
- C. The pump manufacturer shall provide the necessary belts and pulleys for the pump drive. A belt guard shall be included.
- D. The electric motor mount shall be of the heavy duty adjustable type. It shall be designed to support the weight of the electric motor plus any loads imposed upon it by the belt drive, with an additional safety factor for medium shock loads. It shall be suitable for use in any orientation from vertical to horizontal.

The electric motor mount shall be factory mounted directly to the hood of the water pump. It shall be capable of varying the center distance of the electric motor in relation to the water pump by a minimum of four (4) inches for installation and take up of the drive belts. It shall utilize hinge type design with two (2) hardened steel pusher bolts to adjust the center distance, allow precision parallel alignment of the pump and motor centerlines and fine tune the tension of the drive belts.
- E. Belt drives shall be designed using 3VX, 5VX, 5V or 8V belt cross sections. The small sheave outside diameter shall not be less than the NEMA standard for general purpose electric motors. Sheaves shall be locked securely to shafts by "QD" type bushings and pump thrust load shall in no way be transmitted through the bushing or sheave to the

thrust bearing. Belts and pulleys shall be protected by a fiberglass or sheet metal guard. Guards for electric motor driven pumps shall be mounted to the pump hood by three structural steel brackets.

2.05 DISCHARGE PIPING

- A. Discharge Flap Gate: The pump manufacturer shall supply a discharge flap gate for each pump discharge piping system (total of two (2)). The flap gate shall be manufactured from ASTM A242 “COR-TEN” or ASTM A36 and ASTM A53 steel. Flap Gates shall have an inside diameter of 30” and a flange to match the pipe flange. Flap Gates for the discharge shall be as manufactured by the pump manufacturer (MWI/Couch) or Engineer approved equal. The gate hinges shall be enclosed in Schedule 80 steel pipe, complete with iolite bushings and a grease fitting. The vent pipe shall be Schedule 80 steel pipe, threaded one end for connection to the threaded opening welded to the top of the assembly. All gate seats shall be machined.
- B. Discharge Piping: Flanged discharge piping and fittings as shown on the Drawings shall be supplied by the pump manufacturer. Pump discharge piping and fittings shall be manufactured from ASTM A242 “COR-TEN” steel. Flanges shall safely withstand all operating heads without distortion or leakage. The pump manufacturer shall supply two (2) loose 30” flanges with hardware to be field welded to the discharge pipe, for each pump (total of four (4)). One flange will connect to the pump elbow and the other flange will connect to the flap gate. Anti-seepage rings shall be welded to the discharge piping at the locations shown on the Drawings, two per pump discharge piping system (total of four (4)). Field welded joints shall be cleaned and coated in the field as specified below.
- C. All steel piping, fittings, and valves shall be cleaned by sandblasting according to method SSPC-SP10 “Bare White Metal” before applying two coats of 4-8 mils DFT each of Sherwin Williams Dura-Plate 235 or approved equal.

2.06 FACTORY TESTS

- A. Prior to shipment, pumps shall be full size factory tested in an open sump at the manufacturer’s place of business by a registered Professional Engineer. Each pump bowl assembly shall have a non-witnessed factory test with a Standard Performance Test as described in Hydraulic Institute Test Standards, Rotodynamic Pumps for Hydraulic Performance Acceptance Tests – 14.6 and all test data submitted for approval by the Engineer prior to shipment. Certified copies of the calculated pump performance curves from the Standard Performance Test shall be submitted including anticipated head, capacity, bowl efficiency, total brake horsepower. Typical NPSHR and required submergence values typical for this pump shall be provided and certified by the pump manufacturer.

- B. Each pump shall guarantee and meet all conditions to achieve an Acceptance Grade of “1U” as outlined in Table 14.6.3.4 of the Hydraulic Institute Test Standards, Rotodynamic Pumps for Hydraulic Performance Acceptance Tests – 14.6.
- C. Pump and motor test results as specified in Section 01300 shall be submitted for approval by the Engineer prior to shipment.

2.07 SURFACE PREPARATION AND SHOP PRIME PAINTING

- A. Each piece of equipment in the pumping system including pump, support system and motor shall be prepared and shop-primed as specified per Manufacturer’s recommendations. The shop primer shall be compatible with the finish paint.
- B. Each pump and associated equipment shall be shop-primed and any manufacturer’s standard practice finished-coating shall be applied prior to shipment. Color shall be selected by the Engineer and an adequate supply of touch-up paint shall be supplied by the manufacturer.
- C. All interior and exterior wetted surfaces of pump columns and discharge elbows and the exterior of the bowl assemblies shall be cleaned of all rust and mill scale.
- D. All column pipe shall be supplied with a protective coating both inside and outside. Surface preparation shall conform to the coating manufacturer's recommendations.
- E. Discharge head shall be supplied with a protective coating both inside and outside. Surface preparation shall conform to the coating manufacturer's recommendations.

2.08 CONTROL PANEL

- A. General: One (1) UL approved control panel shall be supplied for the pump station; containing all the electrical and mechanical equipment necessary to provide for the operation of designated number of electric pumps and motor operated gates. The panel shall be wall-mounted type and provide remote monitoring and control from a SCADA telemetry system.
- B. Operation Requirements:
 - 1. The control panel shall consist of all of the power distribution and control components as indicated on the plans and shall include a main circuit breaker and a motor circuit protector and solid state reduced voltage motor starter for each pump motor, and 15-ampere, 120-volt circuit breakers as required. Motor space heater power and control.
 - 2. Construction and Materials: The control panel shall be NEMA 3R 316 stainless steel dead front construction with welded double locking hasps and dead front aluminum inner door, and oriented as shown on the Drawings. The control panel shall include thirty percent (30%) extra mounting space for additional equipment.

The enclosure shall allow a minimum 8 inches (8") of clear space above the main circuit breakers and 10 inches (10") below the motor starters for making wire terminations. The control panel enclosure shall have a minimum 6 inches (6") of clear space along each side with bracing to allow strapping of the incoming power feeder from the electric service.

3. Panel Exterior:

- a. Panel shall have stainless steel heavy-duty key locking door handle and three-point latch.
- b. All exterior mounted accessories shall be constructed of corrosion proof materials such as stainless steel or aluminum.

4. Panel Inner Door:

- a. The inner aluminum door mounted on a continuous hinge, two pivot handles shall be furnished for protection against exposed wiring and shall have cutouts for access to all of the circuit breakers. The inner door shall include a restraining mechanism to fix the inner door in the open position. Mounted on the inner door will be pump run, ready and fault pilot lights, hand-off automatic switches, elapsed time meters and SSRV starter monitoring panels for each pump; gate open and close pilot lights and open-close-auto switches for each motor operated gate; a 20-ampere ground fault duplex receptacle, duplex receptacle breaker, pump control breakers, and power meter.
- b. A permanently affixed 11 inch by 17 inch (minimum), laminated panel wiring schematic and pump data sheet shall be installed on the interior of the enclosure door. In addition, there shall be permanently affixed to the interior side of the exterior enclosure door both a nameplate and a 10" x 12" pocket for log sheet storage. The nameplate shall contain the voltage, phase, rated horsepower, speed, date of manufacture, pump and panel manufacturer's name, address, and telephone number, pump data, including impeller data, operating point and head, KW input, amps at the operating point and at least two (2) other points on the pump curve.

5. Panel Components:

- a. Main and Branch Circuit Breakers: All circuit breakers shall be heavy-duty industrial service molded case breakers with amperage rating as required. All circuit breakers shall have an appropriate locking device to meet OSHA lockout and tag-out rules. Circuit breakers shall be thermo-magnetic as manufactured by Square D.
- b. The control relays shall be enclosed, eight-pin and/or eleven-pin plug-in type. The control relays shall contain test button and neon or LED

- energized indicator. The plug base shall be keyed to allow for proper pin alignment. Control relay sockets shall be octal-style with clamp on screw terminals. These sockets shall be mounted on DIN railing and 600 VAC rating. All relay sockets shall be keyed to allow for proper pin alignment. Relays shall be Eaton D3PF3 Series, or equal.
- c. Duplex Service Receptacle: A duplex service receptacle supplying 20 amps at 115 volts shall be provided on the panel door. The duplex receptacle shall be provided with ground fault protection.
 - d. Elapsed Time Meters: Elapsed time meters shall be 115-volt non-reset types and shall indicate pump running time in hours and tenths of hours to 99999.9 hours.
6. Motor Starters:
- a. A solid state reduced voltage, NEMA rated, motor starter as manufactured by Square-D (Altistart Model 48), shall be furnished for each pump motor. All motor starters shall be equipped to provide under-voltage release and individual overload protection on all three phases. Motor starter monitoring panels with fault reset push-buttons shall be located on the exterior of the inner compartment door.
 - b. Each pump motor shall be protected by a 3-pole motor circuit protector. The motor circuit protector shall be operated by a toggle-type handle and contain a quick-make, quick-break, over center switching mechanism mechanically trip-free from the handle so contacts cannot be held closed against a short circuit and abnormal currents causing the motor circuit protector to trip. Tripping shall be clearly indicated by the handle automatically assuming a position midway between the normal "ON" and "OFF" positions. All latch surfaces shall be ground and polished. All poles shall be constructed to open, close, and trip simultaneously. The motor circuit protector shall be completely enclosed in a high-strength glass polyester molded case. Ampere ratings shall be clear and visible. Contacts shall be non-welding silver alloy. A manual push to trip button shall be provided for manual exercising of the trip mechanism. Each pole of these motor circuit protectors shall provide instantaneous short circuit protection by means of an adjustable magnetic-only element.
7. Phase Monitor: A 3-phase monitor shall be installed and wired to disconnect control power from the motor starters in the event of loss of power, phase reversal, loss of any phase or phase balance, or low voltage. The phase monitor shall automatically reset upon removal of any and all of the preceding conditions.
8. Pilot devices: Pilot devices shall be 30mm heavy duty as manufacturer by Allen-Bradley, or equal.

9. Indicator Lights: Indicator lamps shall be 30mm, as manufactured by Allen-Bradley, or equal. Lamp modules shall use LED lamps and be equipped to operate at 120-volt input. Lamps shall be easily replaceable from the front of the control compartment door without removing lamp module from its mounted position.
10. Power Meter: The panel shall include CTs and power monitor per Square-D PM800 series. The panel shall monitor each leg of the incoming power.
11. Current Transducers: The panel shall include CTs and current transducers for each pump. Current transducers shall be Ohio Semitronics CTRS series. The panel shall monitor one leg of each pump motor feeder.
12. Identification Markers:
 - a. All circuit breakers, control switches, indicator lights, relays, and other control devices shall be identified with permanently affixed legend plates and lamicoïd-type engraved nameplates where applicable. A black and red on white label stating "DANGER<HIGH VOLTAGE<240 or 480 (use applicable) VOLTS" shall be affixed to the face of the inner door unit.
 - b. Install nameplates using stainless steel drive pins or machine screws. Dymo type labels and labels fastened with adhesive only will not be accepted.
 - c. Install conductor identification markers on conductors at terminations and in junction and pull boxes through which the conductors pass. Color code power conductors by insulation or tape and identifies by markers in junction and pull boxes to indicate the conductor's panel and circuit number. Identify control conductors by markers at all locations.
 - d. Identification markers that are not preprinted, such as panelboard indexes, terminal block marking strips, and special cable markers, shall be typewritten or otherwise mechanically printed, not hand lettered.
13. Spare Parts:
 - a. The manufacturer shall furnish the following parts for each panel supplied:
 - i. Phase Monitor
 - ii. Fuses (10 of each size and type used)
 - iii. Pilot light lamps (10 of each size and type used)
14. SCADA Telemetry Interface:
 - a. Pump Run Status (Each pump)
 - b. Pump Ready Status (Each pump)
 - c. Pump Fault (Each pump)
 - d. Pump Remote Command (Each Pump)
 - e. Incoming Amps

- f. Pump 1 Amps
- g. Pump 2 Amps
- h. Gate Open Status (Each Gate)
- i. Gate Closed Status (Each Gate)
- j. Gate Remote Command (Each Gate)

PART 3 - EXECUTION

3.01 PREPARATION

- A. Coordinate with other trades, equipment and systems to the fullest extent possible.
- B. Take all necessary measurements in the field to determine the exact dimensions for all work and the required sizes of all equipment under this Contract. All pertinent data and dimensions shall be verified.

3.02 INSTALLATION

- A. Installation shall be in strict accordance with the manufacturer's instructions and recommendations in the locations shown on the pump drawings. Anchor bolts shall be set in accordance with the pump manufacturer's recommendations and setting plans.
- B. The Contractor shall supply the services of a qualified pump installer to supervise the pump installation and testing to the satisfaction of the Engineer. Should the Contractor fail to have a qualified engineer and/or service person on the job during the installation, the Engineer may direct the Contractor to provide the services of a factory representative to check over the installation.
- C. Qualified supervisory services, including manufacturers' engineering representatives, shall be provided for a minimum of two (2) days to ensure that the work is done in a manner fully approved by the respective equipment manufacturer. The pump manufacturer's representative shall specifically supervise the installation and alignment of the pump with the driver, the grouting, the alignment of the connecting piping, and the installation of the field installed packing. If there are difficulties in the start-up or operation of the equipment due to the manufacturer's design or fabrication, additional service shall be provided at no additional cost to the District. Services of the manufacturer's representatives and training shall be provided when the first pump is started, with follow-up visits upon start-up of each subsequent pump.
- D. Connection of piping to pumps shall be done in the presence of the District or Engineer. All piping connections to the pump shall be done without bending and/or twisting the piping to mate with the pump flange connections.
- E. A certificate from the equipment manufacturer shall be submitted stating that the installation of their equipment is satisfactory, that the equipment is ready for operation,

and that the District's operating personnel have been suitably instructed in the operation, lubrication and care of each unit.

3.03 FIELD TESTS

- A. In the presence of the District or Engineer, the Contractor shall conduct such tests as necessary to indicate that the pumps and motors conform to the efficiencies and operating conditions specified. A 7-day operating period of the pumps will be required before acceptance. If pump performance does not meet the specified requirements, corrective measures shall be taken or the pump shall be removed and replaced with a pump which satisfies the conditions specified. All test procedures shall be in accordance with factory test procedures specified above and HI standards for testing for these pump types. Manufacturer certified results of tests shall be submitted to the District and Engineer. Provide, calibrate and install all temporary gauges and meters, make necessary tapped holes in the pipes, and install all temporary piping and wiring required for the field acceptance tests. Written test procedures shall be submitted to the Engineer for approval a minimum of 30 days prior to testing.
- B. After installation and as soon as conditions permit full speed operation, and in the presence of the District or Engineer, the Contractor shall retain the services of a qualified independent mechanical testing firm or the pump manufacturer to perform a detailed vibration signature analysis of each unit, including both "Bump Tests" and X-Y vibration profiles, to (a) prove compliance with the specified vibration limitations and (b) prove there are no field installed resonant conditions due to misalignment, the foundation, or the connecting piping and its supports, when operating at any speed within the specified operating range. A written report shall be submitted including a sketch of the unit indicating on where and in which direction the vibration readings were taken and recorded showing (a) peak-to-peak displacement, in mils, (b) frequency and (c) peak velocity level, in inches per second. The report shall contain a complete analysis of their findings, describing any problems encountered, if any, probable cause and specific recommendations for any required corrective action.
- C. If required, take corrective action and have the units retested to ensure full compliance with the specified requirements. All costs associated with the field tests or any required corrective action shall be borne by the Contractor.

TABLE 11261-A Canal Transfer Pump Design Criteria

Criteria	
Tag	CTP-1 and CPT-2
Quantity of Pumps	2
Pump Type	Angled Line Shaft, Axial Flow Impeller
Liquid	Surface Water
Motor Rating (HP)	75
Design Point Capacity (cfs/gpm)	25 cfs (11,220 gpm)
Design Point Total Dynamic Head (TDH) (ft)	10.5 ft
Secondary Design Point Capacity (cfs)	32 cfs (14,400 gpm)
Secondary Design Point TDH (ft)	4.0 ft
Maximum Design TDH (ft)	15 ft
Minimum bowl efficiency at Design Points (%)	78% (Design); 45% (Secondary)
Maximum Design Point NPSH _R (ft)	25.5
Nominal Pump Speed (rpm)	785
Manufacturer/Model	MWI NW320x30
Impeller Diameter (in)	20
Pump Discharge Diameter (in)	30

END OF SECTION

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SECTION 16000 ELECTRICAL WORK

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. In general, the work specified in this division of the specifications includes the furnishing of all labor, material, auxiliaries, and services necessary to install complete and properly operating electrical systems, including all fees, charges, and permits necessary.
- B. The Contractor shall furnish and install all wire, cables, conduits, wiring, wiring devices, lighting fixtures, motor controllers, safety switches, relays, control equipment, and all other apparatus and accessories indicated, specified, or required for complete lighting, power, control and instrumentation systems for the project facilities.
- C. The Contractor shall refer to every section of these specifications for installation and coordination requirements applicable to the work specified in this division. The Contractor shall furnish and install all wiring and connections to all electrical equipment furnished under other sections of these specifications, except where specified or indicated otherwise.
- D. The Contractor shall coordinate all electrical work with other project construction trades, installation requirements, sequence of construction schedule, etc., including coordination and installation of required conduit sleeves and supporting devices.
- E. The Contractor shall be required to coordinate all electrical system connections with each appropriate utility company and shall furnish and install all equipment or material necessary to provide complete electrical services in accordance with all utility company requirements.
 - 1. It is the Contractor's responsibility to contact the power company during bidding and within 10 days of notice to proceed. Contact Derek Carr at Derek.Carr@duke-energy.com or 407-359-4824 for service location and details.
- F. Unless otherwise indicated, the basic materials and methods included in this section of the specifications shall be applicable throughout the project.

1.02 GENERAL REQUIREMENTS

- A. Design drawings are diagrammatic and intended to show approximate installation and equipment locations. All dimensions shall be verified in the field and coordinated with shop drawings issued. Equipment schedules are intended to serve as a guide only and

do not relieve the Contractor of the responsibility for the complete furnishing and installation of all wiring, cable, conduits, or additional apparatus required.

- B. The Contractor shall furnish, install, maintain, and remove upon completion of the project, all temporary service required for construction and testing. The service shall be for general power and lighting and shall include distribution system, panelboards, grounding, branch circuits, general lighting, and receptacles as required.
- C. The Contractor shall furnish and install reinforced concrete pads, for electrical equipment, of size as shown on the drawings or required. Unless noted otherwise pads for outdoor equipment shall be minimum 12 inches thick and exceed the equipment dimensions by 42” on sides equipped with door access and 12 inches on all remaining sides.
- D. The Contractor shall furnish a covered, weather-protected facility, providing a clean, dry, non-corrosive environment for storage of all electrical and instrumentation equipment incorporated into this project in accordance with the provisions of the General Conditions.
- E. The Contractor shall furnish and install a system of engraved, laminated nameplates (black lettering on a white background), designed to identify each major piece of equipment.
- F. Motors will be furnished with the equipment they drive unless indicated otherwise. Motors shall be premium efficiency design. Motors located outdoors or within corrosive environments shall be severe duty construction.
- G. All electrical apparatus and lighting equipment shall be in compliance with the Florida Building Code Fifth Edition (2014) Energy Conservation, and the Federal Energy Policy Act of 2005, including all subsequent updates, revisions, and replacements.

1.03 SUBMITTALS

- A. For each individual section of this division, there shall be submitted for approval a single, complete shop drawing submission. All elementary and schematic diagrams shall be provided with indication of system coordination and complete description of sequence of operation. Deviations from the contract documents shall be clearly identified. One copy of each shop drawing submittal shall be provided in PDF format.
- B. Complete operation and maintenance instruction manuals, including system schematics which reflect "as-built" modifications, shall be provided. All wire terminations shall be numbered and identified on as-built drawings included as part of the operations and maintenance manuals. All drawings included within the operation and maintenance manuals shall be reduced to a maximum dimension of 17 inches x 11 inches and shall be legible and reproducible. Special maintenance requirements particular to the system

shall be clearly defined along with special calibration and test procedures. One copy of each operation and maintenance manual submittal shall be provided in PDF format.

- C. Following approval of the operation and maintenance instruction manual submittals, an electronic copy of all as-built electrical apparatus drawings, schematic diagrams, control wiring diagrams, instrumentation drawings, etc. shall be provided. A drawing index, identifying each electronic drawing file name and a description of the contents, shall be included within the operation and maintenance instruction manuals.
 - 1. Unless otherwise approved prior to submittal, all electronic drawings shall be provided on compact disk in both PDF and AutoCAD 2017 format.
- D. One complete set of design drawings shall be neatly marked daily as a record of job progression and "as-built" installation. The drawings shall reflect the actual installed locations of all equipment and indicate the exact routing and elevations of all concealed conduits. Upon completion of the project, the drawings shall be coordinated with the as-built drawings and submitted to the Engineer. One copy of the final as-built drawings shall be provided in PDF format.
- E. The Contractor shall maintain a record of all construction documentation including construction survey data, inspection reports, test reports, startup logs, etc. Upon completion of the project, copies of all construction documentation shall be submitted to the engineer. One copy of the final construction documentation shall be provided in PDF format.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All material shall be new and shall conform with the standards of the Underwriter's Laboratories, Inc., American National Standards Institute, National Electrical Manufacturers' Association, Insulated Power Cable Engineers Association, and Institute of Electrical and Electronic Engineers in every case where such a standard has been established for the particular type of materials in question.
- B. The use of a manufacturer's trade name and catalog number is not intended to indicate preference but only the type and quality of the product desired. Products of reputable manufacturers of equal quality and functional type will be acceptable. Substitutes which tend to lower the quality of the work will not be permitted.
- C. Acceptance of alternate equipment does not relieve the Contractor of the responsibility of compliance with the performance and accuracy requirements of these specifications. Where such substitutions alter the design or space requirements indicated on the Contract Drawings, detailed drawings shall be prepared and submitted by the Contractor delineating any changes in or additions to the work shown on the Contract

Drawings, and such drawings and changes or additions to the work shall be made by the Contractor at no additional expense to the Owner. In all cases, the burden of proof that the material or equipment offered for substitution is equal in construction, efficiency, and service to that named on the Contract Drawings and in these Contract Documents shall rest on the Contractor and, unless the proof is satisfactory to the Engineer, the substitution will not be approved.

- D. Wherever possible, equipment items having the same or similar rated capacity or function shall be identical.
- E. All equipment and apparatus shall be the manufacturer's latest proven design, neither presently scheduled for obsolescence nor developmental prototype.

2.02 RACEWAYS

- A. **Metallic Conduit (Aluminum):** All conduit shall be heavy wall rigid aluminum of standard pipe weight unless noted otherwise.
 - 1. Couplings, conduit unions, conduit fittings, etc., shall be aluminum, shall have conventional trade dimensions, and shall be internally threaded with a tapered thread at each end to fit the tapered thread specified for the corresponding size conduit. Conduit outlet body covers shall be cast construction.
 - 2. All conduits, couplings, and fittings run exposed to corrosive atmospheres, and all conduit elbows and risers within concrete encasement shall have a gray or black factory-applied PVC coating of not less than 20 mils thickness. Damaged PVC coatings shall be repaired with an approved compound. Conduit supports, channels, and mounting apparatus shall be type 316 stainless steel.
- B. **Flexible Conduit:** All flexible conduit shall be Type LTA liquid-tight flexible aluminum conduit made with flexible aluminum core covered with an extruded PVC jacket, unless noted otherwise. Fittings shall be the type specifically designed for flexible conduit use and shall form watertight connections. Flexible conduit fittings shall be aluminum construction.
 - 1. Flexible conduit shall only be used for connections from conduits, junction boxes, or motor controllers to mechanical equipment or where the location of the connection is such that it is impractical to make a rigid conduit connection, where vibration isolation is required, or where specifically called for on the drawings. Flexible conduit shall be used for connection to all motors.
- C. **Non-Metallic Conduit:** Non-metallic conduit, couplings, and fittings shall be Schedule 40 PVC unless noted otherwise. All PVC conduit joints shall be solvent-welded in accordance with the manufacturer's recommendations.

1. Underground conduits and conduit embedded within slabs on grade shall be non-metallic; however, conversion shall be made to rigid metallic conduit before conduit runs exit encasement. Conversion elbows, fittings and risers within the concrete encasement shall be PVC coated rigid aluminum conduit.
2. Underground conduits shall be installed not less than 24 inches below grade.
3. Underground pull boxes shall be provided for all miscellaneous underground conduit runs over 200 feet long.
4. A minimum 3-inch wide polyethylene warning tape, yellow for electrical and orange for telephone, with imprinted legend, shall be installed in the backfill above all underground conduits. Warning Tape shall be Allen Terra Tape, or equal and shall be guaranteed not to discolor. Unless indicated otherwise, the tape shall be 12 inches below the finished ground grade.

2.03 WIRES AND CABLE

- A. Low Voltage Cable: Low voltage wire and cable shall be 600 volt, single-conductor copper, rated 90 degrees C dry and 75 degrees C wet. Unless indicated otherwise, low voltage building wire shall have XHHW-2 insulation.
- B. Instrumentation Cable: Instrumentation cable shall be single twisted pair or triad as indicated.
 1. Twisted shielded pair cable shall be stranded, tinned copper conductors with cross-linked polyethylene primary insulation, overall foil shield with tinned copper braid, and chlorinated polyethylene jacket, 600V; Belden 3072F.
 2. Twisted shielded triad cable shall be stranded, tinned copper conductors with cross-linked polyethylene primary insulation, overall foil shield and chlorinated PVC jacket, 300V; Belden 8770.

2.04 TERMINAL BLOCKS AND WIRE MARKING

- A. Terminal blocks for power conductors shall be 600 volt, three pole unit construction type with high pressure solderless connectors, headless socket screws, and ampere rating equal to or greater than the ampacity of the maximum conductor size to be terminated; Square D Type LBC, or equal.
- B. Terminal blocks for control and instrumentation conductors shall be 600 volt, sectional rail mounted terminal blocks with plastic pre-printed terminal numbering markers on both the inside and outside tracks, and provisions for center terminal bridge jumper cross connections with no loss of space on terminal or rail; Siemens 8WA1 011-1DF11, or equal. Terminal blocks for general control connections shall be feed-through terminal blocks; terminal blocks for instrumentation signal circuits shall be knife type

test/disconnect terminal blocks; and terminal blocks for cable shield termination and grounding shall be ground blocks.

- C. Cable and conductor markers shall be heat shrinkable sleeve markers with permanent legible machine printed markings.

2.05 BOXES

- A. General: Boxes shall be installed at all locations necessary to facilitate proper installation and equipment connection, including each conduit/cable transition.

1. Minimum dimensions of boxes shall not be less than NEC requirements and shall be increased if necessary, for practical reasons or where required to suit job condition.
2. Boxes shall have only the holes necessary to accommodate the conduits at point of installation. All boxes shall have lugs or ears to secure covers.
3. All boxes shall be rigidly secured in position. All boxes, except on unfinished ceilings and walls, and where conduit is run exposed, shall be so set that the front edge of box shall be flush with or recessed not more than 1/4-inch behind the finished wall or ceiling line.

- B. Outlet Boxes: The location of outlets as shown on the drawings will be considered as approximate only. It shall be the work of this section to study all plans with relation to spaces surrounding each outlet in order that the work may fit and that when fixtures or other fittings are installed, they shall be symmetrically located to best suit each condition. All outlets shall be coordinated with the work of other sections of these specifications to prevent outlets or fixtures from being covered by pipe, duct, etc.

1. Outlet boxes shall be cast aluminum one piece hub type standard gang boxes with rubber gaskets. Wiring device boxes shall be equipped with cast screw-type covers; Crouse-Hinds Series FS or equal.

- C. Pull Boxes: Pull boxes, including junction boxes and terminal boxes, shall be installed at all necessary points, whether indicated or not, to prevent injury to the insulation or other damage that might result from pulling resistance or other reasons during installation. Unless indicated otherwise, pull boxes shall be NEMA 4X aluminum or 316 stainless.

- D. Underground Pull Boxes: Underground pull boxes shall be minimum 30-inch x 17-inch x 18-inch deep composolite service boxes constructed of reinforced polymer concrete suitable for traffic loading, with locking cover and molded logo; Quazite Composolite, or equal.

2.06 WIRING DEVICES

- A. Wall Switches: Wall switches shall be specification grade, totally-enclosed, toggle switches rated 20 ampere, 120/277 volt. Switches shall be single pole, double-pole, 3-way, or 4-way as indicated; GE-5951 through 5954, Hubbell 1221 through 1224, Leviton 1221 through 1224, or equal. Wall installed outdoors or in corrosive atmospheres shall be weatherproof and vapor-tight. Weatherproof and vapor-tight switches shall consist of standard wall switches as previously specified, enclosed in Series FS condulets equipped with vapor-tight gasketed covers; Appleton Series FSK-1VTS-A, or equal.
- B. Receptacles: Receptacles shall be specification grade, grounding type, totally-enclosed, duplex receptacles rated 20 ampere, 125 volt; GE 8300-9, Hubbell 5362-GRY, Leviton 5362-GY, or equal.
 - 1. Receptacles installed outdoors or in corrosive atmospheres shall be weatherproof. Weatherproof receptacles shall each consist of standard duplex receptacles as previously specified, enclosed in Series FS conduit equipped with a weatherproof cover; Crouse-Hinds WLRD or equal. Outdoor receptacle covers shall be aluminum in-use covers; Crouse-Hinds WIUMV, or equal. Outdoor receptacles installed on circuits without ground fault protection shall be type GFCI.

2.07 MOTOR STARTERS

- A. Manual Motor Starters: Manual motor starters shall be 600 volt, toggle-type suitable for installation within standard outlet boxes. Enclosures for all starters not installed in outlet boxes, and all starters located outdoors, or in corrosive atmospheres, shall be NEMA 4X aluminum or type 316 stainless steel.
- B. Magnetic Motor Starters: Unless indicated or required otherwise, each motor starter shall be of the combination type complete with molded case motor circuit protector; full-voltage magnetic starter; manual resetting, 3-pole, bimetallic thermal overload relay; individual 120 volt control power transformer; enclosure door-mounted pilot control devices; and all required accessory control components.
 - 1. Motor starter enclosures located outdoors, or in corrosive atmospheres, shall be NEMA 4X type 316 stainless steel.
 - 2. Unless indicated otherwise, motor starters for all motors 25 hp and above shall be of the solid state reduced voltage type.

2.08 DISCONNECT SWITCHES

- A. Disconnect switches shall be 600 volt rated heavy-duty safety switches with full cover interlocks and quick-make, quick-break mechanisms. Switches shall be fused or non-fused, of capacities noted; Square-D Type HD or equal.

1. Disconnect switches located outdoors, or in corrosive atmospheres, shall have NEMA 4X type 316 stainless steel enclosures.
2. Unless indicated otherwise, fuses shall be Mersen type TRS-R Class RK5 current limiting time-delay fuses.

2.09 CIRCUIT BREAKERS

- A. Circuit breakers shall be 600 volt thermal magnetic, quick-make, quick-break molded case air circuit breakers, with trip-free operation, incorporating an internal trip bar and a single external handle. Circuit breaker ratings shall be coordinated with the installed service and loads supplied. Unless indicated otherwise, circuit breakers shall be rated not less than 25,000 amperes RMS symmetrical.
 1. Enclosed circuit breakers located outdoors, or in corrosive atmospheres, shall have NEMA 4X type 316 stainless steel enclosures.
 2. Circuit breakers used as a service disconnecting device shall be 100% rated and UL service entrance rated; shall be equipped with long time, short-time, instantaneous and ground fault adjustments for system selectivity; and shall be fully rated for the maximum fault current, without the use of current limiters.

2.10 SUPPORT SYSTEMS

- A. Groups of two or more conduits, and all boxes and equipment, shall be mounted on a system of minimum 1-5/8-inch x 1-5/8-inch heavy wall aluminum or 316 stainless steel channel with a minimum of 25% unused capacity.
- B. Support system hardware shall be aluminum or stainless steel.

2.11 CONTROL DEVICES

- A. Control Stations - Control stations shall be 30 mm, heavy-duty, corrosion resistant, water-tight and oil-tight, complete with NEMA 13 cast aluminum enclosures: Eaton Type E34, Square-D Type SK, or equal.
 1. Safety lockout stations (SAFE-OFF) shall be equipped with 316 stainless steel padlock devices for padlocking in the de-energized position: Eaton 10250A63, Square-D Type K5, or equal.
 2. Control stations installed outdoors, or in corrosive atmospheres, shall have watertight, NEMA 4X cast aluminum enclosures.

2.12 CONTROL COMPONENTS

- A. General - Where indicated on the drawings, or required by the functions specified, control components shall be furnished and installed with-in control panels, motor control center, or other approved locations. Suitable nameplates shall be provided for all panel door or surface-mounted control devices. All component terminals, including auxiliary contacts, shall be wired to master terminal boards.

- B. Instruments - Instruments shall be of standard size not less than 5-1/2" in width and they shall present a uniform appearance when mounted upon the panels. Instruments shall have scales 5" in length and shall be accurate within 1% of full scale. Instrument scales shall be selected with full-load readings at 75% of the scale range, unless specified otherwise or approved.

- C. Pilot Devices: Selector switches, pushbuttons, indicating pilot lights, and additional pilot devices as required, shall be 600 volt rated heavy-duty, oil-tight, 30mm pilot devices as manufactured by General Electric, Cutler-Hammer, or equal.
 - 1. Pushbuttons shall be standard type with anodized aluminum rings and colored buttons.
 - 2. Selector switches shall be standard handle type with anodized aluminum rings and handles.
 - 3. Pilot lights shall be full brightness LED type.
 - 4. All pilot devices shall have appropriate nameplates and locking means for locking in the de-energized mode, and shall be color coded (red - start, on, open, up; green - stop, off, close, down; black - test, silence, miscellaneous).

- D. Running Time Meters - Hour meters shall be non-reset type with register to indicate hours and tenths of hours up to 99,999.9 hours. Each meter shall be a 2-1/2" round panel mounting type, suitable for operation on 120 volt control circuits; Engler Model 10NG1 or equal.

- E. Control Relays - Where required for control system operation, control relays shall be 3P3T, 11 pin octal type, with 10 amp contacts, internal LED, test button, and large ice cube style case; Cutler-Hammer D3PF3AA, D3PF3AT1, or equal.
 - 1. Time delay relays shall be potentiometer adjustable time setting, 1.0% repeatability, 2PDT plug-in type time delay relays with, 10 amp contacts, 8-pin square sockets and hold-down springs. Delay on de-energize mode shall not require input power during the timing; Potter & Brumfield CK Series, or equal.

- F. Power Monitors: Where required for control system operation, 3 phase power monitors shall be provided. Power monitors shall be surface-mounted type consisting of a phase angle sensing circuit driving a DPDT electromechanical relay. Power monitors shall sense loss of any phase, low volt-age on any or all phases, and phase sequence reversal.

Power monitors shall be field-adjustable, provided with fault indication, and adjustable time delay (0-20 seconds); Diversified Electronics Series SLD or equal.

- G. Alarm Horns: Alarm horns shall be piezoelectric audible signal devices; Mallory Sonalert, or equal. Each alarm horn shall be equipped with an enable/disable control switch. Unless indicated otherwise, alarm horns shall be installed within the associated control equipment enclosure. Exterior alarm horns shall be weatherproof semi-flush mounted.

2.13 CONTROL PANELS:

- A. Where indicated on the drawings, specified, or required by the functions specified, control panels, including all necessary accessories, shall be provided for power distribution and control of the associated equipment. Each control panel shall be equipped with an incoming line main circuit breaker and an incoming line surge protection device (SPD). Each three phase control panel shall be equipped with a three phase power monitor.
- B. Control panel components shall be inner-panel or door-mounted, wired to terminal boards with identifying numbers. All contacts, including spare auxiliaries, shall be wired to terminal boards. All wiring shall be neatly bundled with wire ties, or in wireways, and all wiring shall be identified by color coding and numbering. Wiring shall be coded: black - primary power; red - AC control wiring; blue - DC control wiring; white - neutral; and green - ground.
- C. Unless indicated otherwise, each control panel shall be furnished with red (running) and green LED pilot lights, H-O-A selector switch, circuit breaker type combination motor starter, running time meter and control circuit equipment for each motor controlled. Motor starters for all motors 25 HP and above shall be the solid state reduced voltage type. Multiplex control panels shall be furnished with an automatic alternator and lead selector switch. Each control panel shall be equipped with an independent control power system including all required control power transformers, protective fusing, and separate control power main breaker. Control panels shall be equipped with power monitors, an exterior red flashing alarm light, alarm horn, alarm test switch, and a 120 volt convenience outlet.
- D. Control panels shall be furnished with a thermostatically controlled condensation heater and all additional accessories as indicated. Control operation shall be as specified or as required for proper operation of the equipment controlled. In general, for each associated alarm condition, control panels shall be furnished with amber pilot lights and auxiliary contacts for remote indication.
- E. Exterior panels shall be NEMA 12/3R with oil-resistant gasketing and full-sized door-in-door construction. Inner door shall have door-mounted control devices and slotted flush latch. Blank outer door shall have three-point latching handle with padlocking provisions.

- F. A compact cooling fan shall be installed inside the enclosure to provide air circulation and eliminate hot spots within the enclosure. The fan shall provide 50,000 hours of continuous operation without lubrication or service. Finger guards shall be mounted on each side of fan for safety. The enclosure shall be oversized as required to eliminate the need for an enclosure air conditioning system.
- G. Control panel enclosures shall be Type 316 stainless steel with all stainless steel hardware.

2.14 GROUNDING

- A. The project's grounding system shall consist of a grounding electrode system in accordance with NEC specifications, bonded to a main ground bus interconnecting all power distribution equipment. Ground rods shall be located at each outdoor electrical equipment pad, and as indicated or required, and shall be bonded to the main ground bus. Ground rod sections shall be coupled and driven to establish a maximum resistance to remote earth of 5 ohms throughout the grounding system.
- B. Ground rods shall be minimum 10 feet long, 5/8-inch diameter, copper-clad steel sections.
- C. Main ground bus cable shall be minimum No. 1/0, 19 strand tinned copper. Bonding jumpers shall be minimum No. 2 tinned copper.
- D. Unless noted otherwise, all grounding conductors shall be insulated and shall have green colored insulation.
- E. All grounding hardware such as clamps, connectors, couplings, lugs, bolts, nuts, and washers shall be of silicone bronze.

2.15 SURGE PROTECTION

- A. The Contractor shall furnish and install UL 1449 (latest edition) listed surge protection devices (SPD) for the protection of all AC electrical circuits from the effects of lightning-induced currents, substation switching transients, and internally-generated transients from inductive and/or capacitive load switching. Surge protection devices shall be provided for all switchgear, switchboards, motor control centers, power distribution panels, lighting panels, control panels, instrumentation panels, etc.
- B. Each SPD unit shall be marked with a short circuit current rating and shall not be installed at a point on the system where the available fault current is in excess of that rating.
- C. Complete UL 1449 performance ratings, including the fault current rating and VPR rating, shall be posted on the UL label of each SPD.

- D. Submit copies of the UL Standard 1449 Listing documentation for each proposed SPD.
- E. AC power surge protection devices (SPD), formally transient voltage surge suppressors (TVSS), shall utilize heavy duty ‘large block’ MOVs, each exceeding 30mm diameter, with redundant modules per phase. SPD equipment shall provide suppression elements between all phases and each phase conductor and the system neutral. AC power surge protection equipment shall be APT, or equal.
- F. SPD shall be UL labeled as Type 1, intended for use without need for external or supplemental overcurrent controls. Every suppression component of every mode, including N-G, shall be protected by internal overcurrent and thermal overtemperature controls. SPDs relying upon external or supplementary installed safety disconnectors do not meet the intent of this specification.
- G. SPD shall be UL labeled with 200kA Short Circuit Current Rating (SCCR). Fuse ratings shall not be considered in lieu of demonstrated withstand testing of SPD, per NEC 285.6.
- H. SPD shall be UL labeled with 20kA Inominal (I-n) for compliance to UL 96A Lightning Protection Master Label and NFPA 780.
- I. Minimum surge current capability (single pulse rated) per phase shall be:

Service Entrance Equipment:	300kA
Power Distribution Equipment:	200kA
Panelboards & Control Panels:	100kA

- J. SPD shall provide surge current paths for all modes of protection: L-N, L-G, and N-G for Wye systems; L-L, L-G in Delta and impedance grounded Wye systems.
- K. UL 1449 Listed Voltage Protection Ratings (VPRs) shall not exceed the following:

System Voltage	L-N	L-G	L-L	N-G
208Y/120	700V	700V	1200V	700V
480Y/277	1200V	1200V	1800V	1200V

Numerically lower is allowed/preferred; old-style Suppressed Voltage Ratings (SVRs) shall not be submitted, nor evaluated due to outdated less-strenuous testing)

- L. UL 1449 Listed Maximum Continuous Operating Voltage (MCOV):

System Voltage	Allowable Voltage Fluctuation (%)	MCOV
208Y/120	25%	150V
480Y/277	15%	320V

- M. SPD shall have UL 1283 EMI/RFI filtering with minimum attenuation of -50dB at 100kHz.
- N. SPD shall include visual LED diagnostics including a minimum of one green LED indicator per phase, and one red service LED. SPD shall include an audible alarm with on/off silence function and diagnostic test function (excluding branch).
- O. Warranty – Each SPD shall have a warranty period of not less than 10 years, incorporating unlimited replacements of suppressor parts if they are destroyed by transients during the warranty period.

PART 3 - EXECUTION

3.01 CODES, PERMITS, AND INSPECTIONS

- A. The installations shall be in accordance with the regulations of the latest editions of the National Electrical Code, National Electrical Safety Code, applicable city, state, and local codes and regulations and other applicable codes, including utility company codes.
- B. All permits required by state or local ordinances shall be obtained and after completion of the work, a certificate of final inspection and approval from the electrical inspector shall be furnished to the Owner. All permits for installation, inspections, connections, etc., shall be taken out and paid for as part of the work under this section.

3.02 CONDUIT INSTALLATION

- A. Unless otherwise indicated, exposed conduit shall be rigid aluminum, underground conduit and conduit encased in concrete shall be Schedule 40 PVC. Conduit transitions from underground or encased to exposed shall be PVC coated rigid aluminum, including the transition elbows and risers.
- B. All conduits shall be run in such a manner as to cause the least interference with other trades. Conduits shall be joined by means of couplings or 3-piece coupling type conduit unions. Joints shall be set up tight. Runs shall be straight and true; elbows, offsets, and bends shall be uniform and symmetrical. Installation workmanship shall be of the best quality and skill.
- C. Conduits shall be of sizes required to accommodate the number of conductors in accordance with the tables given in the current edition of National Electrical Code or as noted on the drawings. The minimum size of conduit shall be 3/4-inch.
- D. Conduit runs shall terminate below the particular section of the motor control center or equipment to which their respective circuits run. Concealed conduits shall be run in as direct a line as possible. Exposed conduits shall be run parallel to or at right angles

with the lines of the building. All bends shall be made with standard conduit ells, conduit bent to not less than the same radius, or aluminum conduit outlet bodies with gasketed cast iron covers. Adjacent conduit runs shall be installed with concentric bends. All bends shall be free from dents or flattenings. Not more than the equivalent of four quarter bends shall be used in any one run between terminals at cabinets, outlets, and junction or pull boxes. Boxes shall be located in accessible locations.

- E. Conduit shall be continuous from outlet to outlet and from outlets to cabinets, junctions, or pull boxes and shall enter and be secured to all boxes in such a manner that each system shall be electrically continuous from point of service to all outlets. Insulated grounding bushings shall be used on all metallic conduit. Terminals of all conduits shall be plugged with an approved cap to prevent the entrance of foreign materials when exposed during construction.
- F. As far as practicable, all exposed conduits shall be run without traps. Where dips are unavoidable, a pull box or approved conduit outlet body shall be placed at each low point. Conduit systems shall be completed before conductors are drawn in. Where conduits must be run exposed, except as indicated in the drawings, locations of the runs shall be subject to approval.
- G. Where exposed conduit needs clamping to the structures, clamps shall consist of aluminum 1-hole pipe straps and pipe spacers, stainless steel bolts of appropriate size to fill the holes in the straps and spacers, and approved expansion shields. Clamps used with aluminum conduit, and clamps located outdoors or in “corrosive atmospheres”, shall be PVC coated, aluminum or type 316 stainless steel. Clamps shall be bolted to the structure or where necessary to intermediate type 316 stainless steel brackets. Spacing between conduit supports shall not exceed the recommendations published by the National Electrical Code. No deformed, split, or otherwise defective conduit or fitting shall be installed. Conduit shall be installed with a minimum number of joints.
- H. Aluminum Myers hubs shall be used for all threaded conduit connections to enclosures that do not contain integral threaded conduit hubs. Conduit connections to enclosures located outdoors shall only enter the bottom of the enclosure.
- I. Where conduit has been cut in the field, it shall be cut square using a hand or power hacksaw or approved pipe cutter using cutting knives. The use of pipe cutters with cutter wheels will not be permitted. The cut ends of the field-cut conduit shall be reamed to remove burrs and sharp edges. Where threads have to be cut on conduit, the threads shall have the same effective length and shall have the same thread dimensions and taper as specified for factory-cut threads on conduit. Conduits installed in the work with threads not complying with these requirements shall be removed and replaced.
- J. Where conduit installed in concrete or masonry extends across building joints, expansion joints with approved type grounding straps and clamps shall be installed. Expansion joints shall be Type XJ as manufactured by Crouse-Hinds, Appleton, or

equal. Where conduit enters a building through the concrete foundation, below final grade, approved type FSK entrance seals shall be used.

- K. All conduit shall be cleaned, prior to pulling in wire and cable, by pulling a stiff wire brush of the size of the conduit through it. This cleaning shall remove all foreign matter, including water, from the conduit. All boxes in which the conduit terminates shall be cleaned of all concrete, mortar, or other foreign matter and all threads in boxes shall be left clean and true upon completion of the work.
- L. All spare, future, or empty conduits shall be equipped with a pull wire prior to capping.
- M. All conduits, fittings, and electrical equipment used within hazardous areas shall comply with requirements of the National Electrical Code for the type of hazardous location encountered and shall be furnished as specified for "corrosive atmospheres".
 - 1. In such hazardous locations, conduits terminating at boxes enclosing electric switching, or circuit opening equipment, shall be sealed at the entrance to the enclosure with approved, compound-filled, sealing fittings to prevent passage of explosive or combustible gases through the conduits.
 - 2. All conduits exiting from such hazardous locations or entering said locations shall be similarly sealed at point of exit or entrance.

3.03 WIRE AND CABLE INSTALLATION

- A. The installation of wires and cables includes all splicing of these wires and cables to each other and connecting them to receptacles, switches, control boxes, lighting fixtures, motors, and all other electrical apparatus installed under this Contract. All cable installation methods shall correspond to manufacturer's recommendations.
- B. Wire and cable shall be suitably protected from weather or damage during storage and handling and it shall be first-class condition when installed.
- C. The minimum size of wire or cable conductor shall be No. 12, unless indicated otherwise on the drawings. Wire sizes No. 8 and larger, and all wire sizes utilized for control or instrumentation, shall be stranded. All sizes called for in the specifications or shown on the drawings are American Wire Gauge sizes.
 - 1. No wire smaller than No. 12 shall be used for any branch circuit unless noted otherwise on the drawings. Larger sizes shall be used where required or indicated on the drawings. If the single distance from the panelboard to the first device exceeds 50 feet, the minimum size for this run shall be No. 10 AWG with the minimum between devices as No. 12 AWG.
- D. All sizes of wire and cable furnished and installed under these specifications shall be color-coded with a separate color for each phase and neutral used consistently

throughout. Each conductor shall have factory color-coded insulation. As an alternative, wire sizes No.8 and larger shall have black insulation and shall be color-coded with waterproof phasing tape at each termination, junction box, pull box, etc. All 277/480 volt wiring shall be color-coded yellow, brown, and orange for hot legs (Phase A, B, and C, respectively). All 120/208-240 volt wiring shall be color-coded black, blue, and red for hot legs (Phase A, B, and C, respectively). The grounded neutral conductor of each circuit shall be color-coded white. Grounding conductors shall be color-coded green.

- E. All wires and cables shall, as far as practicable in the judgment of the Engineer, be continuous from origin to destination without running splices in intermediate pull boxes, junction boxes, or wireways. At the ends of these wires and cables, only sufficient slack shall be left as may be required for making proper connections. There shall be no unnecessary slack.
- F. In connecting wires and cables to apparatus, various methods shall be used depending upon the local conditions as detailed on the drawings. In general, solderless pressure connectors shall be used for terminals, taps, and splices for all wires and cables. Solderless pressure connectors or vinyl-covered steel spring-type connectors shall be securely fastened and shall not loosen under vibration or normal strain. All connections shall be in accordance with manufacturer's recommendations and shall be with connectors approved for the particular connection conditions.
- G. Where wires and cables are connected to metallic surfaces, the coated surfaces of the metal shall be polished before installing the mechanical connector. The lacquer coating of the conduits shall be removed where a ground clamp is to be installed.
- H. All soldered joints shall be made mechanically strong before soldering and shall be carefully soldered without the use of acid and shall be taped with insulating tape to a thickness equal to that of the insulation.
- I. The installation of wires and cables shall include the furnishing and installing of all hangers, racks, cable cleats, and supports that may be necessary to make a neat and substantial wiring installation in all pull boxes, wireways, cable channels, and in such other locations as may be required. Plastic ties shall be used to hold the wires and cables together and to the racks or supports.
- J. Each junction box, terminal box, control cabinet, or other terminal location containing a total of 4 or more conductor terminations or splices, shall be equipped with 1 or more terminal boards, as required, for connecting each wire including the spare wires. Each wire terminal shall be permanently marked throughout the entire system using, wherever possible, the notation of the wires given on the manufacturer's wiring diagrams. Sufficient terminal blocks shall be provided to terminate all wires routed to the enclosure including all spare conductors. In addition, the greater of 20 percent or four unused spare terminals shall be provided. All connections for future functions shall be wired to numbered terminal blocks, grouped separate from the terminal blocks in

use. Terminal blocks shall be grouped to isolate power conductors from control conductors and to separate AC circuits from DC circuits.

- K. Each control, instrumentation, and power cable and conductor shall be marked with the proper feeder symbol or termination number in each manhole, handhole, pull box, wireway, terminal cabinet, panelboard, switchboard and all additional locations required to provide positive identification. Each conductor shall be marked at each point of termination following final installation.
- L. The electrical installation shall maintain suitable isolation between power, control and instrumentation conductors. Approved isolation barriers shall be provided within each pull box, terminal box, wireway, cable tray, handhole, manhole, etc.

3.04 GROUNDING

- A. The concrete-encased steel reinforcement within the foundation of each structure shall be grounded, with a minimum of one 20-foot ground rod, at each corner column and at intermediate columns at distances not to exceed 60 feet. The main ground bus shall be interconnected to each ground rod throughout the structural grounding system with a continuous bare copper cable loop, minimum No. 4/0 (19 strand), buried 30 inches below grade and 24 inches outside the structural footing.
- B. A minimum of one 20-foot ground rod shall be located within each manhole and handhole. The main ground bus shall be interconnected to each ground rod throughout the underground conduit bank system with a continuous tinned copper cable, minimum No. 1/0 (19 strand), installed within the backfill 6 inches above the direct buried conduits.
- C. All grounding connections shall be made in the same manner as current carrying connections are made with bolted clamps and solderless connectors. All underground grounding system connections, cable-to-cable, cable-to-ground rod, etc., shall be made with exothermic-fused connections. Contact surfaces shall be equal in area to those of current carrying connectors. All contact surfaces shall be thoroughly cleaned before connections are made.
- D. All ground connections shall be made with connectors or lugs approved for the specific type of connection.
- E. Insulated-type grounding bushings shall be used for all metallic conduit terminations.
- F. Permanent and effective ground connections shall be provided for transformer secondary neutrals.
- G. The metallic frame of each motor, generator, transformer, panelboard, lighting fixture, outlet box, control equipment enclosure, etc. shall be grounded to the ground bus of the

power distribution equipment with an insulated grounding conductor included in the feeder or branch circuit conduit.

- H. Installed ground cables shall be protected from subsequent mechanical damage. Sleeves shall be provided in foundation walls and in floors to facilitate installation of ground cables. Where ground cables enter buildings through sleeves, the sleeves shall be sealed with jute packing and approved sealing compound.

3.05 SURGE PROTECTION

- A. Surge protection devices (SPD) shall be provided for all switchgear, switchboards, motor control centers, power distribution panels, lighting panels, control panels, instrumentation panels, etc.
- B. Service Entrance - Each SPD installed on service entrance equipment shall be replaceable modular construction. A UL approved disconnect switch shall be provided as a means of servicing disconnect if a 60A breaker is not available.
- C. Power Distribution - Each SPD installed on switchboards or motor control centers shall be replaceable modular construction. Each SPD shall have an independent means of servicing disconnect such that the protected power distribution equipment remains energized. A 30A breaker (or larger) may serve this function.
- D. Sub Panels - Each SPD installed on power distribution panelboards, lighting panelboards, control panels, unit equipment, etc. shall be encapsulated construction.
- E. SPD equipment shall be installed per manufacturer's installation instructions with lead lengths as short (less than 24") and straight as possible. Gently twist conductors together.
- F. Installer may reasonably rearrange breaker locations to ensure short & straightest possible leads to SPDs.
- G. SPD shall be installed on the load side of the main service disconnect.
- H. Before energizing, installer shall verify service and separately derived system Neutral to Ground bonding jumpers per NEC.
- I. Status indication pilot lights for each SPD shall be remote mounted and shall be visible from the front of the protected equipment enclosure.

3.06 TESTING

- A. Upon completion, the Contractor shall provide all necessary instruments and special apparatus to thoroughly test the complete installation and shall conduct all tests that may be required to insure system is free of all improper grounds and short circuits, and

that all the feeders are properly balanced. All electrical equipment shall be tested to determine proper polarity, phasing, relay settings, and operation. System shall be checked for quality and completeness in accordance with the provisions of the General Conditions. Any objectionable noise, heating, voltage drop, or excessive current draw, after in operation, shall be identified and corrected.

- B. Prior to energization, the electrical system ground resistance shall be tested. Additionally, the insulation resistance of all electrical gear, power feeders, and electric motors shall be measured. Upon completion of all corrective measures required, certified acceptance reports, including tabulations of all initial and final resistance measurements, shall be submitted for approval in accordance with the provisions of the General Conditions.
- C. Each motor starter overload element, and each motor circuit protector, shall be selected and adjusted to coordinate with the nameplate full-load current and service factor of the actual motors installed. Improper units shall be replaced. Upon completion of all corrective measures required, certified compliance reports, including tabulation of the actual full load current and voltage measurements for each phase of each motor, together with the nameplate current rating, overload element rating, and motor circuit protector setting, shall be submitted for approval in accordance with the provisions of the General Conditions.
- D. System testing shall include complete circuit breaker tests for each power circuit breaker and complete thermal surveys of all new and existing electrical apparatus. Upon completion of all corrective measures required, certified acceptance reports, including satisfactory infrared photographs, shall be submitted for approval.

3.07 SPARE PARTS

- A. The Contractor shall furnish, upon completion of the project, one year's supply of all consumable parts utilized within the electrical system.
- B. Spare parts shall include pilot lights (minimum 12 of each part number), fuses (minimum 12 of each part number below 100 amps and 6 of each part number 100 amps and above).

3.08 GUARANTEES

- A. All materials and workmanship shall be guaranteed to be free from defects. Any part of the system considered defective by the Engineer within the guarantee period shall be immediately replaced or corrected to the Engineer's satisfaction without further expense to the Owner.
- B. Upon final completion, the Contractor shall furnish certification from each equipment manufacturer that all equipment has been installed in accordance with the requirements

of these specifications, is ready for permanent operation, and that nothing in the installation shall render the warranty null and void.

END OF SECTION

APPENDIX A
GEOTECHNICAL REPORT



Geotechnical Exploration and Evaluation Report

Lake Apopka Interconnect Pump Station Apopka, Florida

CSI Geo Project No.: 71-19-310-08

Prepared for:

Four Waters Engineering, Inc.

April 22, 2020

CSI Geo

Geotechnical • CMT • CEI

April 22, 2020

Mr. Michael Klink, P.E.
Four Waters Engineering, Inc.
324 6th Avenue North
Jacksonville Beach, FL 32250

RE: Lake Apopka Interconnect Pump Station
Apopka, Florida

Subject: Geotechnical Exploration and Evaluation Report
CSI Geo Project No.: 71-19-310-08

Dear Mr. Klink:

CSI Geo, Inc. has performed the authorized geotechnical exploration and laboratory testing program for the proposed Lake Apopka Interconnect Pump Station in Apopka, Florida. This report presents our understanding of the subsurface conditions along with our engineering evaluation and recommendations.

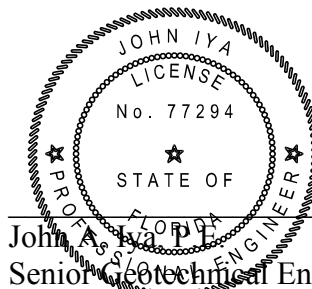
We have enjoyed working with you on this project and look forward to working with you on future projects. If you have any questions concerning this report, please contact our office.

Sincerely,

CSI Geo, Inc.



Nader Amer, Ph.D.
Geotechnical Engineer



John Iya, P.E.
Senior Geotechnical Engineer
Registered, Florida No. 77294

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APPENDIX

- Site Location Map
- Soil Conservation (NRCS/USDA) Soil Survey Report
- Field Exploration Plan
- Report of SPT Borings
- Summary of Laboratory Testing Results
- Environmental Corrosion Test Results
- Grain Size Distribution Curves
- Report of Muck Probes
- Steel H-Piles Capacity Curves
- Recommended Soil Parameters for Sheet Pile Wall Design
- Lateral Soil Parameters
- Key to Soil Classification
- Field and Laboratory Test Procedures

1.0 PROJECT INFORMATION

1.1 General Project Information

The purpose of this geotechnical exploration program was to develop information concerning the subsurface conditions in order to evaluate the site with respect to the proposed Lake Apopka Interconnect Pump Station project in Apopka, Florida. The project consists of the design and construction of pumps, piping and support structures.

This report describes the field and laboratory testing activities performed and presents the findings. The subsurface soil and groundwater conditions are presented in this report along with site preparation and construction recommendations.

Information regarding this project was provided to CSI Geo, Inc. (CSI Geo) by Mr. Michael Klink, P.E of Four Waters Engineering, Inc. (Four Waters). To this date we have received the following documents regarding this project:

- 60% Submittal Plans
Lake Apopka North Shoe Interconnect Pump Station
Prepared by: Four Waters Engineering (Four Waters)
Received: February, 2020

1.2 Existing Conditions and Project Description

The project site is located at just west of the intersection of Fudge Road and Canal Road in Apopka, Florida. The existing site conditions generally consist of levees, canals and water retention areas generally covered with short grass, wetlands and marshland vegetation (**Photo No. 01**). A Site Location Map is included in the **Appendix**.

Based on the information provided to us, we understand that the project consists of the design and construction of a duplex axial flow pump station (**Exhibit No. 01**) to facilitate moving water in the North Shore area of Lake Apopka from the Duda Parcel to Unit 1 Parcel and help the reduction of pollution (specifically Phosphorus) in Lake Apopka.



Photo No. 01: Existing site conditions

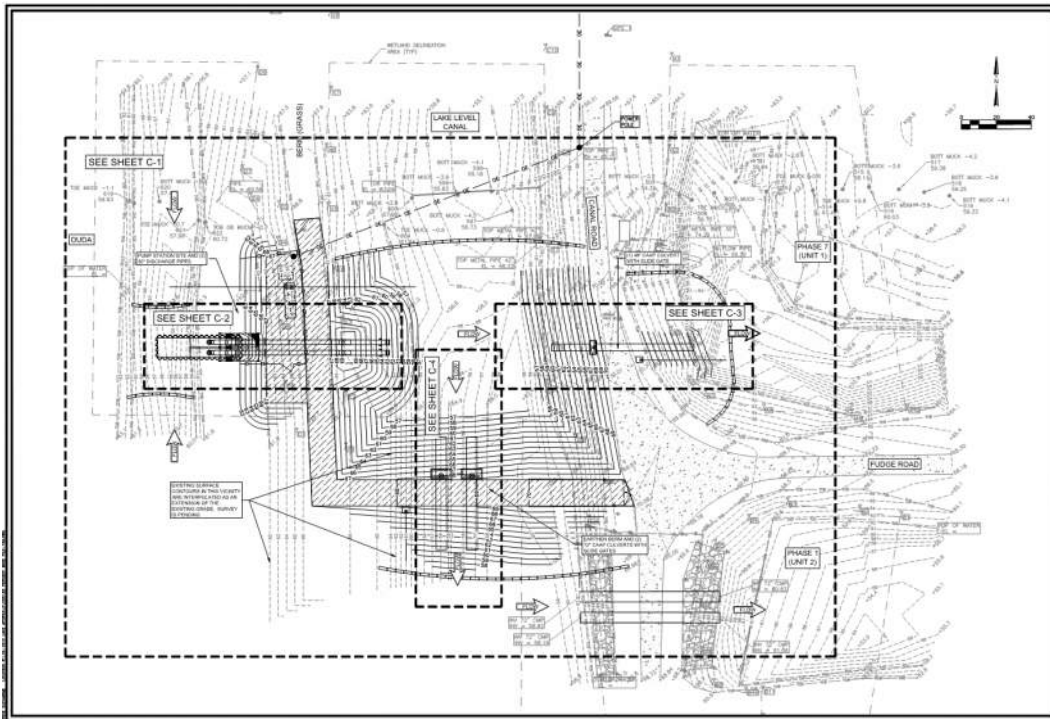


Exhibit No. 01: Overall Proposed Site Plan

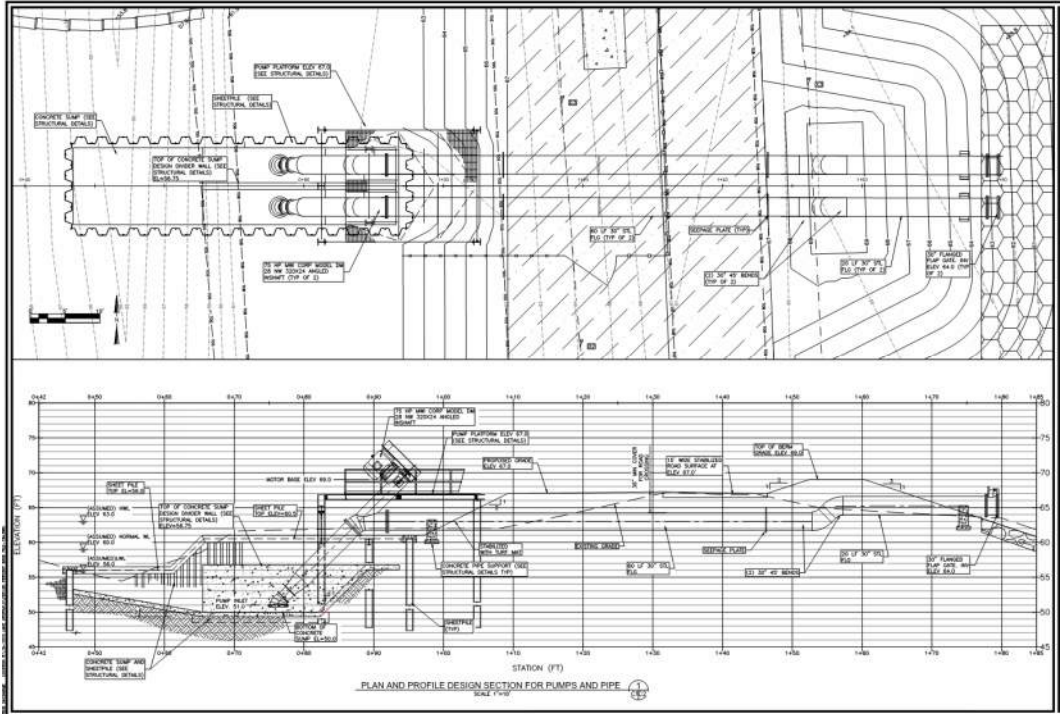


Exhibit No. 02: Proposed Plan & Profile Design Section – West Berm

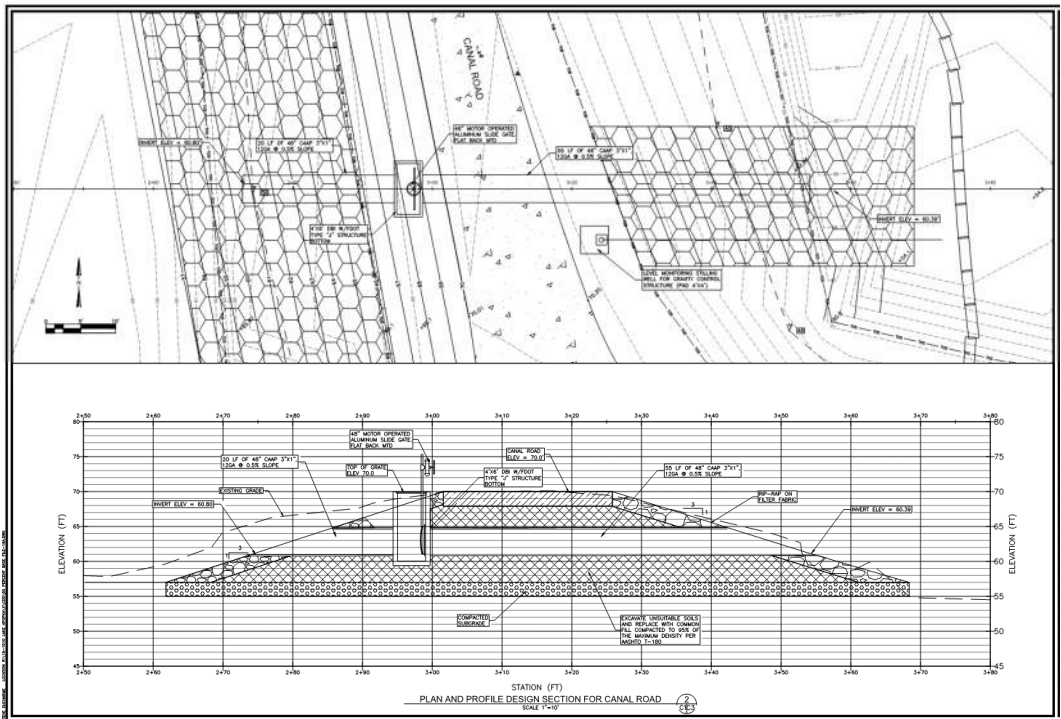


Exhibit No. 03: Proposed Plan & Profile Design Section – East Berm

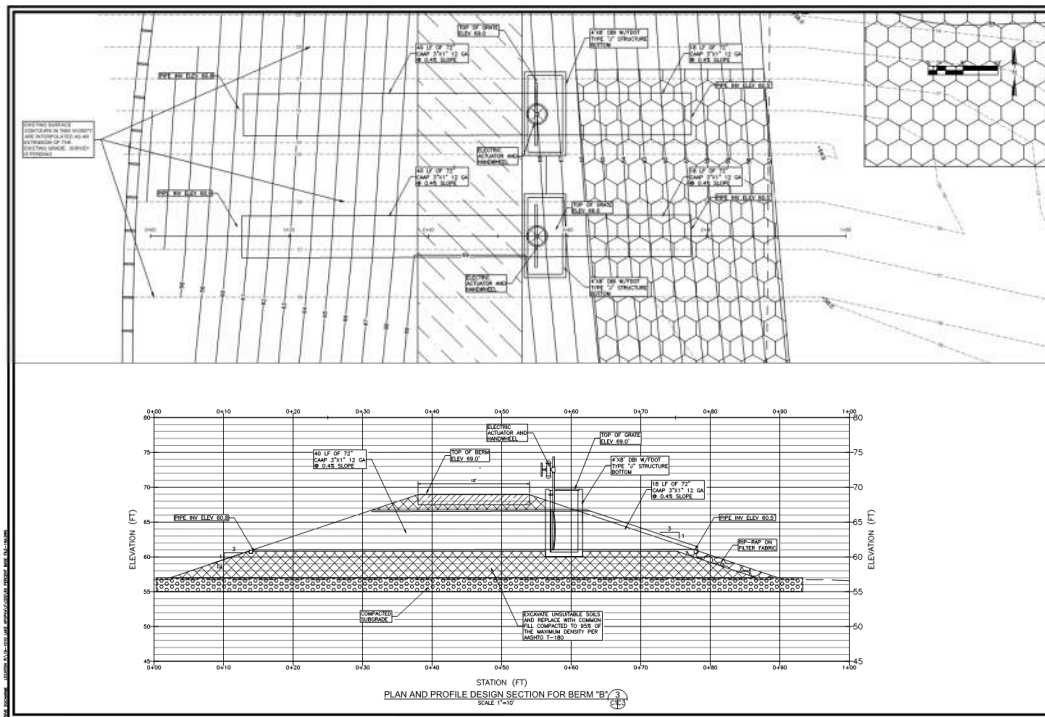


Exhibit No. 04: Proposed Plan & Profile Design Section – South Berm

Overall, the project will consist of the construction of sheet pilings, concrete sump, concrete divider wall, pumps support platform, steel pipes and pipe support concrete footings. The support platform will be supported on 12x53 steel H-piles (Exhibits Nos 01 through 04).

1.3 Geologic and Physiographic Setting

The project site is located within the northwest corner of Orange County just east of the eastern boundary of Lake County and west of the town of Apopka, Florida. The site geology is characterized by surface and near-surface sediments consisting of quartz sand, clay, and limestone, ranging in age from late Eocene to Holocene. The upper three geologic deposits, in descending order from the ground surface are:

1. Cypresshead Formation, of the Pliocene age
2. Hawthorn Group, Coosawhatchie Formation of the Miocene age.
3. Ocala Limestone of the Eocene age.

The geologic formations within Orange County includes the Recent and Pleistocene series, about 200 feet thick, that is undifferentiated soils and marls that consist mostly of quartz sand with varying amounts of clay and shell. Beneath Recent and Pleistocene series, the Miocene series exists that includes the Hawthorn Group formation about 200 feet thick. The Hawthorn formation consists mostly of clayey quartz sand and silt, phosphatic sand, and phosphatic limestone. The

Below the Miocene series is the Ocala Limestone of the Eocene age. The limestone formations of the Ocala Group can reach thicknesses of 90-150 feet, and primarily consist of white, to cream, to dark brown, granular to chalky, fossiliferous, poorly to well indurated limestone and dolomite.

1.4 Soil Conservation (NRCS/USDA) Map Data

Review of the Natural Resources Conservation Services (NRCS) Soil Survey Map for Orange County, Florida indicates that the site is located within an area containing primarily the Gator muck soil *Series 18*. This soil series is in depressions on marine terraces and is frequently ponded, nearly level and very poorly drained. The NRCS Soil Survey report for the project area is included in the **Appendix**.

2.0 GEOTECHNICAL EXPLORATION

2.1 Field Exploration

The area of the new pump station was explored by means of two (2) Standard Penetration Test (SPT) borings B-1 and B-2 drilled to a depth of 60 feet below the existing top of berms. The boring locations were selected by Four Waters and located in the field by personnel from CSI Geo using handheld GPS equipment. The approximate locations of the soil borings are shown on the Field Exploration Plan sheet included in the **Appendix**.

Soil samples collected were visually classified in the field and then transported to our laboratory for re-classification and testing. Representative soil samples obtained during our field exploration program were visually classified using the Unified (USCS) Soil Classification System.

Additionally, muck probes were conducted by Geometric Surveyors (Geometrics) generally along the north and south of the proposed pumps and pipes. The muck probes were performed to delineate the limits of unsuitable muck and soft soils present in the general area of the proposed pump station. It should be noted that the depth of muck and soft soils presented on the Report of Muck Probe sheets have been extrapolated from the data provided to us as directed. Therefore, the depth of muck and soft soils may vary between the actual tested locations.

2.2 Laboratory Testing

Quantitative laboratory testing was performed on representative soil samples to better define their composition. Laboratory tests performed were percent fines, organic content, natural moisture content, and Atterberg limit test. A Summary of Laboratory Test Results, and Field and Laboratory Test Procedures used are included in the **Appendix**.

2.3 Environmental Corrosion Testing

Environmental classification tests were performed on selected samples obtained from the field exploration. A total of two soil samples were obtained from the area of the new pump station for environmental classification testing. The tests were conducted in order to define the electrical

resistivity, chlorides content, sulfates content, and pH of the samples. The laboratory test data was used to determine the substructure environmental classification in accordance with the FDOT Structures Design Guidelines Manual. The Environmental Corrosion Test Results are included in the **Appendix**.

3.0 GENERAL SUBSURFACE CONDITIONS

3.1 General

An illustrated representation of the subsurface conditions encountered in the proposed construction areas are shown on the Report of SPT Borings sheet presented in the **Appendix**. The Report of SPT borings and the soil conditions outlined below highlight the major subsurface stratification. The Report of SPT borings in the **Appendix** should be consulted for a detailed description of the subsurface conditions encountered at each boring location. When reviewing the Report of SPT Borings, it should be understood that soil conditions may vary outside of the explored area.

3.2 Soil Conditions

Review of test borings B-1 and B-2 performed on the berms indicates that the soil conditions consist of unsuitable highly organic soils (PT) with inter-bedded-layers of very loose silty sands (SM) and soft to stiff clayey sands (SC) in the upper 8 to 17 feet of depth below the top of existing berms. Below these surficial soils and until a depth of about 37 feet, stiff clayey sands (SC) and sandy clays (CL) were encountered followed by medium dense slightly silty sands (SP-SM) until the boring termination depth of 60 feet. Test boring B-2 encountered 5 feet of very soft highly weathered sandy limestone at a depth of about 13 feet below the existing top of berm.

Results of the muck probing activities performed in the canal areas at locations north and south of the proposed improvements indicate that the thickness of the unsuitable muck and soft soils ranges from about 0.3 to 4.5 feet below the canal bottom. A generalized muck profile through the pumps/pipes assembly alignment, is shown on the Report of Muck Probe sheet included in the **Appendix**.

Unsuitable organic soils, muck and soft soils should be anticipated throughout the site. The thickness and depth of these unsuitable soils may vary from those noted herein, and in some locations the unsuitable material may be deeper. It is very likely that all excavated soils will get mixed which will eventually consist of organic soils, muck and plastic clays which are

considered unsuitable for construction and backfill purposes. Therefore, we recommend that allowance be made for possible overruns in quantities of subsoil removal and replacement with select backfill.

3.3 Groundwater Conditions

The groundwater level was measured and recorded as encountered at the time of drilling. The depths of the groundwater level at the test locations are marked on the Report of SPT Borings sheet presented in the **Appendix**. The depth of groundwater level measured at the time of drilling ranged from 4.5 to 5.0 feet below the existing grades.

Fluctuations of the groundwater level should be anticipated as a result of seasonal climatic variations, surface water runoff patterns, construction activities, proximity to adjacent water bodies, and other related factors. During seasonal high precipitation periods, groundwater levels can be expected to rise above the levels recorded during this exploration. Therefore, design drawings and specifications should account for the possibility of groundwater level variations, and construction planning should be based on the assumption that such variations will occur.

3.4 Environmental Classification Test Results

The FDOT Structural Design guidelines were used to classify the soil samples. Recommended environmental classification for the pump station was determined based on the location of the project corridor which is within 2,500 feet of a body of water (Lake Apopka) with chloride concentrations in excess of 6,000 ppm. This area of the pump station is therefore classified as “Extremely Aggressive” for both steel and concrete. Results of the environmental corrosion tests performed on the soil samples are presented in the Environmental Corrosion Test Results sheet included in the **Appendix**.

4.0 GEOTECHNICAL ENGINEERING EVALUATION AND RECOMMENDATIONS

4.1 Basis for Evaluation & Recommendations

Geotechnical evaluation and recommendations as presented in this report are based on our site observations, field and laboratory test data obtained, and our understanding of the project information as previously described in this report. The discovery of site and/or subsurface conditions during construction that deviate from the data obtained in this exploration should be reported to CSI Geo for re-evaluation.

4.2 Shallow Foundation Evaluation & Recommendations

The results of test borings performed on the existing berms and the muck probes performed in the areas of the berm slopes and canal, indicates that the project site is generally underlain by unsuitable highly organic soils in the upper 8 to 17 feet (elevation +62' to +50') below the top of the existing berms and in the upper 0.3 to 4.5 feet (elevation +61' to +50') below the bottom of the existing canal crossings.

4.2.1 Concrete Pump Sump and Divider Wall

Based on the information provided to us, the bearing levels of the concrete sump and the divider wall are expected to range from approximately elevation +54' to elevation +49'. At these levels, the bearing soils consist of unsuitable highly organic soils underlain by stiff plastic clayey sands. These unsuitable organic soils if left in-place, will continue to settle even under their own weight. We recommend that the unsuitable organic soils encountered at the bearing levels be removed in their entirety and replaced with compacted clean sands or lean concrete. Plastic clays encountered at the bearing levels after the removal of unsuitable organic soils, muck and soft soils, should be over-excavated to a minimum depth of 2 feet and backfilled with compacted clean sands or lean concrete. Dewatering as discussed in sections 5.3 and 5.4 of this report will be required during demucking so that the process can be performed "in the dry" condition

Upon satisfactory removal of unsuitable organic soils and plastic clays, and backfill with compacted clean sands or lean concrete, an allowable net bearing pressure of up to 1,000 pounds per square foot (psf) can be used for design of the concrete sump and 1,500 psf for the dividing

wall foundations. All new structural fill should be compacted to at least 95 percent of the modified Proctor maximum dry density.

We recommend that an experienced geotechnical engineer observe the subgrade soils within the exposed foundations prior to foundation installation. This is to assess the soil's suitability for foundation support and confirm their consistency with the conditions our recommendations are based on.

4.2.2 Pipe Bedding and Pipe Support Concrete Footings

Based on the information provided to us, the bearing levels of the pipes including those on the southern berm "B" which was added to the design subsequent to the time our field exploration, are expected to range from about elevation +60.4' to +63'. At these levels, the soils consist of as much as 10 feet of unsuitable organic soils underlain by stiff plastic clays. These unsuitable organic soils if left in-place will continue to settle even under their own weight. We recommend that the unsuitable organic soils be removed in their entirety and replaced with compacted clean sands. Plastic clays encountered at the bearing levels should be over-excavated a minimum depth of 1 foot below the pipe invert and 2 feet below the support footing bottom and backfilled with compacted clean sands. Dewatering as discussed in sections 5.3 and 5.4 of this report will be required during demucking so that the process can be performed "in the dry" condition

Upon satisfactory removal of unsuitable organic soils and plastic clays and backfill with compacted clean sands, an allowable net bearing pressure of 3,000 psf can be used for design of the pipe support footings. All new structural fill should be compacted to at least 95 percent of the modified Proctor maximum dry density.

We recommend that an experienced geotechnical engineer observe the subgrade soils within the exposed foundations prior to foundation installation. This is to assess the soil's suitability for foundation support and confirm their consistency with the conditions our recommendations are based on.

4.3 Pump Platform Driven Pile Foundation Evaluation

Based on the information provided to us, we understand that the proposed pump platform will be supported on steel 12x53 H-Piles. We have therefore, evaluated allowable pile capacities versus estimated pile tip elevations for the steel 12x53 H-pile.

The allowable compressive capacity was determined by dividing the ultimate pile capacity by a factor of safety of 2.5. Allowable tensile capacity was determined by dividing the ultimate side friction by a factor of safety of 3.0. The graphical plots provided in the **Appendix** present the Allowable Compressive Capacity versus Estimated Pile Embedment Elevation and the Allowable Tensile Capacity versus Estimated Pile Embedment Elevation.

4.3.1 Driven Pile Axial Capacity

Following the Allowable Stress Design (ASD) approach and using the graphical plots of the Allowable Compressive Capacity versus Estimated Pile Embedment Elevation and the Allowable Tensile Capacity versus Estimated Pile Embedment Elevation presented in the **Appendix**, the structural designer would determine the required pile length by locating the total design load along the x-axis, drawing a vertical line to meet the graph for the selected pile diameter and subsequently drawing a horizontal line to intersect the vertical (y) axis.

4.3.2 Lateral Loads and Considerations

We understand that the platform foundation will be subjected to lateral loads. The structural designer should perform the lateral load analysis based on actual loading conditions. Based on the results of our geotechnical findings we have developed recommended lateral soil parameters for use by the structural engineer to determine the lateral loads on the foundations based on the actual structural conditions. These lateral soil parameters are included in the **Appendix**. The parameters are based on our interpretation of the SPT boring results and published industry standards.

4.3.3 Minimum Pile Tip Elevation

Minimum pile tip elevations should be established and must be the deepest of the minimum elevations that satisfy compressive capacity, uplift capacity, and lateral stability requirements. The minimum tip for lateral stability requirements must be established by the Structural Engineer.

4.3.4 Driven Pile Construction Recommendations

The steel pilings should be in conformance with the FDOT Standard Specifications. The piles should be driven sufficiently deep to develop the required allowable capacities. Piles installed for the pump platform should have a minimum penetration of 10 feet into competent soils, or a minimum penetration of 20 feet into soft soils. However, the actual final pile depths should be determined during the driving. Pile driving termination should be established such that at least 3 feet of equal or increasing blows are attained. Piles should be installed in such sequence that the soil surrounding the pile is not compacted to the extent that other piles cannot be installed properly.

One method to determine the required driving resistance in blows per foot consists of the wave equation. If the wave equation is used, all piles should be driven to the Required Driving Resistance (RDR) as follows: $RDR = \text{Design load} \times FS$. The FS is a safety factor of 3.0 when the wave equation analysis is used as defined in Section 455-5.12.2 of FDOT Standard Specifications for Road and Bridge Construction. The wave equation should also be used to evaluate suitability of the proposed driving system. No hammer should be approved for driving unless wave equation analysis shows it is capable of driving to a resistance at least 3.0 times the design load.

In lieu of the wave equation, the following two formulas may be used to determine the required driving resistance in blows per foot:

- $R = \frac{2WH}{S + 1.0}$ for gravity Hammers
- $2 E$

- $R = \frac{E}{S + 0.1}$ for Power Hammers

Where, R = Safe bearing value, in tons.

S = The average penetration per blow, in inches.

H = Height of Hammer fall (stroke), in feet.

W = Weight of striking part of Hammer, in tons

E = Energy delivered by Hammer per blow in foot-pounds.

The hammer provided should meet the requirements of Section 455-5.12.2(2) of FDOT Standard Specifications for Road and Bridge Construction. The hammer may be air, steam, hydraulic, diesel, or gravity type. The hammer may be a single or double-acting hammer and should be maintained such that the required number of blows per minute for which the hammer is designated is satisfied. The pile hammer should be operated at speeds in strict accordance with the manufacturer’s recommendations. The authorized production pile lengths should be established in the field when each pile has reached the blow count criteria and when blow count is increasing for a depth of at least three feet. We recommend that the production lengths be conservatively estimated so that the number of required mechanical splices are minimized. Production pile driving should conform to Sections 455-5.15, 455-5.16, and 455-5.17 of the FDOT Standard Specifications.

During driving, pile driving records should be kept for each pile detailing pertinent information such as pile type, length, date driven, and blow count with depth. The capacity of each pile should be reviewed based on its final tip elevation and driving record. An engineering technician familiar with the installation of driven piles and acting under the direction and supervision of the Geotechnical Engineer should witness the installation of the piles. His/her duties should include, but not be limited to, the following:

- Keeping an accurate record of pile installation and driving procedures.
- Verifying that each pile is installed to the proper driving resistance and to a depth indicative of its bearing in the desired bearing formation.
- Confirming that the pile driving equipment is operating properly.

- Inspecting the piles prior to installation for defects and confirming that the piles are not damaged during installation.

We recommend as a minimum construction control measure that all pile-driving records be reviewed by the Geotechnical Engineer.

4.4 Sheet Pile Design Soil Parameters

We understand that sheet piles will be used to facilitate excavations and the construction of the pump sump and divider wall. We recommend that soil parameters and assumptions to be used for the sheet pile should include the following:

Recommended Soil Parameters for Sheet Pile Wall Design (Boring: B-1)

Soil Parameter	Very Loose Silty Fine SAND, Highly Organic SAND and Sandy CLAY	Stiff to Very Stiff Sandy CLAY	Loose to Medium Dense SAND
Elevation (ft)	+67.0 to +50.0	+50.0 to +30.0	+30.0 to +7.0
Saturated Unit Weight – g (pcf)	90	110	110
Effective Unit Weight – g’ (pcf)	28	48	48
Angle of Internal Friction – ϕ (degrees)	-	-	31
Cohesion – C (psf)	250	1500	-
At-Rest Earth Pressure Coeff. K_0	1.00	1.00	0.48
Active Earth Pressure Coeff. K_a	1.00	1.00	0.32
Passive Earth Pressure Coeff. K_p	1.00	1.00	3.12

Recommended Soil Parameters for Sheet Pile Wall Design (Boring: B-2)

Soil Parameter	Medium Dense SAND and Clayey SAND with Organics	Highly Weathered sandy Limestone	Stiff to Hard Clayey Fine SAND	Medium Dense SAND
Elevation (ft)	+70.0 to +58.0	+58.0 to +53.0	+53.0 to +33.0	+33.0 to +10.0
Saturated Unit Weight – g (pcf)	100	105	120	110
Effective Unit Weight – g' (pcf)	38	43	58	48
Angle of Internal Friction – ϕ (degrees)	29	28	-	31
Cohesion – C (psf)	-	-	2000	-
At-Rest Earth Pressure Coeff. K_0	0.52	0.53	1.00	0.48
Active Earth Pressure Coeff. K_a	0.35	0.36	1.00	0.32
Passive Earth Pressure Coeff. K_p	2.88	2.77	1.00	3.12

Notes:

1. Soil descriptions are simplified for input purposes and do not represent a detailed classification of the soil strata encountered.

5.0 SITE PREPARATION & EARTHWORK RECOMMENDATIONS

5.1 General Site Preparation Activities

The general site preparation activities anticipated at the site may include clearing and grubbing, stripping, and final foundation preparation activities. Clearing consists of the complete removal of all obstructions and objectional matter. This includes trees, fallen timber, brush, vegetation, abandoned structures, etc. Grubbing consists of the removal of all stumps, roots, buried logs, etc.

Stripping includes removal of low growing vegetation and organic top-soils, muck, and peats. Concentrated root zones and muck/peat material encountered at the pipe bedding and foundation bearing levels should be completely removed and replaced with compacted structural fill material as described earlier.

5.2 Surface Water Control

The need for surface water runoff control should be anticipated during the site preparation and construction process. Lack of proper controls could result in ponding of surface water on compacted surfaces. Ponded water, combined with machine or foot traffic during construction operations or other activities, could disturb otherwise acceptable soils or previously compacted existing soils, causing instability, “pumping”, and generally unacceptable conditions. The ponded water will also impede or prevent necessary soil compaction operations and make construction trafficability difficult. Surface water can be controlled by proper grading of the site and by the use of temporary drainage ditches, diversion berms, and/or pumping from drainage controlled collection points.

5.3 Groundwater Control

Shoring of excavations may be required to facilitate construction. At the time of drilling, groundwater was encountered at about elevation +63 and +65 feet. Extensive dewatering of groundwater should be anticipated for the construction. Dewatering at the site can be achieved by means of pumping from well points. Ideally, the water table should be lowered to a level at least one foot below the bottom of any excavations made during construction and at least two

feet below the level of any vibratory compaction operations. We recommend that the dewatering system be kept operational until the pump station is constructed and that the dewatering system should not be turned off unless approved by the Engineer. It is also recommended that the groundwater level should be monitored on a regular basis to ensure that the groundwater level stays below the bottom of the pump station during construction.

5.4 Removal of Unsuitable Soils

Unsuitable organic soils, soft soils and plastic clays were encountered to depths ranging from 8 to 17 feet (elevation +50') below the top of the existing berms. These soils should be excavated and replaced with suitable backfill (SP, SP-SM, SP-SC materials) in thin lifts not exceeding 12 inches in loose thickness and compacted in the dry to a minimum dry density of 95% obtained from the Modified Proctor compaction test.

Extensive dewatering will be required during demucking so that the process can be performed “in the dry” condition. Demucking below the groundwater level will result in inadequate demucking, which will make backfill placement and compaction very difficult. A well point system will be required for the groundwater control. We recommend maintaining the groundwater level at least one foot below the bottom of any excavations made during construction and two feet below the surface of any compaction operations. Following the demucking operation, backfilling should be performed in thin lifts with suitable soils not exceeding 12 inches in loose thickness. The backfill material may then be compacted to a minimum density of 95% of the maximum dry density obtained from the modified proctor compaction test. Special attention should be paid not to use heavy compaction equipment within three feet from the new sheet pile wall system. Light compaction equipment should be used, such as hand held compaction equipment within the area adjacent to the new sheet wall system.

The thickness and depth of these unsuitable may vary from those noted herein, and in some locations the unsuitable material may be deeper. It is very likely that all excavated soils will get mixed and will eventually consist of organic soils, muck and plastic clays which are considered unsuitable for construction and backfill purposes. Therefore, we recommend that allowance be made for possible overruns in quantities of subsoil removal and replacement with select backfill.

5.5 Site and Fill Compaction

Structural fill material and backfill material needed for the construction should be placed in lifts not exceeding 12 inches in loose thickness. All new structural fill and backfill should be compacted to at least 95 percent of the modified Proctor maximum dry density (ASTM D-1557).

Backfill material should consist of an inorganic, non-plastic, granular soil with fines content (passing through the No. 200 mesh sieve) not exceeding 10 percent. The fill shall be free of roots, logs, refuse, brush, sod, or organic and/or perishable materials, muck or other highly organic material, rocks, cobbles, boulders, or cemented fragments having a dimension larger than 3 inches.

Compaction of the bearing level soils can be achieved by using a manually operated mechanical tamper or other approved methods, provided proper dewatering techniques are implemented. The upper 12 inches of the select structural fill foundation bearing level soils should be compacted to densities equivalent to at least 95 percent of the modified Proctor maximum dry density (ASTM D-1557). Alternatively, lean concrete should be used if adequate compaction can not be achieved.

All excavations, as applicable for the construction of the pump station should comply with the Florida Trench Safety Act (Sections 553.60-553.64, Florida Statutes) and Occupational Safety and Health Administration (OSHA) Trench Excavation Safety Standards, 29 C.F.R s. 1926.650, Subpart P, including all subsequent provisions or updates to Standards as adopted by the Florida Department of Labor and Employment Security (DOLES).

5.6 Disturbed Soil Conditions

Should the soils experience “pumping” and subsequent soil strength loss during compaction operations, compaction work should be terminated and: (1) the disturbed soils removed and backfilled with “dry” fill soils, which are then compacted; or (2) the excess moisture content within the disturbed soils allowed to dissipate before re-compaction. Furthermore, the groundwater level should be checked and controlled as necessary in order to help ensure proper

drawdown of any high groundwater conditions that may be causing the “pumping” conditions during compaction or construction activity upon these soils.

6.0 CONSTRUCTION MONITORING AND TESTING GUIDELINES

Prior to initiating compaction operations, we recommend that representative samples of the backfill or structural fill material to be used in the construction and acceptable exposed in-place soils to be collected and tested to determine their compaction and classification characteristics. The maximum dry density, optimum moisture content, gradation and plasticity characteristics should be determined. These tests are needed for compaction quality control of the backfill or structural fill and existing soils and to determine if the fill material is acceptable.

The subgrade of the proposed pump concrete sump, divider wall, pipes and pipe support footings should also be inspected to ensure that adequate subgrade support is provided. During construction, the required backfill should also be monitored to ensure that the backfill materials meet the required compaction specifications.

A representative number of in-place field density tests should be performed on each lift for the compacted backfill and structural fill materials. For excavation and backfill construction areas, we recommend that in-place density testing be performed at a rate of one test per excavation or fill placement area.

The fill placement and compaction operations should be observed and documented by a qualified engineering technician working under the direction of the Engineer. This includes evaluation of natural moisture content of the borrow fill and recommend fill placement scheme for the various fill materials being used for construction. We recommend that the natural moisture of the borrow fill material be checked at a rate of one test for every 500 cubic yards of material. The frequency of testing, however, may be changed in the field by the Engineer depending on actual field conditions present during construction.

Any significant deviations, either from the project specifications or from good practice, should be brought to the attention of the Engineer for evaluation and appropriate recommendations

Other Quality Control/Quality Assurance procedures or activities that should be implemented at the site for the installation of the sheet pile wall system include:

- Verify the adequacy of field storage of construction material to prevent damage or degradation.
- Verify and observe the quality and dimensions of the sheet pile wall sections and anchors.
- Confirm construction material compliance with the design drawings.
- Verify that the sheet pile wall and anchors are installed at the correct location, elevation, and within acceptable tolerances with respect to alignment, length, and diameter.
- Ensure proper anchoring of the anchor tie at the wall face and that the ties are not loose.
- Monitor, document and report to the geotechnical engineer any possible soil loss behind the sheet pile wall that may occur during construction.
- Ensure proper compaction of the sump and divider wall foundation subgrade.
- Ensure that the sump and the divider wall are installed at the appropriate elevations and within the acceptable tolerances.
- Ensure proper documentation of all construction activities.

7.0 REPORT LIMITATIONS

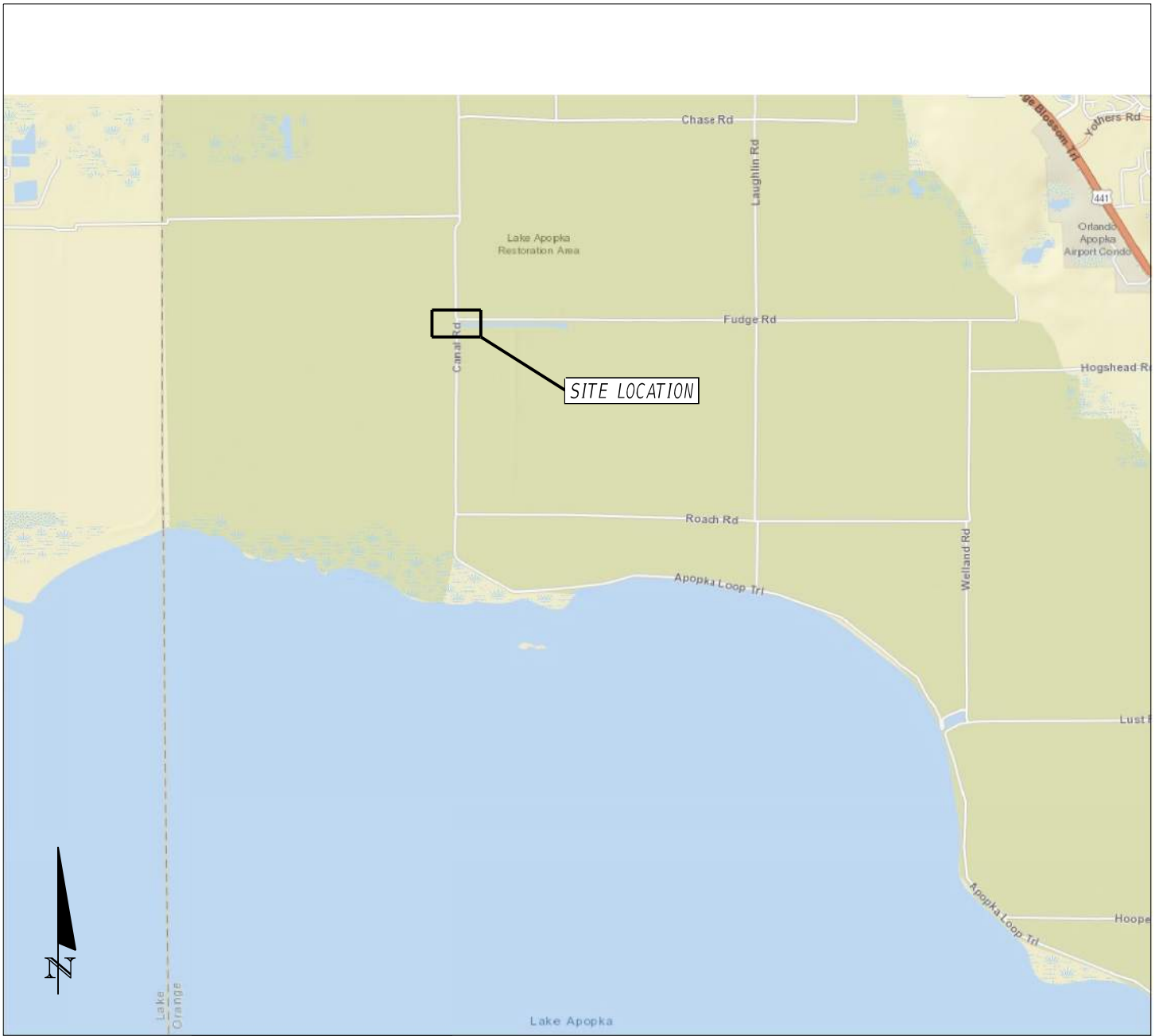
The subsurface exploration program including our evaluation and recommendations was performed in general accordance of accepted geotechnical engineering principles and standard practices. CSI Geo is not responsible for any independent conclusions, opinions, or interpretations made by others based on the data presented in this report.

This report does not reflect any variations that may occur adjacent or between soil borings. The discovery of any site or subsurface condition during construction that deviates from the findings and data as presented in this report should be reported to CSI Geo for evaluation. If the locations of the proposed features are changed, our office should be contacted so our recommendations can be re-evaluated. We recommend that CSI Geo be given the opportunity to review the final design drawings and specifications to ensure that our recommendations are properly included and implemented.

APPENDIX

Site Location Map
Soil Conservation (NRCS/USDA) Soil Survey Report
Field Exploration Plan
Report of SPT Borings
Report of Muck Probes
Summary of Laboratory Testing Results
Environmental Corrosion Test Results
Grain Size Distribution Curves
Steel H-Piles Capacity Curves
Recommended Soil Parameters for Sheet Pile Wall Design
Lateral Soil Parameters
Key to Soil Classification
Field and Laboratory Test Procedures

Site Location Map



CSI GEO, INC.
 2394 ST. JOHNS BLUFF ROAD S., SUITE 200
 JACKSONVILLE, FLORIDA 32246

SITE LOCATION MAP
 LAKE APOPKA INTERCONNECT PUMP STATION
 APOPKA, FLORIDA

**Soil Conservation (NRCS/USDA) Soil
Survey Report**



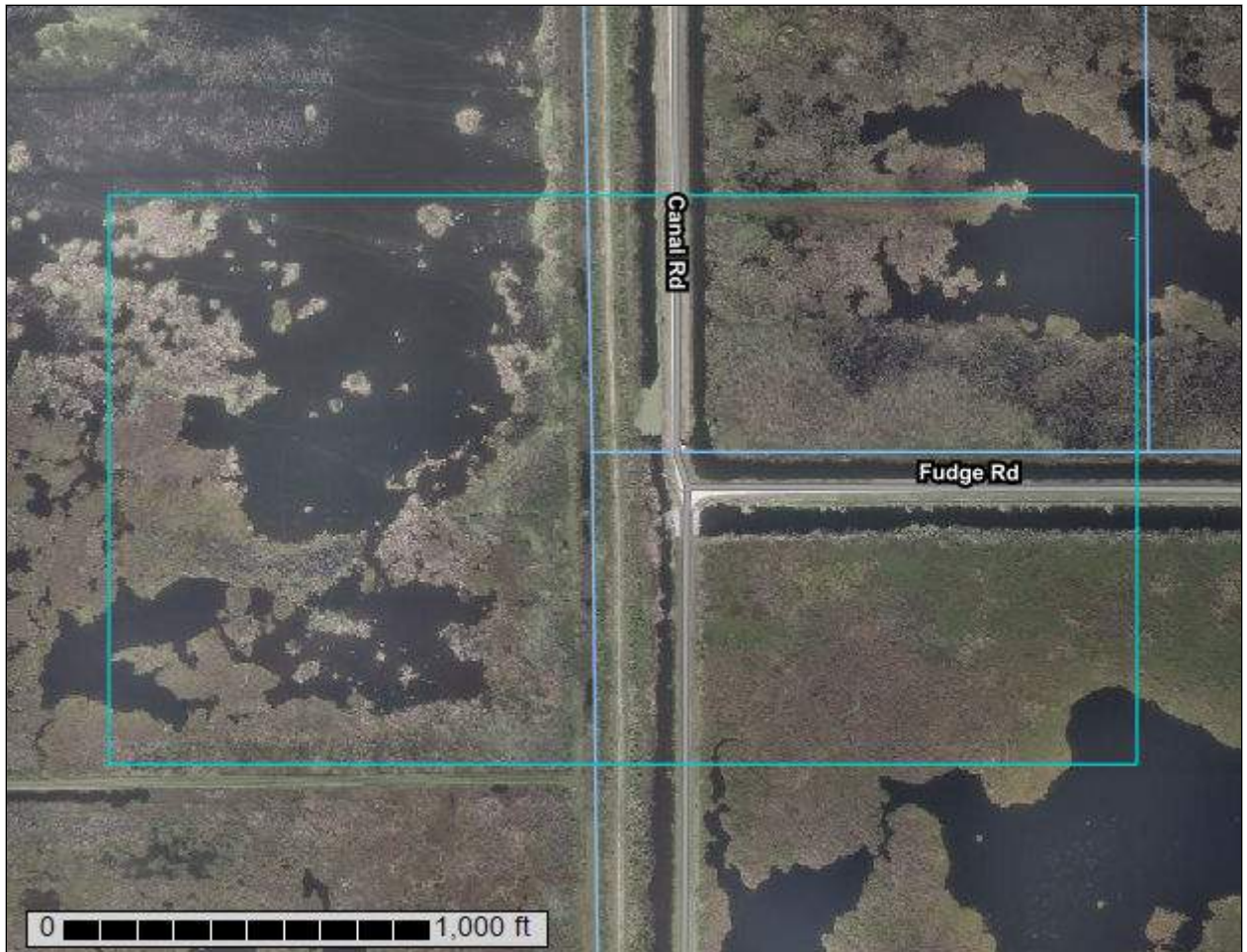
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Orange County, Florida**



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

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scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

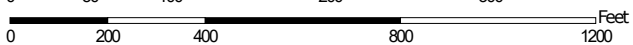
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map







































Map Scale: 1:4,720 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84



MAP LEGEND

- Area of Interest (AOI)**
 -  Area of Interest (AOI)
- Soils**
 -  Soil Map Unit Polygons
 -  Soil Map Unit Lines
 -  Soil Map Unit Points
- Special Point Features**
 -  Blowout
 -  Borrow Pit
 -  Clay Spot
 -  Closed Depression
 -  Gravel Pit
 -  Gravelly Spot
 -  Landfill
 -  Lava Flow
 -  Marsh or swamp
 -  Mine or Quarry
 -  Miscellaneous Water
 -  Perennial Water
 -  Rock Outcrop
 -  Saline Spot
 -  Sandy Spot
 -  Severely Eroded Spot
 -  Sinkhole
 -  Slide or Slip
 -  Sodic Spot
- Water Features**
 -  Streams and Canals
- Transportation**
 -  Rails
 -  Interstate Highways
 -  US Routes
 -  Major Roads
 -  Local Roads
- Background**
 -  Aerial Photography
- Other**
 -  Spoil Area
 -  Stony Spot
 -  Very Stony Spot
 -  Wet Spot
 -  Other
 -  Special Line Features

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Orange County, Florida
 Survey Area Data: Version 16, Sep 17, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 22, 2018—Jan 9, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
18	Gator muck, frequently ponded, 0 to 1 percent slopes	84.7	84.2%
49	Terra Ceia muck, frequently ponded, 0 to 1 percent slopes	15.9	15.8%
Totals for Area of Interest		100.6	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

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onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Orange County, Florida

18—Gator muck, frequently ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2tzwz
Elevation: 0 to 100 feet
Mean annual precipitation: 42 to 56 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Gator and similar soils: 83 percent
Minor components: 17 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gator

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material over sandy and loamy marine deposits

Typical profile

Oa - 0 to 18 inches: muck
Cg1 - 18 to 36 inches: sandy clay loam
Cg2 - 36 to 55 inches: fine sandy loam
Cg3 - 55 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very high (about 13.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Forage suitability group: Organic soils in depressions and on flood plains (G155XB645FL)
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL)

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Hydric soil rating: Yes

Minor Components

Terra ceia

Percent of map unit: 5 percent

Landform: Depressions on marine terraces

Landform position (three-dimensional): Tread, dip

Down-slope shape: Concave, convex

Across-slope shape: Concave, linear

Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL)

Hydric soil rating: Yes

Chobee

Percent of map unit: 4 percent

Landform: Depressions on marine terraces

Landform position (three-dimensional): Tread, dip

Down-slope shape: Concave

Across-slope shape: Concave

Ecological site: Freshwater Marshes and Ponds (R155XY010FL)

Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL)

Hydric soil rating: Yes

Tequesta

Percent of map unit: 4 percent

Landform: Depressions on marine terraces

Landform position (three-dimensional): Tread, dip

Down-slope shape: Concave

Across-slope shape: Concave

Other vegetative classification: Freshwater Marshes and Ponds (R156BY010FL)

Hydric soil rating: Yes

Felda

Percent of map unit: 3 percent

Landform: Flatwoods on marine terraces, drainageways on marine terraces

Landform position (three-dimensional): Tread, talf, dip

Down-slope shape: Linear

Across-slope shape: Linear, concave

Ecological site: Slough (R155XY011FL)

Other vegetative classification: Slough (R155XY011FL)

Hydric soil rating: Yes

Pompano

Percent of map unit: 1 percent

Landform: Drainageways on marine terraces, flatwoods on marine terraces

Landform position (three-dimensional): Tread, dip, talf

Down-slope shape: Linear

Across-slope shape: Concave, linear

Other vegetative classification: Slough (R155XY011FL)

Hydric soil rating: Yes

49—Terra Ceia muck, frequently ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2svzl
Elevation: 0 to 130 feet
Mean annual precipitation: 45 to 62 inches
Mean annual air temperature: 68 to 79 degrees F
Frost-free period: 335 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Terra ceia and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Terra Ceia

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Convex, concave
Across-slope shape: Linear, concave
Parent material: Herbaceous organic material

Typical profile

Oa1 - 0 to 15 inches: muck
Oa2 - 15 to 44 inches: muck
Oa3 - 44 to 80 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very high (about 23.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Organic soils in depressions and on flood plains (G155XB645FL)

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Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

Minor Components

Okeelanta

Percent of map unit: 6 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

Gator

Percent of map unit: 5 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

Tomoka

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Talf, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

Okeechobee

Percent of map unit: 2 percent
Landform: Marshes on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

Anclote

Percent of map unit: 1 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Convex, concave
Across-slope shape: Linear, concave
Hydric soil rating: Yes

Pompano

Percent of map unit: 1 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

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Chobee

Percent of map unit: 1 percent

Landform: Depressions on flatwoods on marine terraces

Landform position (three-dimensional): Tread, dip, talf

Down-slope shape: Concave, linear

Across-slope shape: Concave, linear

Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL)

Hydric soil rating: Yes

Placid

Percent of map unit: 1 percent

Landform: Drainageways on marine terraces, depressions on marine terraces

Landform position (three-dimensional): Tread, dip

Down-slope shape: Concave

Across-slope shape: Concave

Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL)

Hydric soil rating: Yes

References

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

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United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Field Exploration Plan



LEGEND



STANDARD PENETRATION TEST (SPT) BORING LOCATION

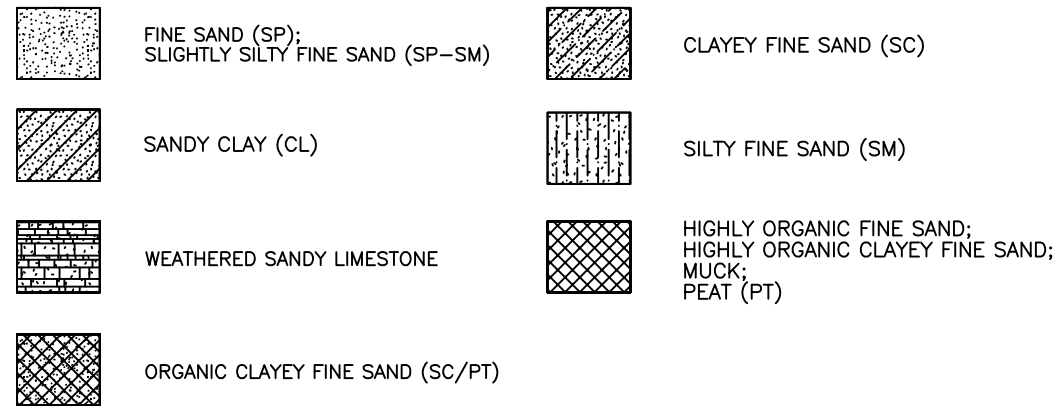
CSIGeo
GEOTECHNICAL · CMT · CEI
 2394 ST. JOHNS BLUFF ROAD, S. SUITE 200
 JACKSONVILLE, FLORIDA 32246

GEOTECHNICAL ENGINEERING
 CONSTRUCTION MATERIAL TESTING
 CONSTRUCTION ENGINEERING INSPECTION

FIELD EXPLORATION PLAN
 LAKE APOPKA INTERCONNECT PUMP STATION
 APOPKA, FLORIDA

Report of SPT Borings

LEGEND



(SP) UNIFIED SOIL CLASSIFICATION SYSTEM
 N STANDARD PENETRATION RESISTANCE IN BLOWS PER FT UNLESS OTHERWISE NOTED, NUMBERS TO THE LEFT OF BORING INDICATE N-VALUES.
 B.T. STANDARD PENETRATION TEST BORING TERMINATION
 GROUND WATER LEVEL AT TIME OF DRILLING

W	NATURAL MOISTURE CONTENT (%)
-200	FINES PASSING NO. 200 SIEVE (%)
OC%	ORGANIC CONTENT
LL	LIQUID LIMIT
PI	PLASTICITY INDEX

GRANULAR MATERIALS		SILTS AND CLAYS	
RELATIVE DENSITY	AUTOMATIC HAMMER SPT N-VALUE (BLOWS/FT)	CONSISTENCY	AUTOMATIC HAMMER SPT N-VALUE (BLOWS/FT)
VERY LOOSE	LESS THAN 3	VERY SOFT	LESS THAN 1
LOOSE	3-8	SOFT	1-3
MEDIUM DENSE	8-24	FIRM	3-6
DENSE	24-40	STIFF	6-12
VERY DENSE	GREATER THAN 40	VERY STIFF	12-24
		HARD	GREATER THAN 24

STANDARD PENETRATION TEST DATA

SPOON INSIDE DIA. 1.44 INCHES
 SPOON OUTSIDE DIA. 2.0 INCHES
 ASTM STANDARD DROP HAMMER

AVG. HAMMER DROP 30.0 INCHES
 HAMMER WEIGHT 140.0 LBS

ENVIRONMENTAL CLASSIFICATION:

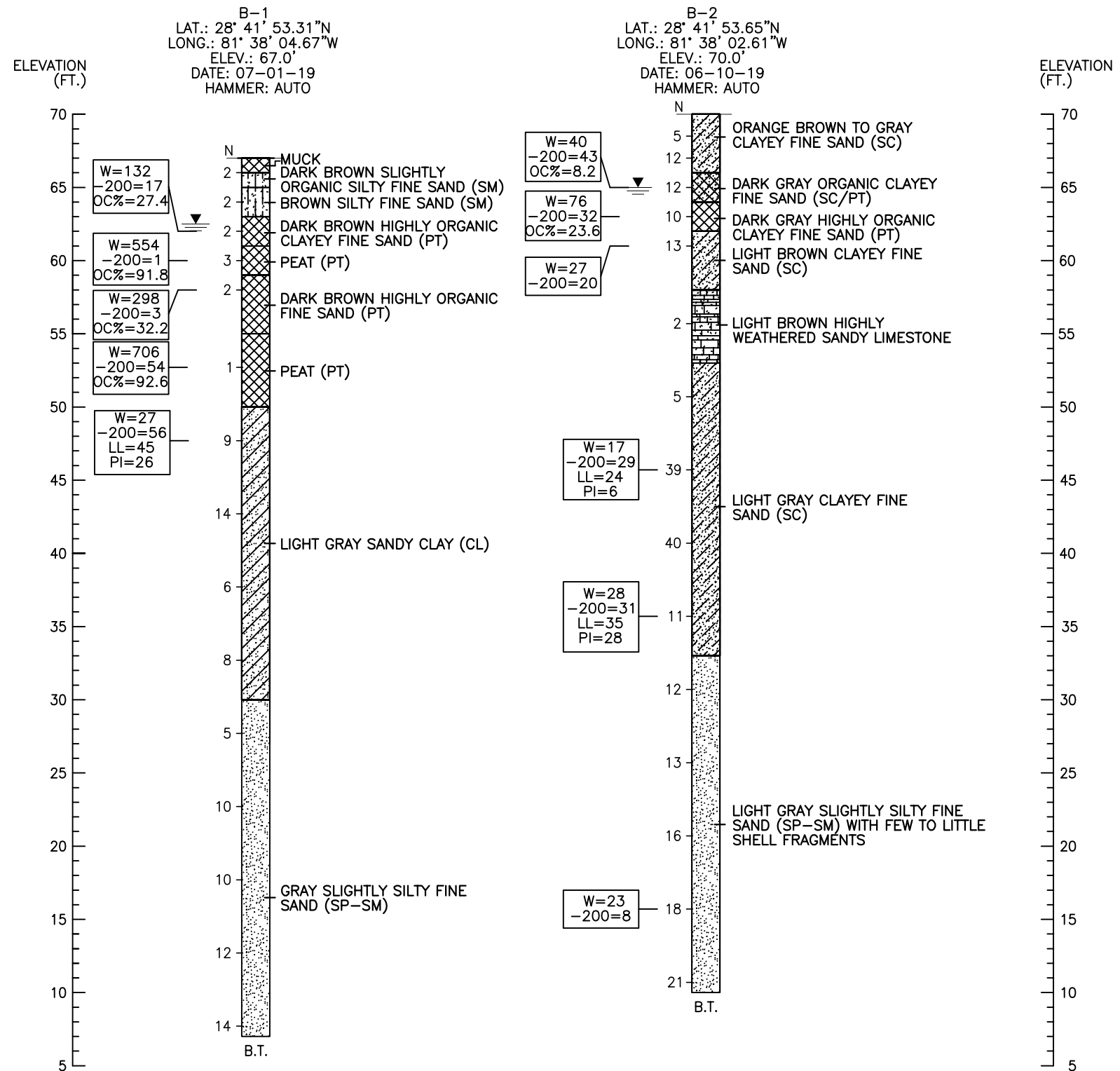
SUBSTRUCTURE:
 STEEL: EXTREMELY AGGRESSIVE*
 CONCRETE: EXTREMELY AGGRESSIVE*

*EXTREMELY AGGRESSIVE DUE TO THE PROJECT SITE BEING WITHIN 2,500 FEET FROM TRIBUTARIES OF THE INTRACOASTAL WATER WAY WHICH IS CONNECTED TO LAKE APOPKA WITH CHLORIDE CONCENTRATIONS IN EXCESS OF 6,000 PPM.

NOTES:

1) DRILL AND PENETRATION TESTING WAS PERFORMED IN ACCORDANCE WITH ASTM D-1586.

2) LAYER BOUNDARIES ARE APPROXIMATE AND MAY VARY BETWEEN OR AWAY FROM BORING LOCATIONS.



Summary of Laboratory Test Results

SUMMARY OF LABORATORY TEST RESULTS

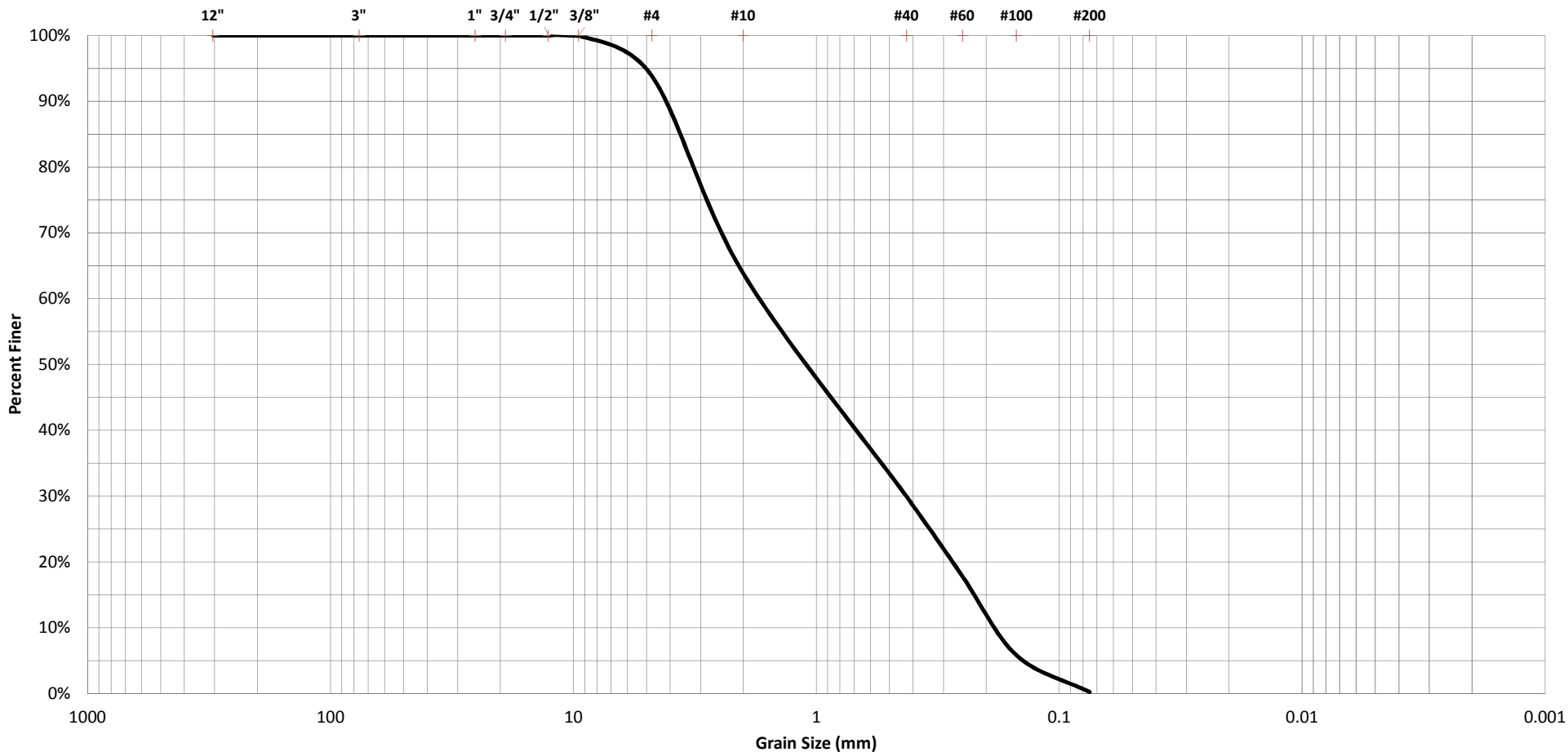
Lake Apopka Interconnect Pump Station
Apopka, Florida

Boring No.	Sample No.	Approximate Depth (ft)	Natural Moisture Content (%)	Organic Content (%)	Percent Passing Sieve Size (%)						Atterberg Limits		Soil Classification Symbol
					#4	#10	#40	#60	#100	#200	LL	PI	
B-1	3	4.0 - 6.0	132	27.4						17			PT
B-1	4	6.0 - 8.0	554	91.8						1			PT
B-1	5	8.0 - 10.0	298	32.2	94	64	30	18	6	3			PT
B-1	6	13.5 - 15.0	706	92.6	82	68	58	57	56	54			PT
B-1	7	18.5 - 20.0	27							56	45	26	CL
B-2	3	4.0 - 6.0	40	8.2						43			SC/PT
B-2	4	6.0 - 8.0	76	23.6						32			PT
B-2	5	8.0 - 10.0	27		98	97	85	70	10	20			SC
B-2	8	23.5 - 25.0	17							29	24	6	SC
B-2	10	33.5 - 35.0	28							31	35	28	SC
B-2	14	53.5 - 55.0	23							8			SP-SM

Grain Size Distribution Curves

GRAIN SIZE DISTRIBUTION GRAPH

US STANDARD SIEVE SIZES



BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY

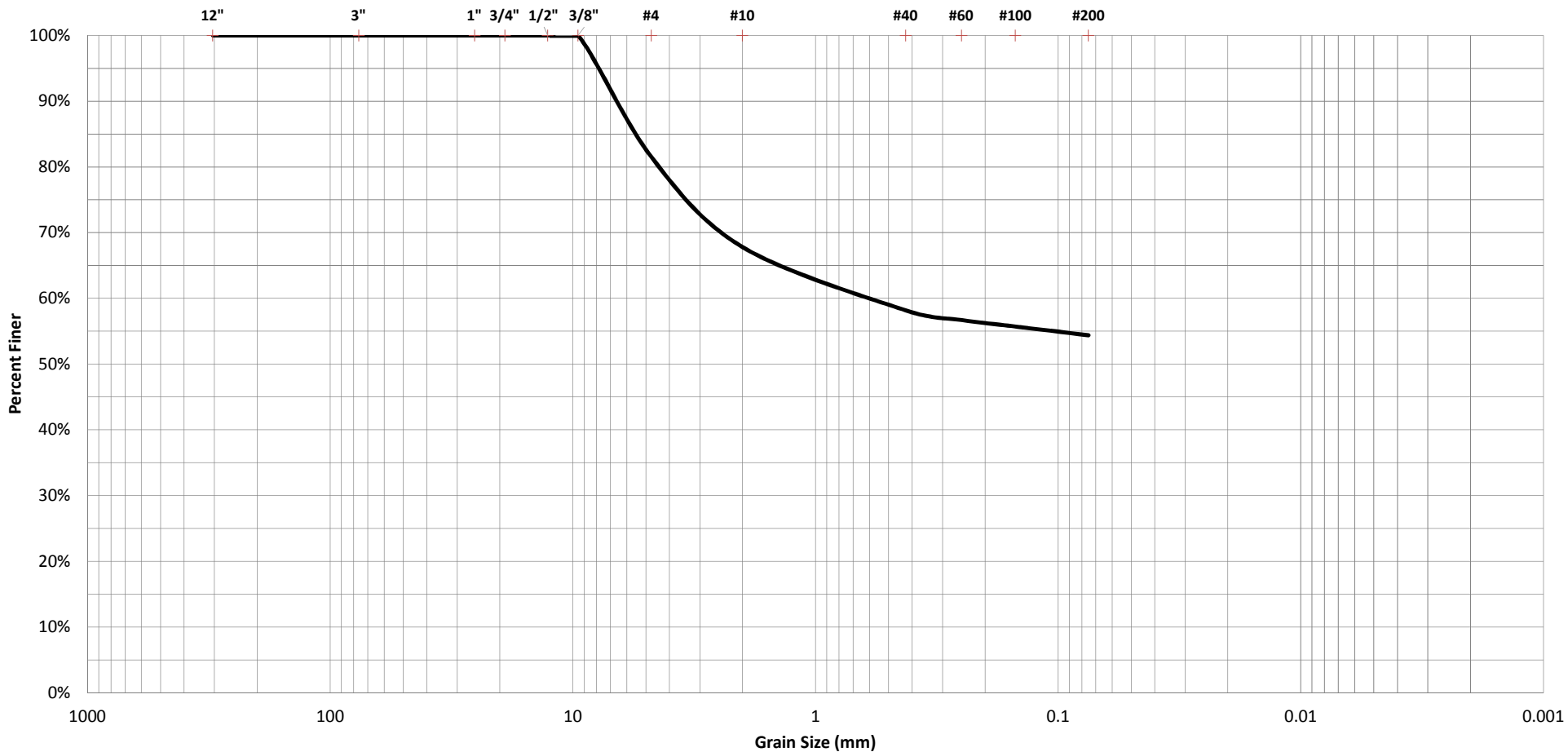
PROJECT NAME:	Lake Apopka Interconnect Pump Station	BORING NO. / SAMPLE NO.:	B - 1 (5)
CSI GEO PROJECT NUMBER:	71-19-310-08	DEPTH (FT.) :	8-10

W%	LL	PL	PI	DESCRIPTION / CLASSIFICATION	
298	-	-	-	Dark Brown Highly Organic Fine SAND	PT

CSI Geo, Inc.

GRAIN SIZE DISTRIBUTION GRAPH

US STANDARD SIEVE SIZES



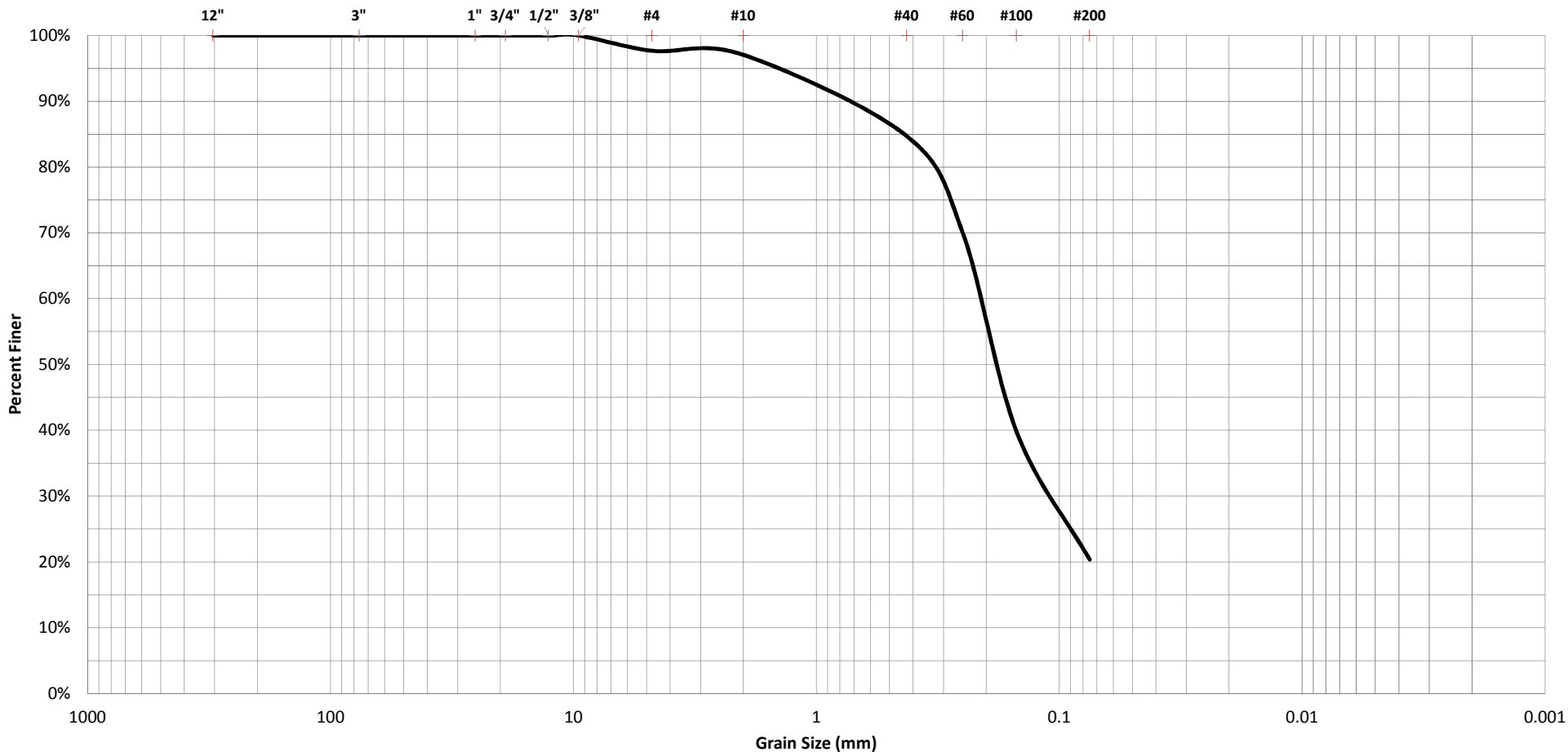
BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY

PROJECT NAME:	Lake Apopka Interconnect Pump Station	BORING NO. / SAMPLE NO.:	B-1 (6)
CSI GEO PROJECT NUMBER:	71-19-310-08	DEPTH (FT.) :	13.5'-15'

W%	LL	PL	PI	DESCRIPTION / CLASSIFICATION	CSI Geo, Inc.
706	-	-	-	Peat	

GRAIN SIZE DISTRIBUTION GRAPH

US STANDARD SIEVE SIZES



BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY

PROJECT NAME:	Lake Apopka Interconnect Pump Station	BORING NO. / SAMPLE NO.:	B-2 (5)
CSI GEO PROJECT NUMBER:	71-19-310-08	DEPTH (FT.) :	8'-10'

W%	LL	PL	PI	DESCRIPTION / CLASSIFICATION	CSI Geo, Inc.
27	-	-	-	Light Brown Clayey Fine SAND SC	

Environmental Corrosion Test Results

ENVIRONMENTAL CORROSION TEST RESULTS

Lake Apopka Interconnect Pump Station Apopka, Florida

Sample No.	Depth (ft)	pH (S.U.) ^a	Resistivity (ohm-cm)	Sulfates (ppm)	Chlorides (ppm)	Environmental Classification (Substructures)	
						Steel	Concrete
B-1	1.0 - 4.0	8.1	2,950	U ^b	25	Extremely Aggressive*	Extremely Aggressive
B-2	0.0 - 4.0	7.8	2,570	18	10	Extremely Aggressive	Extremely Aggressive

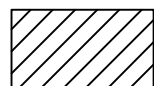
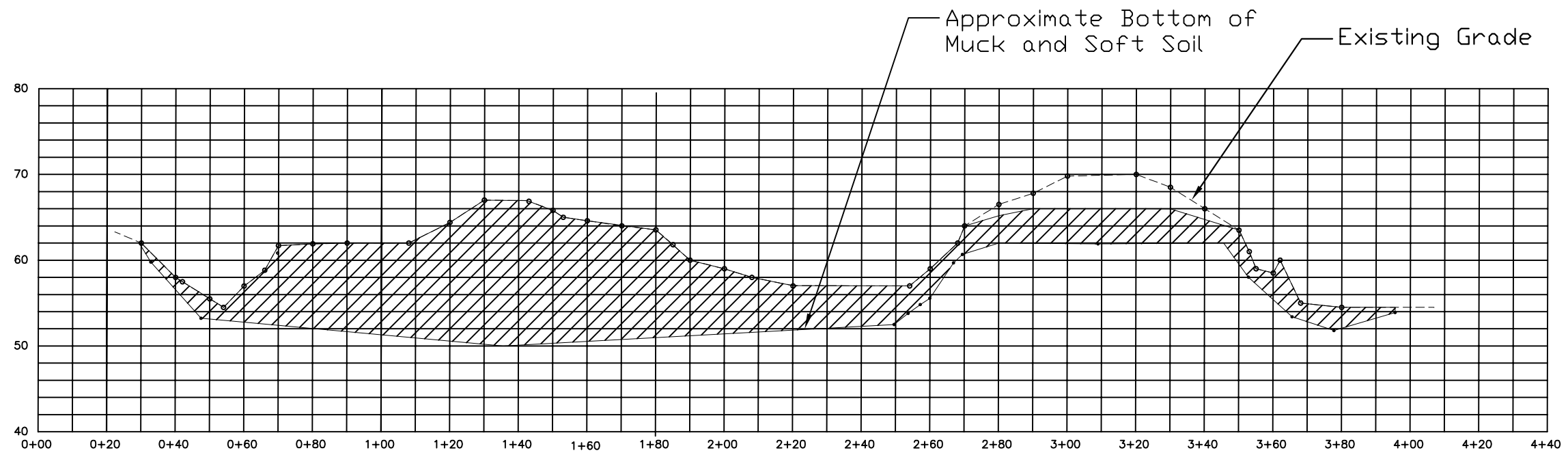
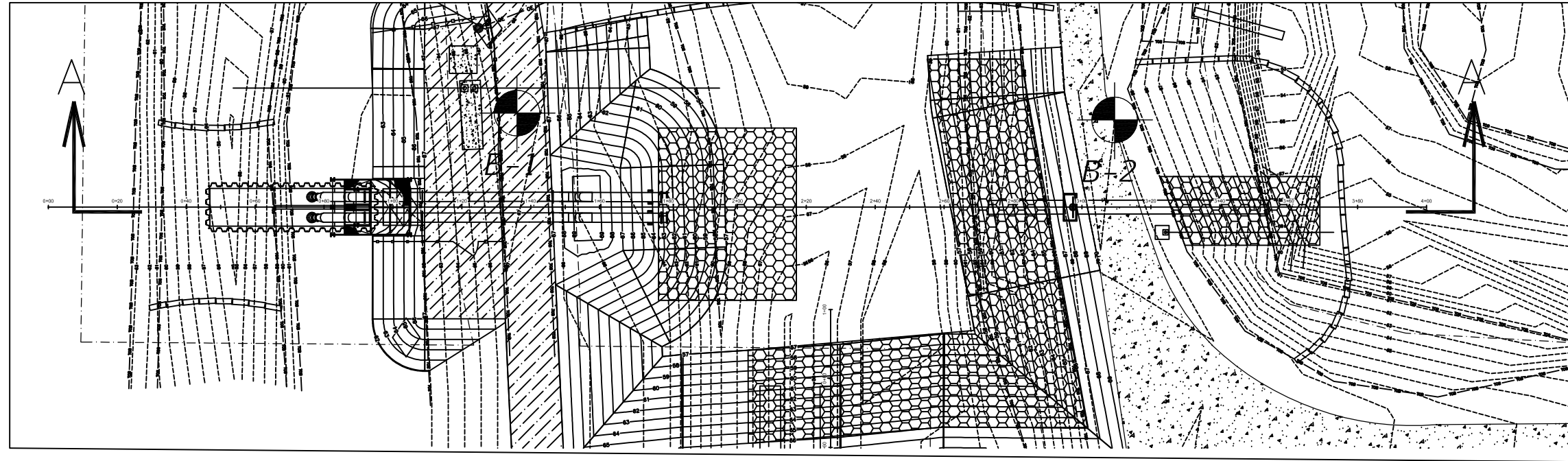
Notes:

^aS.U. : pH standard units

^bU: Compound tested for but not detected

* Extremely Aggressive due to the project site being within 2,500 feet from tributaries of the intracoastal water way which is connected to Lake Apopka with chloride concentrations in excess of 6,000 ppm.

Muck Probe Plan



Muck and Soft Soil

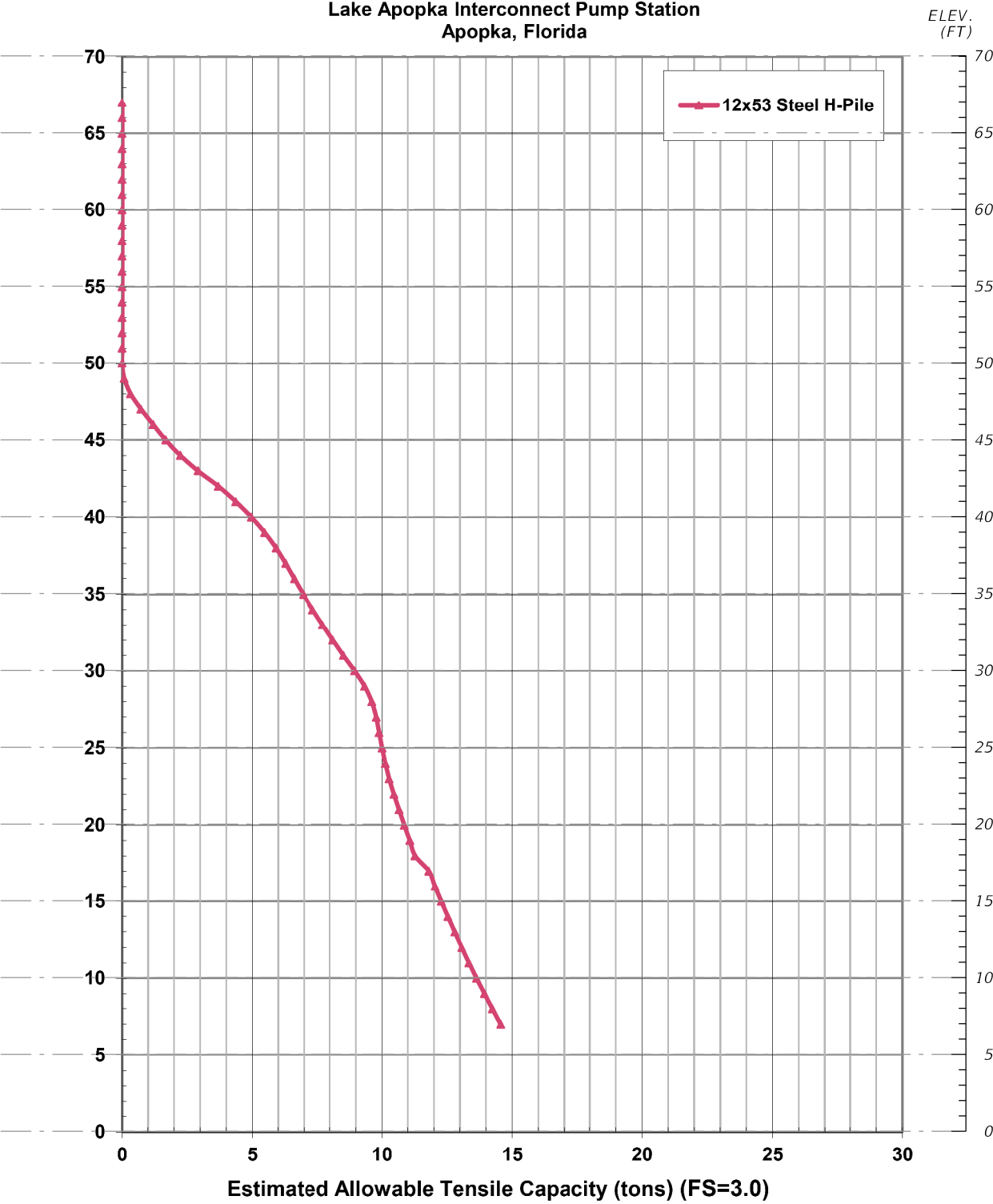
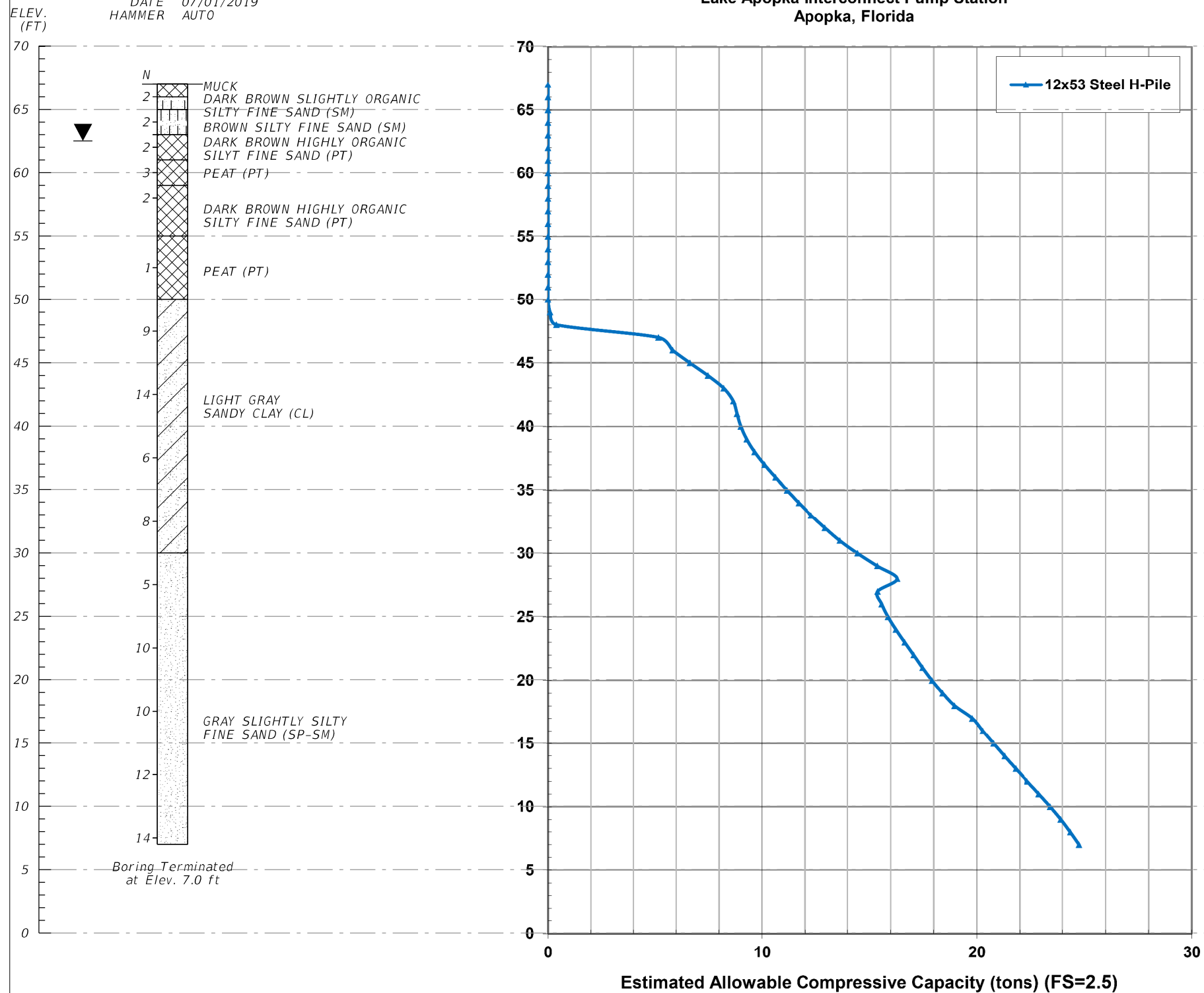
Cross Section A-A

Driven Pile Capacity Curves

BOR # B-1
 LATITUDE 28°41'53.31"N
 LONGITUDE 81°38'04.67"W
 ELEV. 67.0'
 DATE 07/01/2019
 HAMMER AUTO

Estimated Allowable Compressive Capacity Curve
12x53 Steel H-Pile
Boring B-1
Lake Apopka Interconnect Pump Station
Apopka, Florida

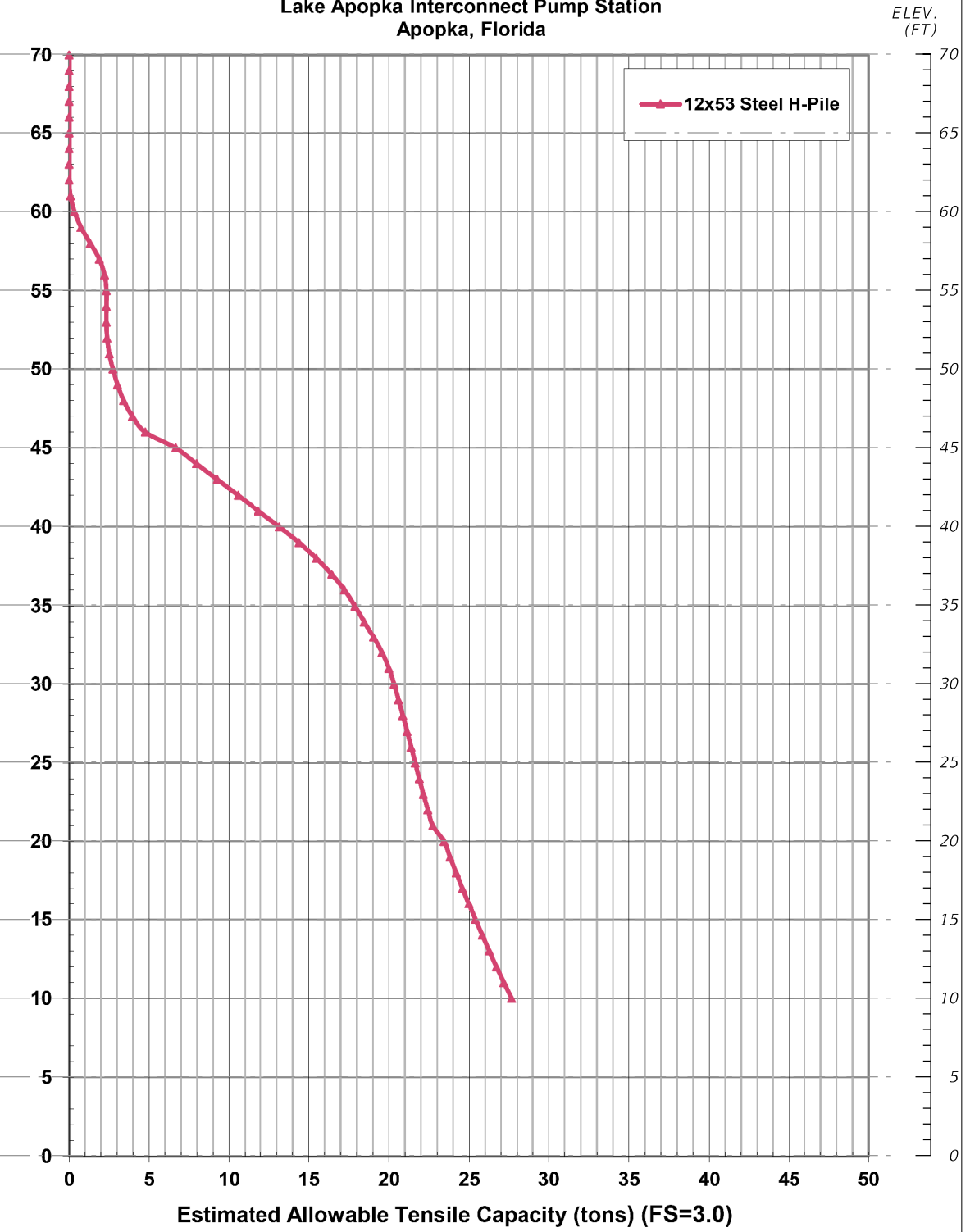
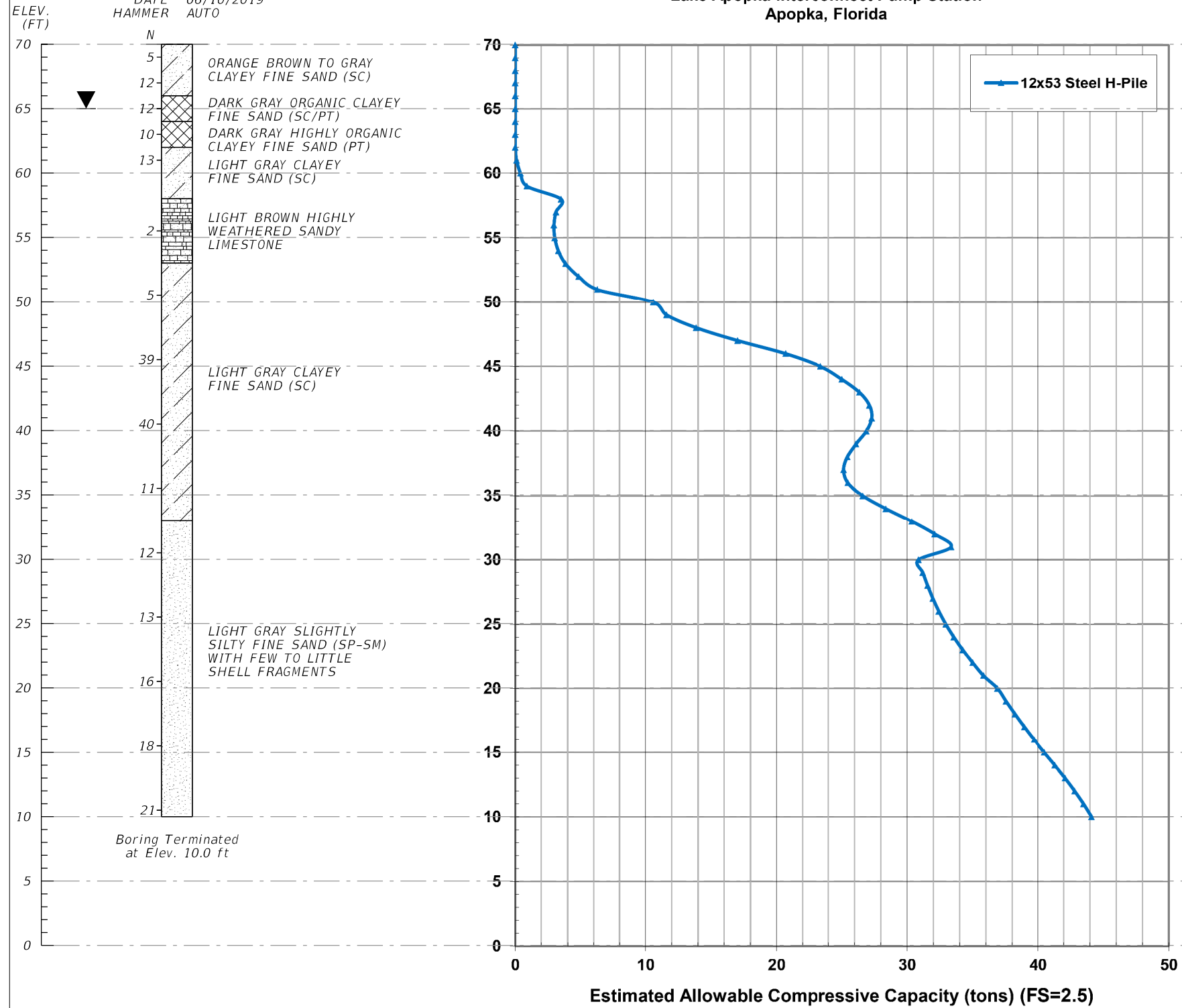
Estimated Allowable Tensile Capacity Curve
12x53 Steel H-Pile
Boring B-1
Lake Apopka Interconnect Pump Station
Apopka, Florida



BOR # B-2
 LATITUDE 28°41'53.65"N
 LONGITUDE 81°38'02.61"W
 ELEV. 70.0'
 DATE 06/10/2019
 HAMMER AUTO

Estimated Allowable Compressive Capacity Curve
12x53 Steel H-Pile
Boring B-2
Lake Apopka Interconnect Pump Station
Apopka, Florida

Estimated Allowable Tensile Capacity Curve
12x53 Steel H-Pile
Boring B-2
Lake Apopka Interconnect Pump Station
Apopka, Florida



Recommended Soil Parameters for Sheet Pile Wall Design

Recommended Soil Parameters for Sheet Pile Wall Design

Sheet Pile Wall – (Reference Boring: B-1)

Soil Parameter	Very Loose Silty Fine SAND, Highly Organic SAND and Sandy CLAY	Stiff to Very Stiff Sandy CLAY	Loose to Medium Dense SAND
Elevation (ft)	+67.0' to +50.0'	+50.0' to +30.0'	+30.0' to +7.0'
Saturated Unit Weight – γ (pcf)	90	110	110
Effective Unit Weight – γ' (pcf)	28	48	48
Angle of Internal Friction – ϕ (degrees)	-	-	31
Cohesion – C (psf)	250	1500	-
At-Rest Earth Pressure Coeff. K_0	1.00	1.00	0.48
Active Earth Pressure Coeff. K_a	1.00	1.00	0.32
Passive Earth Pressure Coeff. K_p	1.00	1.00	3.12

Recommended Soil Parameters for Sheet Pile Wall Design

Sheet Pile Wall- (Reference Boring B-2)

Soil Parameter	Medium Dense SAND and Clayey SAND with Organics	Highly Weathered Sandy Limestone	Stiff to Hard Clayey Fine SAND	Medium Dense SAND
Elevation (ft)	+70.0' to +58.0'	+58.0' to +53.0'	+53.0' to +33.0'	+33.0' to +10.0'
Saturated Unit Weight – g (pcf)	100	105	120	110
Effective Unit Weight – g' (pcf)	38	43	58	48
Angle of Internal Friction – ϕ (degrees)	29	28	-	31
Cohesion – C (psf)	-	-	2000	-
At-Rest Earth Pressure Coeff. K_0	0.52	0.53	1.00	0.48
Active Earth Pressure Coeff. K_a	0.35	0.36	1.00	0.32
Passive Earth Pressure Coeff. K_p	2.88	2.77	1.00	3.12

Lateral Soil Parameters

CSI Geo, Inc.
Lateral Soil Parameters

PROJECT NAME: Lake Apopka Interconnect Pump Station
 PROJECT NUMBER: 71-19-310-08
 PREPARED BY: TQ DATE: 4/14/2020
 CHECKED BY: JJ DATE: 4/14/2020

BORING NUMBER: B-1
 BORING DEPTH (ft): 60
 DEPTH TO GWT (ft): 6.5
 GS ELEVATION (ft): 67

HAMMER TYPE: AUTO
 PILE TYPE: Steel H-pile
 PILE SIZE: HP12x53

LAYER #	SOIL CLASSIFICATION	DEPTH (ft)		ELEVATION (ft)		VERTICAL TOTAL STRESS AT MID. LAYER	VERTICAL EFFECTIVE STRESS AT MID. LAYER	OVERBURDEN CORRECTION FACTOR ^A	CORRECTED N-VALUE	TOTAL UNIT WEIGHT ^A	LATERAL SOIL MODULUS ^B	50% STRAIN ^C	100% STRAIN ^C	UNDRAINED SHEAR STRENGTH ^D	FRICTION ANGLE ^E	POISSON'S RATIO ^F	SHEAR MODULUS ^G	STEEL H-PILE	
		TOP	BOTTOM	TOP	BOTTOM	σ (psf)	σ' (psf)	C_u	N'	γ (pcf)	k (pci)	ϵ_{50} (in/in)	ϵ_{100} (in/in)	C_u (psf)	Φ (deg)	ν	G (ksi)	ULT. UNIT SKIN FRICTION ^H	ULT. UNIT END BEARING ^I
																		f_s (psf)	q_b (ksf)
1	PT	0.0	1.0	67.0	66.0	47	47	2.0	5	90	70	0.010	0.030	250	---	0.45	0.9	160	5
2	SM	1.0	4.0	66.0	63.0	235	235	2.0	5	90	70	0.010	0.030	600	---	0.45	0.9	160	0
3	PT	4.0	17.0	63.0	50.0	981	731	1.3	4	90	40	0.020	0.060	250	---	0.40	0.6	160	5
4	CL	17.0	37.0	50.0	30.0	2575	1296	1.1	12	100	500	0.007	0.015	1600	30	0.50	4.1	680	15
5	SP-SM	37.0	60.0	30.0	7.0	4773	2152	1.0	12	105	30	---	---	---	31	0.30	1.3	25	65

NOTES:

* DUE TO THE VARIABILITY AND UNPREDICTABLE NATURE OF THE DEBRIS MATERIAL, THE PROVIDED PARAMETERS SHOULD BE USED WITH CAUTION

A) OVERBURDEN CORRECTION

B) SOIL UNIT WEIGHT FOLLOWS TYPICAL VALUES IN THE LITERATURE.

C) SOIL MODULUS (k) FOLLOWS:

SANDS/MIXED SOILS

CLAYS - TABLE 3.3 IN LPILE PLUS 5.0 USER'S MANUAL.

Partially Weathered Rock (PWR)

D) ϵ_{50} & ϵ_{100}

E) UNDRAINED SHEAR STRENGTH

F) FRICTION ANGLE

G) POISSON'S RATIO

H) SHEAR MODULUS

I) VERTICAL FAILURE SHEAR STRESS

J) VERTICAL BEARING FAILURE LOAD AT TIP

Key to Soil Classification

KEY TO SOIL CLASSIFICATION

Correlation of Penetration Resistance with Relative Density and Consistency

<u>Granular Materials</u>		<u>Silts and Clays</u>	
<u>Relative Density</u>	<u>Auto Hammer SPT N-Value (Blows/foot)</u>	<u>Consistency</u>	<u>Auto Hammer SPT N-Value (Blows/foot)</u>
Very Loose	Less than 3	Very Soft	Less than 1
Loose	3 - 8	Soft	1 - 3
Medium Dense	8 - 24	Firm	3 - 6
Dense	24 - 40	Stiff	6 - 12
Very Dense	Greater than 40	Very Stiff	12 - 24
		Hard	Greater than 24

Particle Size Identification (Unified Soil Classification System)

Boulders:	Diameter exceeds 8 inches
Cobbles:	3 to 8 inches diameter
Gravel:	Coarse - 3/4 to 3 inches in diameter Fine - 4.76 mm to 3/4 inch in diameter
Sand:	Coarse - 2.0 mm to 4.76 mm in diameter Medium - 0.42 mm to 2.0 mm in diameter Fine - 0.074 mm to 0.42 mm in diameter

Modifiers

These modifiers provide our estimate of the amount of fines (silt or clay size particles) in soil samples.

Approximate Fines Content

5% Fines 12%
12% Fines 30%
30% Fines 50%

Modifiers

Slightly silty or slightly clayey
Silty or clayey
Very silty or very clayey

These modifiers provide our estimate of shell, rock fragments, or roots in the soil sample.

Approximate Content, By Weight

< 5%
5% to 10%
15% to 25%
30% to 45%
50% to 100%

Modifiers

Trace
Few
Little
Some
Mostly

These modifiers provide our estimate of organic content in the soil sample.

Organic Content

1% to 3%
3% to 5%
5% to 20%
20% to 75%
> 75%

Modifiers

Trace
Slightly Organic
Organic
Highly Organic (Muck)
Peat

Field and Laboratory Test Procedures

FIELD AND LABORATORY TEST PROCEDURES

FIELD TEST PROCEDURES

Standard Penetration Test (SPT) Borings – Standard Penetration Tests (SPT) borings were made in general accordance with ASTM D-1586-67, "Penetration Test and Split-Barrel Sampling of Soils". The borings were continuously sampled to 10 ft. Below 10 feet and until boring termination depths, split spoon sampling was performed at a spacing of 5 feet. Below the groundwater levels, the borings were advanced using rotary drilling techniques with side discharge and circulating bentonite fluid for borehole flushing and stability. Drilling tools were removed from the borehole and a split-barrel sampler inserted to the borehole bottom and driven 18-24 inches into the material using a 140-pound SPT hammer falling on the average 30 inches per hammer blow. The number of hammer blows for the second and third six inch intervals of penetration is termed the "penetration resistance, blow count, or N-value". After driving the sampler 18-24 inches or to refusal at each test interval, the sampler was retrieved from the borehole and a representative sample of the material within the split-barrel was placed in a glass jar or plastic bag and sealed. After completing the drilling operations, the samples for the boring were transported to our laboratory where they were examined by one of our geotechnical engineers to verify the driller's field classifications.

LABORATORY TEST PROCEDURES

Percent Fine Content – To determine the percentage of soils finer than No. 200 sieve, the dried samples were washed over a 200 mesh sieve. The material retained on the sieve was oven dried and then weighed and compared with the unwashed dry weight in order to determine the weight of the fines. The percentage of fines in the soil sample was then determined as the percentage of weight of fines in the sample to the weight of the unwashed sample. This test was conducted in accordance with ASTM D 1140.

Natural Moisture Content – The water content is the ratio, expressed as a percentage, of the weight of water in a given mass of soil to the weight of the solid particles. This test was conducted in the general accordance with FM 1-T 265.

Percent Organic Content

This test is based on the percent of organics by weight of the total sample. This test was conducted in accordance with FM I - T 267.

Plasticity (Atterberg Limits) - The soil's Plastic Index (PI) is bracketed by the Liquid Limit (LL) and Plastic Limit (PL). The LL is the moisture content at which the soil flows as a heavy viscous fluid and is determined in general accordance with FM 1-T 089. The PL is the moisture content at which the soil begins to crumble when rolled into a small thread and is also determined in general accordance with FM 1-T 090. The water-plasticity ratio is computed from the above test data. This ratio is an expression comparing the relative natural state of soil with its liquid and plastic consolidation characteristics.

pH – The pH is an expression of the concentration of dissociated hydrogen ions present in an aqueous solution. pH values range from 1 to 14, with values below 7 indicating acidic conditions and values above 7 indicating alkaline (basic) conditions. This test is performed using a calibrated electronic pH meter with a sensing probe. The meter is calibrated by immersing the probe in a

solution with a known pH. The soil pH is determined by mixing equal weights of soil and distilled water and testing the supernatant solution with the pH probe.

Electrical Resistivity – Resistivity is a measure of the resistance to flow of electrical current through the soil. Resistivity, the inverse of conductivity, is measured in units of ohm-centimeters. This measurement is performed with a calibrated electronic conductivity/resistivity meter which is equipped with a sensing probe. The conductivity/resistivity of soil samples is conductivity/resistivity of the supernatant solution with the sensing probe.

Sulfate and Chloride Content – The sulfate (SO_4^{2-}) and chloride (Cl^-) content of the site soils were performed in general accordance with ASTM D-512 for chloride ions in soils, and ASTM D-4130 for sulfate ions in soils.

APPENDIX B
PERMITS

FDEP



FLORIDA DEPARTMENT OF Environmental Protection

Central District
3319 Maguire Blvd, Suite 232
Orlando, FL 32803-3767

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Noah Valenstein
Secretary

April 30, 2020

Dr. Ann Shortelle, Executive Director
St. John's River Water Management District
4049 Reid Street
Palatka, FL 32177-2571
ashortelle@sjrwmd.com

File No. 0386773-001 Orange

Dear Dr. Shortelle:

On April 10, we received your notice of intent to use a General Permit (GP), pursuant to Rule 62-330.439, Florida Administrative Code (F.A.C.) to construct a pump station and infrastructure improvements within the Lake Apopka North Shore (LANS) area. The project is located near the intersection of Canal Road and Fudge Road in the LANS area, Apopka, Florida.

Your intent to use a General Permit has been reviewed by Department staff for three types of authorizations: (1) regulatory authorization, (2) proprietary authorization (related to state-owned submerged lands), and (3) federal authorization. The authority for review and the outcomes of the reviews are listed below. Please read each section carefully.

Your project did not qualify for the federal, therefore, additional authorization must be obtained prior to commencement of the proposed activity. This letter does not relieve you from the responsibility of obtaining other federal, state, or local authorizations that may be required for the activity. Please refer to the specific section(s) dealing with that portion of the review below for advice on how to proceed.

If you change the project from what you submitted, the authorization(s) granted may no longer be valid at the time of commencement of the project. Please contact us prior to beginning your project if you wish to make any changes.

1. Regulatory Review – Approved

Based on the forms, drawings, and documents submitted with your notice, it appears that the project meets the requirements for the General Permit under Rule 62-330.439, F.A.C. Any activities performed under a General Permit are subject to general conditions required in Rule 62-330.405, F.A.C. (attached), and the specific conditions of Rule 62-330.439, F.A.C. (attached).

Any deviations from these conditions may subject the permittee to enforcement action and possible penalties.

Please be advised that the construction phase of the GP must be completed within five years from the date the notice to use the GP was received by the Department. If you wish to continue this GP beyond the expiration date, you must notify the Department at least 30 days before its expiration.

Authority for review- Part IV of Chapter 373, F.S., Title 62, F.A.C. and in accordance with the operating agreements executed between the Department and the water management districts, as referenced in Chapter 62-113, F.A.C.

2. Proprietary Review – Not required

The activity does not appear to be located on sovereign submerged lands, and does not require further authorization under Chapter 253 of the Florida Statutes, or Chapters 18-20 or 18-21 of the Florida Administrative Code.

3. Federal Review - SPGP Not Approved

Your proposed activity as outlined on your application and attached drawings does not qualify for Federal authorization pursuant to the State Programmatic General Permit and a SEPARATE permit or authorization shall be required from the U. S. Army Corps of Engineers. You must apply separately to the Corps using the Application for Department of the Army Permit (ENG 4345) or alternative as allowed by Corps regulations. More information on Corps permitting may be found online in the Jacksonville District Regulatory Division Sourcebook (<https://www.saj.usace.army.mil/Missions/Regulatory/Source-Book/>).

Authority for review - an agreement with the USACOE entitled “Coordination Agreement Between the U. S. Army Corps of Engineers (Jacksonville District) and the Florida Department of Environmental Protection (or Duly Authorized Designee), State Programmatic General Permit”, Section 10 of the Rivers and Harbor Act of 1899, and Section 404 of the Clean Water Act.

Additional Information

Please retain this General Permit. The activities may be inspected by authorized state personnel in the future to ensure compliance with appropriate statutes and administrative codes. If the activities are not in compliance, you may be subject to penalties under Chapter 373, F.S., and Chapter 18-14, F.A.C.

NOTICE OF RIGHTS

This action is final and effective on the date filed with the Clerk of the Department unless a petition for an administrative hearing is timely filed under Sections 120.569 and 120.57, F.S., before the deadline for filing a petition. On the filing of a timely and sufficient petition, this action will not be final and effective until further order of the Department. Because the administrative hearing process is designed to formulate final agency action, the subsequent order may modify or take a different position than this action.

Petition for Administrative Hearing

A person whose substantial interests are affected by the Department's action may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57, F.S. Pursuant to Rules 28-106.201 and 28-106.301, F.A.C., a petition for an administrative hearing must contain the following information:

- (a) The name and address of each agency affected and each agency's file or identification number, if known;
- (b) The name, address, any e-mail address, any facsimile number, and telephone number of the petitioner, if the petitioner is not represented by an attorney or a qualified representative; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination;
- (c) A statement of when and how the petitioner received notice of the agency decision;
- (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;
- (e) A concise statement of the ultimate facts alleged, including the specific facts that the petitioner contends warrant reversal or modification of the agency's proposed action;
- (f) A statement of the specific rules or statutes that the petitioner contends require reversal or modification of the agency's proposed action, including an explanation of how the alleged facts relate to the specific rules or statutes; and
- (g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wishes the agency to take with respect to the agency's proposed action.

The petition 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, or via electronic correspondence at Agency_Clerk@dep.state.fl.us. Also, a copy of the petition shall be mailed to the applicant at the address indicated above at the time of filing.

Time Period for Filing a Petition

In accordance with Rule 62-110.106(3), F.A.C., petitions for an administrative hearing by the applicant and persons entitled to written notice under Section 120.60(3), F.S., must be filed within 21 days of receipt of this written notice. Petitions filed by any persons other than the applicant, and other than those entitled to written notice under Section 120.60(3), F.S., must be filed within 21 days of publication of the notice or within 21 days of receipt of the written notice, whichever occurs first. You cannot justifiably rely on the finality of this decision unless notice of this decision and the right of substantially affected persons to challenge this decision has been duly published or otherwise provided to all persons substantially affected by the decision. While you are not required to publish notice of this action, you may elect to do so pursuant Rule 62-110.106(10)(a).

The failure to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57, F.S., or to intervene in this proceeding and participate as a party to it. 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, F.A.C. If you do not publish notice of this action, this waiver will not apply to persons who have not received written notice of this action.

Extension of Time

Under Rule 62-110.106(4), F.A.C., a person whose substantial interests are affected by the Department's action may also request an extension of time to file a petition for an administrative hearing. The Department may, for good cause shown, grant the request for an extension of time. Requests for extension of time must be filed with the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, or via electronic correspondence at Agency_Clerk@dep.state.fl.us, before the deadline for filing a petition for an administrative hearing. A timely request for extension of time shall toll the running of the time period for filing a petition until the request is acted upon.

Mediation

Mediation is not available in this proceeding.

FLAWAC Review

The applicant, or any party within the meaning of Section 373.114(1)(a) or 373.4275, F.S., may also seek appellate review of this order before the Land and Water Adjudicatory Commission under Section 373.114(1) or 373.4275, F.S. Requests for review before the Land and Water Adjudicatory Commission must be filed with the Secretary of the Commission and served on the Department within 20 days from the date when this order is filed with the Clerk of the Department.

Judicial Review

Once this decision becomes final, any party to this action has the right to seek judicial review pursuant to Section 120.68, F.S., by filing a Notice of Appeal pursuant to Florida Rules of Appellate Procedure 9.110 and 9.190 with the Clerk of the Department in the Office of General Counsel (Station #35, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000) and by

62-330.485 General Permit to the Department and Water Management Districts for Environmental Restoration or Enhancement.

(1) A general permit is granted to the Department and Districts for the construction, alteration, operation, maintenance, removal and abandonment of projects to implement Department or District environmental restoration or enhancement projects.

(2) The environmental restoration or enhancement project must comply with any one of the following procedures:

(a) The project is part of a Surface Water Improvement and Management Plan developed pursuant to section 373.453, F.S.; or

(b) The project is approved by the District Governing Board or the Secretary of the Department after conducting at least one public meeting; or

(c) The project is wholly or partially funded through the Land Acquisition Trust Fund pursuant to Article X, Section 28 of the Florida Constitution, or through any successor trust fund.

(3) When the activity is to be conducted by the Department, the Department shall provide the notice and any processing fee required by rule 62-330.071, F.A.C., to the appropriate District.

(4) When the activity is to be conducted by a District, the District shall provide the notice and any required fee to the appropriate Department office.

62-330.405 General Conditions for All General Permits

The following general permit conditions are binding upon the permittee and are enforceable under chapter 373, F.S. These conditions do not apply to the general permit for stormwater management systems under section 403.814(12), F.S.

(1) The general permit is valid only for the specific activity indicated. Any deviation from the specified activity and the conditions for undertaking that activity shall constitute a violation of the permit and may subject the permittee to enforcement action and revocation of the permit under chapter 373, F.S.

(2) The general permit does not eliminate the necessity to obtain any required federal, state, local and special district authorizations prior to the start of any construction, alteration, operation, maintenance, removal or abandonment authorized by this permit; and it does not authorize any violation of any other applicable federal, state, local, or special district laws (including, but not limited to, those governing the “take” of listed species).

(3) The general permit does not convey to the permittee or create in the permittee any property right, or any interest in real property, nor does it authorize any entrance upon or activities on property which is not owned or controlled by the permittee, or convey any rights or privileges other than those specified in the general permit.

(4) The general permit does not relieve the permittee from liability and penalties when the permitted activity causes harm or injury to: human health or welfare; animal, plant or aquatic life; or property. It does not allow the permittee to cause pollution that violates state water quality standards.

(5) Section 253.77, F.S., provides that a person may not commence any excavation, construction, or other activity involving the use of state-owned or other lands of the state, the title to which is vested in the Board of Trustees of the Internal Improvement Trust Fund without

obtaining the required consent, lease, easement, or other form of authorization authorizing the proposed use. Therefore, the permittee is responsible for obtaining any necessary authorizations from the Board of Trustees prior to commencing activity on state-owned lands.

(6) The authorization to conduct activities under a general permit may be modified, suspended or revoked in accordance with chapter 120, F.S., and section 373.429, F.S.

(7) The general permit is not transferable to a new third party. To be used by a different permittee, a new notice to use a general permit must be submitted in accordance with rule 62-330.402, F.A.C. Activities constructed in accordance with the terms and conditions of a general permit are automatically authorized to be operated and maintained by the permittee and subsequent owners in accordance with subsection 62-330.340(1), F.A.C. Any person holding the general permit, persons working under the general permit, and owners of land while work is conducted under the general permit shall remain liable for any corrective actions that may be required as a result of any permit violations prior to sale, conveyance, or other transfer of ownership or control of the permitted project, activity, or the real property at which the permitted project or activity is located.

(8) Upon reasonable notice to the permittee, Agency staff with proper identification shall have permission to enter, inspect, sample and test the permitted system to ensure conformity with the plans and specifications approved by the general permit.

(9) The permittee shall maintain any permitted project or activity in accordance with the plans submitted to the Agency and authorized in the general permit.

(10) A permittee's right to conduct a specific activity under the general permit is authorized for a duration of five years.

(11) Activities shall be conducted in a manner that does not cause or contribute to violations of state water quality standards. Performance-based erosion and sediment control best management practices shall be implemented and maintained immediately prior to, during, and after construction as needed to stabilize all disturbed areas, including other measures specified in the permit to prevent adverse impacts to the water resources and adjacent lands. Erosion and sediment control measures shall be installed and maintained in accordance with the *State of Florida Erosion and Sediment Control Designer and Reviewer Manual (Florida Department of Environmental Protection and Florida Department of Transportation, June 2007)*, available at <https://www.flrules.org/Gateway/reference.asp?No=Ref-04227>, and the *Florida Stormwater Erosion and Sedimentation Control Inspector's Manual (Florida Department of Environmental Protection, Nonpoint Source Management Section, Tallahassee, Florida, July 2008)*, available at http://publicfiles.dep.state.fl.us/DEAR/Stormwater_Training_Docs/erosion-inspectors-manual.pdf.

(12) Unless otherwise specified in the general permit, temporary vehicular access within wetlands during construction shall be performed using vehicles generating minimum ground pressure to minimize rutting and other environmental impacts. Within forested wetlands, the permittee shall choose alignments that minimize the destruction of mature wetland trees to the greatest extent practicable. When needed to prevent rutting or soil compaction, access vehicles shall be operated on wooden, composite, metal, or other non-earthen construction mats. In all cases, access in wetlands shall comply with the following:

(a) Access within forested wetlands shall not include the cutting or clearing of any native wetland tree having a diameter four inches or greater at breast height;

(b) The maximum width of the construction access area shall be limited to 15 feet;

(c) All mats shall be removed as soon as practicable after equipment has completed passage

through, or work has been completed, at any location along the alignment of the project, but in no case longer than seven days after equipment has completed work or passage through that location; and

(d) Areas disturbed for access shall be restored to natural grades immediately after the maintenance or repair is completed.

(13) Barges or other work vessels used to conduct in-water activities shall be operated in a manner that prevents unauthorized dredging, water quality violations, and damage to submerged aquatic communities.

(14) The construction, alteration, or use of the authorized project shall not adversely impede navigation or create a navigational hazard in the water body.

(15) Except where specifically authorized in the general permit, activities must not:

(a) Impound or obstruct existing water flow, cause adverse impacts to existing surface water storage and conveyance capabilities, or otherwise cause adverse water quantity or flooding impacts to receiving water and adjacent lands; or

(b) Cause an adverse impact to the maintenance of surface or ground water levels or surface water flows established pursuant to section 373.042, F.S., or a Works of the District established pursuant to section 373.086, F.S.

(16) If prehistoric or historic artifacts, such as pottery or ceramics, projectile points, stone tools, dugout canoes, metal implements, historic building materials, or any other physical remains that could be associated with Native American, early European, or American settlement are encountered at any time within the project site area, the permitted project shall cease all activities involving subsurface disturbance in the vicinity of the discovery. The permittee or other designee shall contact the Florida Department of State, Division of Historical Resources, Compliance Review Section (DHR), at (850)245-6333, as well as the appropriate permitting agency office. Project activities shall not resume without verbal or written authorization from the Division of Historical Resources. If unmarked human remains are encountered, all work shall stop immediately and the proper authorities notified in accordance with section 872.05, F.S.

(17) The activity must be capable, based on generally accepted engineering and scientific principles, of being performed and of functioning as proposed, and must comply with any applicable District special basin and geographic area criteria.

(18) The permittee shall comply with the following when performing work within waters accessible to federally- or state-listed aquatic species, such as manatees, marine turtles, smalltooth sawfish, and Gulf sturgeon:

(a) All vessels associated with the project shall operate at "Idle Speed/No Wake" at all times while in the work area and where the draft of the vessels provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

(b) All deployed siltation or turbidity barriers shall be properly secured, monitored, and maintained to prevent entanglement or entrapment of listed species.

(c) All in-water activities, including vessel operation, must be shut down if a listed species comes within 50 feet of the work area. Activities shall not resume until the animal(s) has moved beyond a 50-foot radius of the in-water work, or until 30 minutes elapses since the last sighting within 50 feet. Animals must not be herded away or harassed into leaving. All onsite project personnel are responsible for observing water-related activities for the presence of listed species.

(d) Any listed species that is killed or injured by work associated with activities performed shall be reported immediately to the Florida Fish and Wildlife Conservation Commission (FWC) Hotline at 1(888)404-3922 and ImperiledSpecies@myFWC.com.

(e) Whenever there is a spill or frac-out of drilling fluid into waters accessible to the above species during a directional drilling operation, the FWC shall be notified at ImperiledSpecies@myfwc.com with details of the event within 24 hours following detection of the spill or frac-out.

(19) The permittee shall hold and save the Agency harmless from any and all damages, claims, or liabilities which may arise by reason of the construction, alteration, operation, maintenance, removal, abandonment or use of any activity authorized by the general permit.

(20) The permittee shall immediately notify the Agency in writing of any submitted information that is discovered to be inaccurate.

Rulemaking Authority 373.026(7), 373.043, 373.118(1), 373.406(5), 373.4131, 373.414(9), 373.4145, 373.418, 403.805(1) FS. Law Implemented 373.044, 373.118(1), 373.129, 373.136, 373.406(5), 373.413, 373.4131, 373.414(9), 373.4145, 373.416, 373.422, 373.423, 373.429, 403.814(1) FS. History—New 10-3-95, Amended 10-1-07, Formerly 62-341.215, Amended 10-1-13, 6-1-18.

April 7, 2020

Florida Department of Environmental Project (FDEP)
Central District
3319 Maguire Blvd., Suite 232
Orlando, FL 32803-3767

RE: SJRWMD Lake Apopka North Shore Interconnect Pump Station
ERP Submittal

Dear FDEP:

Four Waters Engineering (4Waters) has been tasked by the St. Johns River Water Management District (SJRWMD) to design and permit a pump station and infrastructure improvements to allow movement of water for different areas of the North Shores of Lake Apopka to improve water quality. The location of the improvements is located near the intersection of Canal Road and Fudge Road as shown in the permit figure vicinity map.

The proposed duplex pump station design includes pump access platforms, electrical service to the pumps, pump controls for the pump station, site grading with temporary and permanent erosion control, fencing, gravel access, temporary coffer dams, pump basin, pump pipe discharge, and proposed culverts with control gate structures.

The ERP permit submittal includes the following items:

- Signed ERP Application.
- Signed and sealed Permit Figures.
- Permit Fee, SJRWMD requests FDEP to send payment amount after a permit number is assigned – this can be sent to my email address and I will forward to SJRWMD to pay via credit card.

Please notify us upon receipt of this hardcopy and we will send the project manager assigned to this project the electronic copy of the submittal. Please contact me if you require any additional information or clarification for this permit submittal. My contact information is mklink@4WEng.com or (904) 414-2400, Ext. 54.

Thank you for your assistance.

Sincerely,
FOUR WATERS ENGINEERING, INC.



Michael Klink, P.E.
Senior Engineer

RECEIVED

APR 10 2020

DEP Central District

Enclosures: As stated

Cc (via email): Bob Naleway, SJRWMD Senior Professional Engineer
Becky Trudeau, SJRWMD Environmental Coordinator

Notice of Intent to Use an Environmental Resource General Permit

Instructions: This form is for projects that qualify for a General Permit in accordance with Chapter 62-330 F.A.C. General Permits (GP) are provided for certain activities that have been determined to have minimal impacts to the water resources of the state when conducted in compliance with the terms and conditions of the general permit. Complete and submit this form to the appropriate agency as identified in Part 3 below.

If activity is located on, or has the potential to be located on, state-owned sovereignty submerged lands (SSL), the reviewing Agency will begin processing the request for state-owned sovereignty submerged lands authorization. If you know that your project is located on SSL, (i.e., waterward of the line of mean or ordinary high water of rivers, streams, bays, bayous, sounds, the Gulf of Mexico, the Atlantic Ocean, or certain natural lakes, we recommend completing Section F of the Environmental Resource Permit Application. You are not required to complete Section F to receive a General Permit, but it will help the agency process the SSL authorization. Both authorizations are required prior to construction on SSL.

Part 1: General Information

A. Rule section number of the GP or which you are applying: 62-330.485 , F.A.C.

We recommend contacting your local Corps district office if your project does not qualify for the State Programmatic General Permit (SPGP) and you are not sure whether the project requires separate Corps authorization. If Corps authorization is required, you will need to submit the appropriate federal application form separately to the Corps. Corps contact information may be found online at the Jacksonville District Regulatory Division website.

B. Applicant This is a Contact Person for Additional Information

Name: Last: Shortelle

First: Ann

Middle: B

Title: Executive Director, SJRWMD Company: SJRWMD

Address: 4049 Reid Street

City: Palatka

State: FL

Zip: 32177-2571

Home Telephone:

Work Telephone: (386) 329-4500

Cell Phone:

E-mail Address: ashortelle@sjrwmd.com

Correspondence will be sent via email, unless you check here to receive it via US Mail



C. Consultant/Agent This is a Contact Person for Additional Information

Name: Last: Klink First: Michael Middle: R
Title: Senior Engineer Company: Four Waters Engineering, Inc.
Address: 324 6th Avenue North
City: Jacksonville Beach State: FL Zip: 32250
Home Telephone: Work Telephone: (904) 414-2400 ext. 54
Cell Phone: (843) 298-2369
E-mail Address: mklink@4WEng.com

Correspondence will be sent via email, unless you check here to receive it via US Mail

D. Land Owner(s) (If Different or in Addition to Applicant Identified Above)

Name: Last: First: Middle:
Title: Company:
Address:
City: State: Zip:
Home Telephone: Work Telephone:
Cell Phone:
E-mail Address:

Correspondence will be sent via email, unless you check here to receive it via US Mail:

E. Location of proposed activities:

Tax Parcel Identification Number: 12-21-27-0000-00-006
Address: 2803 Lust Rd
City: Apopka County: Orange Zip: 32712
Latitude (DMS) 28 ° 41 ' 53.2 " Longitude (DMS) 81 ° 38 ' 06.4 "

F. Date activity is proposed: To Commence: September 2020 To be Completed: August 2021

G. Describe in general terms the proposed project, system, or activity:

See attachment.

H. Describe wetland and aquatic habitats to be affected:

See attachment.

I. Construction methods and schedule:

See attachment.

J. Additional information that demonstrates that you qualify for the general permit, addressing all the parameters, thresholds, and conditions required in the general permit.

Part 2: Certification

I hereby certify I have read and will conduct the above activities in accordance with the criteria, limitations, and specific conditions of the general permit identified in Part 1 Section A, and in accordance with the general conditions of Rule 62-330.405, F.A.C. Unless otherwise provided in Chapter 62-330, F.A.C., activities conducted pursuant to the above general permit may commence thirty (30) days after providing written notice to the Department of Environmental Protection or the Water Management District, along with any required additional documentation which may be required to fulfill the requirements of the general permit, unless the Agency responds that the proposed work does not qualify for a general permit.

I understand I may have to provide any additional information/data that may be necessary to provide reasonable assurance or evidence that the proposed project will comply with the applicable state water quality standards or other environmental standards both before construction and after the process is completed.

I further acknowledge that work done under this general permit may also require the review and approval of other federal, state, or local agencies, and that commencement of construction before such federal, state, or local agency approvals or permits are obtained may subject me to enforcement action and fines or penalties by such agencies. Further, the work shall be conducted in a manner that does not violate applicable water quality standards.

Ann B. Shortelle, Ph.D.

 Mar 30, 2020

Typed/Printed Name of Applicant or Agent

Signature of Applicant or Agent

Date

An Agent May Sign Above If Applicant Completes the Following:

I hereby designate and authorize the agent listed in Item Part 1 Section C to act on my behalf as my agent in the processing of this permit application and to furnish on request, supplemental information in support of the application.

Typed/Printed Name of Applicant
(And corporate title, if applicable)

Signature of Applicant

Date

Certification of Sufficient Real Property Interest and Authorization for Staff to Access the Property:


I certify that:

I possess sufficient real property interest in or control, as defined in Section 4.2.3 (d) of Applicant's Handbook Volume I, over the land upon which the activities described in this application are proposed and I have legal authority to grant permission to access those lands. I hereby grant permission, evidenced by my signature below, for staff of the Agency to access, inspect, and sample the lands and waters of the property as necessary for the review of the proposed works and other activities specified in this application. I authorize these agents or personnel to enter the property as many times as may be necessary to make such review, inspection, and/ or sampling. Further, I agree to provide entry to the project site for such agents or personnel to monitor and inspect permitted work if a permit is granted.

OR

I represent an entity having the power of eminent domain and condemnation authority, and I/we shall make appropriate arrangements to enable staff of the Agency to access, inspect, and sample the property as described above.

Ann B. Shortelle, Ph.D., Executive Director

 Mar 30, 2020

Typed/Printed Name of Applicant
(And corporate title, if applicable)

Signature of Applicant

Date

Part 3: Submittal

In addition to the information described in this form, any Notice of Intent to use a General Permit must also include the following, as described in Section 4.2.2 of the Applicant's Handbook, Volume I:

- Location map(s) of sufficient detail to allow someone who is unfamiliar with the site to travel to and locate the specific site of the activity.
- One set of plans and drawings, calculations, environmental information, and other supporting documents that clearly and legibly depict and describe the proposed activities in sufficient detail to demonstrate that the work qualifies for the specified General Permit.
- The required fee, made payable to the appropriate agency.

Fees for the appropriate agency are established in the rules adopted in subsection 62-330.071(1), F.A.C., as listed below:

- Rule 62-4.050, F.A.C. (Department of Environmental Protection or the Northwest Florida Water Management District)
- Rule 40B-1.706, F.A.C. (Suwannee River Water Management District)
- Rule 40C-1.603, F.A.C. (St. Johns River Water Management District)
- Rule 40D-1.607, F.A.C. (Southwest Florida Water Management District)
- Rule 40E-1.607, F.A.C. (South Florida Water Management District)

Operating Agreements between the Department and the water management districts specify which agency will process any given application. For copies of the operating agreements, go to <https://floridadep.gov/ogc/ogc/content/operating-agreements>

This application form may be submitted online; to do so, follow the on-line submittal requirements of the agency:

- o Florida Department of Environmental Protection: <http://www.fldepportal.com/go/>
- o Northwest Florida Water Management District: <https://permitting.sjrwm.com/nwep/permitting/jsp/start.jsp>
- o Suwannee River Water Management District: <https://permitting.sjrwm.com/sre/permitting/jsp/start.jsp>
- o St. Johns River Water Management District: <https://permitting.sjrwm.com/e/permitting/jsp/AccountOverview.do?command=init>
- o Southwest Florida Water Management District: <http://www.swfwmd.state.fl.us/permits/e/permitting/>
- o South Florida Water Management District: <http://my.swfwmd.gov/ePermitting/MainPage.do>

If submitting a paper application, please see Appendix A of Applicant's Handbook, Volume I for submittal locations.

G: Describe in general terms the proposed project, system, or activity:

The objective of this project is to reduce the continued introduction of Phosphorus pumped into Lake Apopka by storing more water on the Lake Apopka North Shore. This will be achieved with the addition of a pumping facility capable of 50 cfs movement of water- including pump access platforms, electrical service to the pump (with transformer), controls for the pump station, site grading with temporary and permanent erosion control, fencing, temporary cofferdams for construction, permanent access berm with culverts and pump basin and drainage infrastructure improvements. The pumping facility will hydraulically connect the North Shore Duda parcel with the North Shore Zellwood parcel across Lake Level Canal.

H: Describe wetland and aquatic habitats to be affected:

All work is located within existing surface water canals adjacent to existing levees. Total surface waters to be impacted is 0.49-acre area. The new gated culvert placement at Canal Road will impact 0.07-acre of surface waters west and east of the road for the placement of riprap as erosion control on the embankment and at the ends of the culvert. No additional impacts are proposed associated with temporary excavation during construction at the road.

The proposed access road with gated culverts at Lake Level Canal will impact 0.29-acre area of surface waters for placement of earthen fill and riprap. These culverts have been sized to allow full pre-project flow in this canal and will not alter the hydraulics of the system. The road will provide necessary access to the pump station and the gated culverts will allow better hydraulic control over the various phases. Although alternative access is available it would require a 20-minute detour to access the pump station from Canal Road. Side slopes are the minimum necessary for stability and the riprap is the minimum to protect the side banks from potential erosion associated with operation of the system.

The proposed pump station and pipe discharge will impact a total of 0.13-acre area of surface waters in Lake Level Canal (0.07-acre) and the Duda Canal (0.06-acre). Impacts at the intake structure are for the construction of a pump bay, including sheetpile walls and an excavated and armored sump area surrounded by sheetpile walls. Fill placement for the pump station will prevent erosion during operation. Fill and riprap in Lake Level Canal are to protect from potential erosion associated with operation of the system.

I: Construction Methods and Schedule:

Standard construction methods will be used. Equipment will include bulldozers, loaders, dump trucks, long reaches, and similar equipment. Construction is scheduled to start September 2020 and be complete by August 2021.

J: Additional information that demonstrates that you qualify for the general permit, addressing all the parameters, thresholds, and conditions required in the general permit.

This work will facilitate hydrologic management allowing for continued progress in the restoration of the marsh at the Lake Apopka North Shore. This work was authorized by the Governing Board at a public meeting as part of the budget and the relevant meeting minute pages are attached.

Tuesday, April 9, 2019

Rich Burklew, chief, Bureau of Water Use Regulation, gave a PowerPoint presentation. A copy of the presentation has been made a permanent part of the record.

A MOTION WAS MADE BY DOUG BOURNIQUE TO APPROVE RECOMMENDATION, SECONDED BY SUSAN DOLAN. MOTION CARRIED UNANIMOUSLY.

Water Supply Committee adjourned at 10:08 a.m.

Water Quality Committee

The meeting of the Water Quality Committee began on Tuesday, April 9, at 10:18 a.m., at District Headquarters in Palatka, Florida. In addition to staff, the meeting was attended by Committee Chairman Susan Dolan, members Doug Burnett and Allan Roberts. Janet Price, Chuck Drake, and Fred Roberts were also in attendance.

Agenda Item 16. Consideration: Approval to issue a work order to Four Waters Engineering, Inc. for the design and permitting of the interconnect pumping system on the Lake Apopka North Shore to reduce total phosphorous discharge to the Lake.

Robert Naleway, senior professional engineer, Bureau of District Projects and Construction, gave a PowerPoint presentation. A copy of the presentation has been made a permanent part of the record.

A MOTION WAS MADE BY ALLAN ROBERTS TO APPROVE RECOMMENDATION, SECONDED BY DOUG BURNETT. MOTION CARRIED UNANIMOUSLY.

Allan Roberts expressed concerns with water quality issues within the district and the state. He suggested that the district investigate ways to develop and improve practices to protect and improve water quality such as buffers around wetlands.

Board members discussed coordinating with DEP regarding these issues.

Water Quality Committee adjourned at 10:41 a.m.

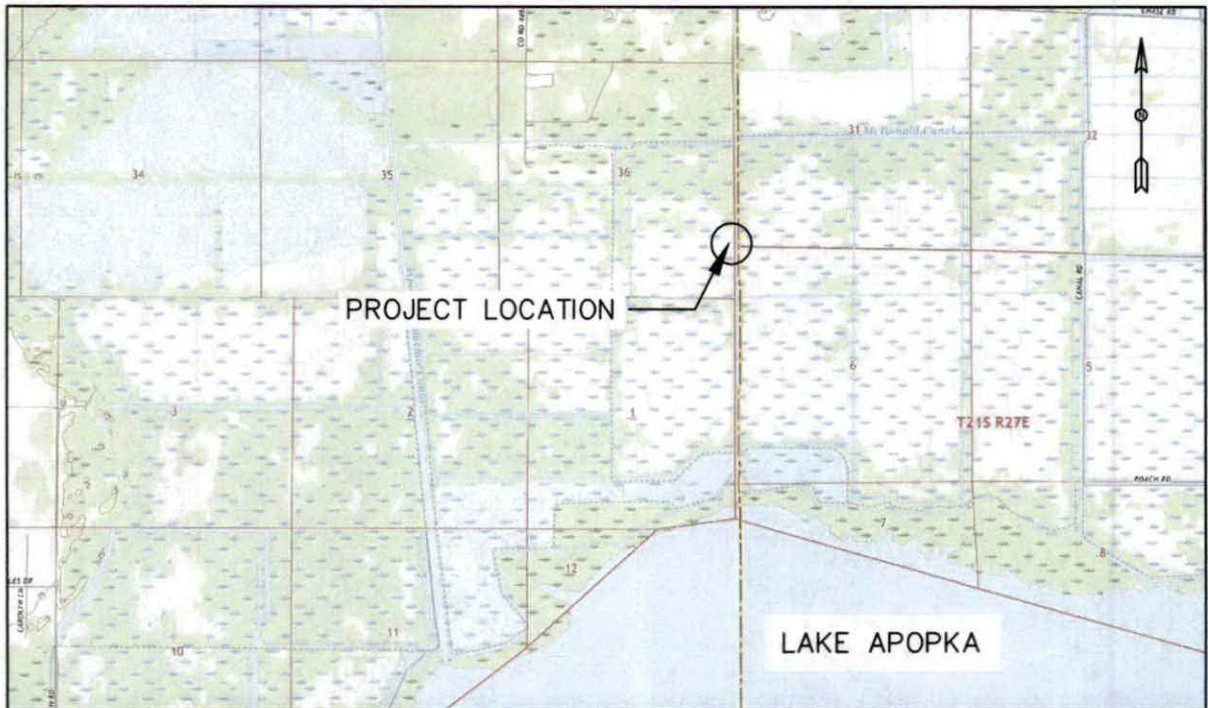
Finance, Audit and Administration Committee

The meeting of the Finance, Audit and Administration Committee began on Tuesday, April 9, at 10:44 a.m., at District Headquarters in Palatka, Florida. In addition to staff, the meeting was attended by Committee Chairman Ron Howse and members Fred Roberts and Chuck Drake. Janet Price, Doug Burnett, and Allan Roberts were also in attendance.

Agenda Item 17. Consideration: Approval of Treasurer's Financial Report dated February 28, 2019.

Mary-Lou Pickles, director, Office of Financial Services, gave a briefing of the Treasurer's Report.

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT UPPER OCKLAWAHA RIVER BASIN/ LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION ORANGE COUNTY, FLORIDA

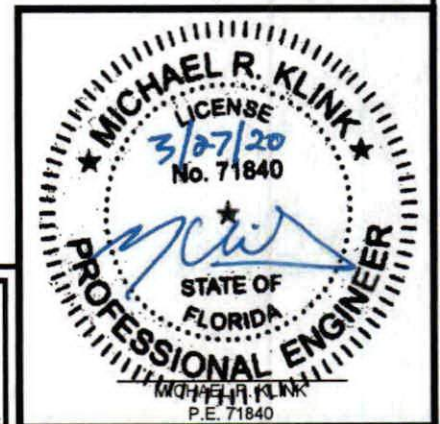


VICINITY MAP
NOT TO SCALE

SHEET INDEX

SHEET NO.	SHEET TITLE
1	COVER SHEET AND VICINITY MAP
2	OVERALL SITE PLAN
3	PUMP STATION LAYOUT
4	PUMP STATION PLAN
5	BERM A CROSS-SECTION
6	BERM B CROSS-SECTION
7	BERM C CROSS-SECTION
8	EROSION AND SEDIMENT CONTROL
9	EROSION AND SEDIMENT CONTROL
10	EROSION AND SEDIMENT CONTROL

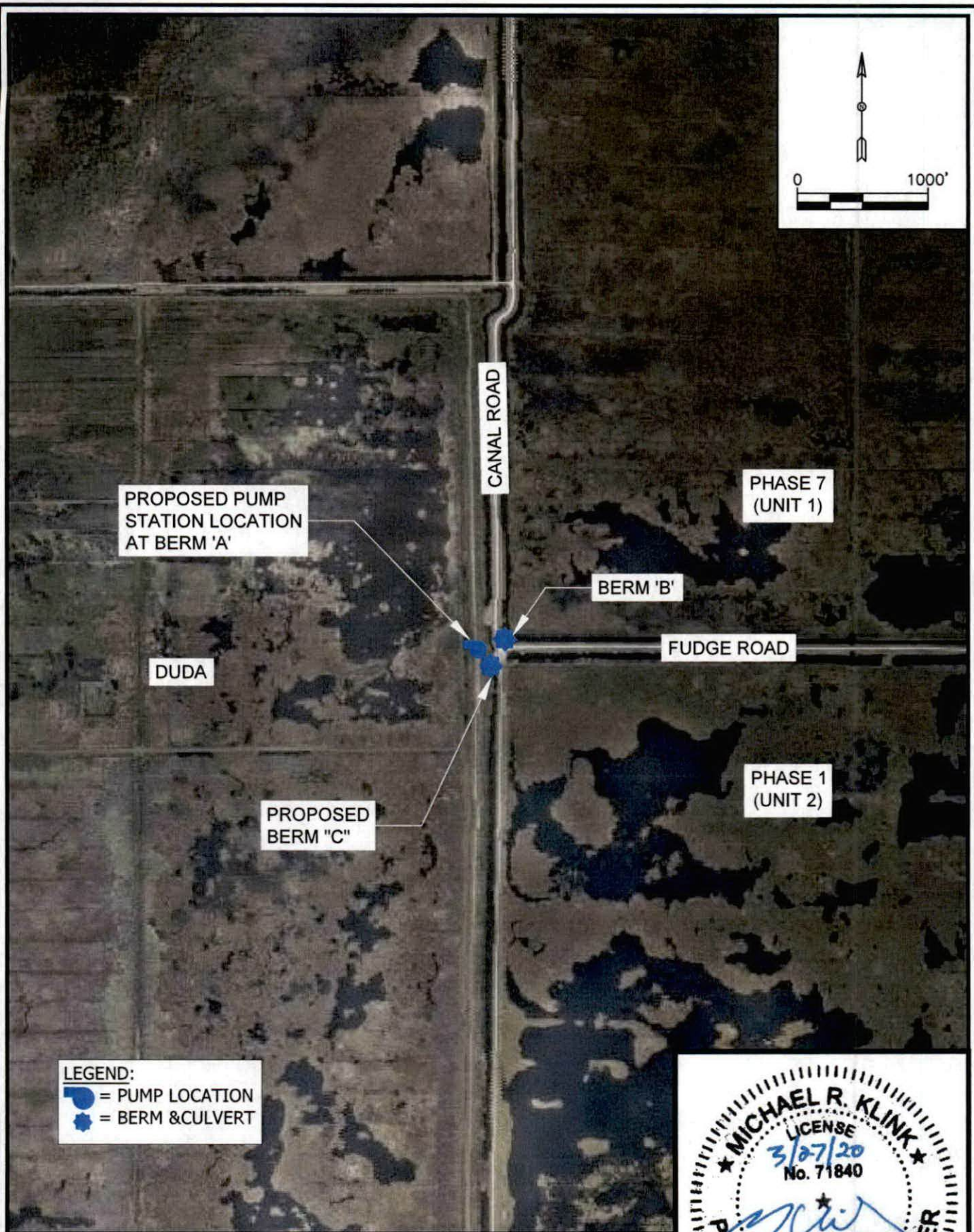
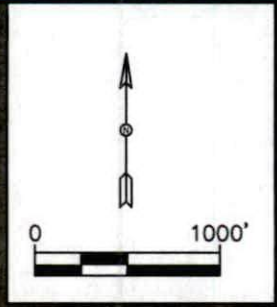
NOTE:
1. ALL ELEVATIONS SHOWN
HEREON ARE REFERENCED
TO NAVD(88)



FOUR WATERS ENGINEERING
324 6th AVE N. JACKSONVILLE BEACH, FLORIDA 32250
904-414-2400 C.O.A.# 31101 WWW.4WENG.COM

COVER SHEET AND VICINITY MAP
UPPER OCKLAWAHA RIVER BASIN/ LAKE APOPKA
NORTH SHORE INTERCONNECT PUMP STATION
ORANGE COUNTY, FLORIDA
PERMIT REVIEW **SHEET 1**

STEVE DUCHAMNE LOCATION R\19-1010 LAKE APOPKA\GIS\PERMIT\LAKE APOPKA PERMIT DRAWINGS_Y102.DWG



PROPOSED PUMP STATION LOCATION AT BERM 'A'

PHASE 7 (UNIT 1)

BERM 'B'

FUDGE ROAD

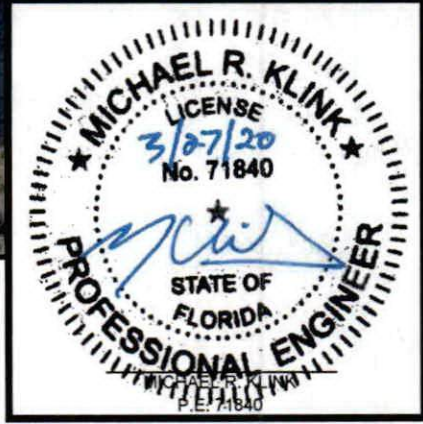
DUDA

PHASE 1 (UNIT 2)

PROPOSED BERM 'C'

CANAL ROAD

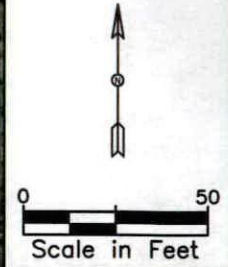
LEGEND:
 = PUMP LOCATION
 = BERM & CULVERT




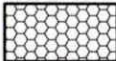
STEVE DUCHARNE LOCATION: P:\19-1010 LAKE APOPKA\X\GIS\PERMIT\LAKE_APOPKA_PERMIT_DRAWINGS_1\10.DWG

FOUR WATERS ENGINEERING
 324 6th AVE N. JACKSONVILLE BEACH, FLORIDA 32250
 904-414-2400 C.O.A.# 31101 WWW.4WENG.COM

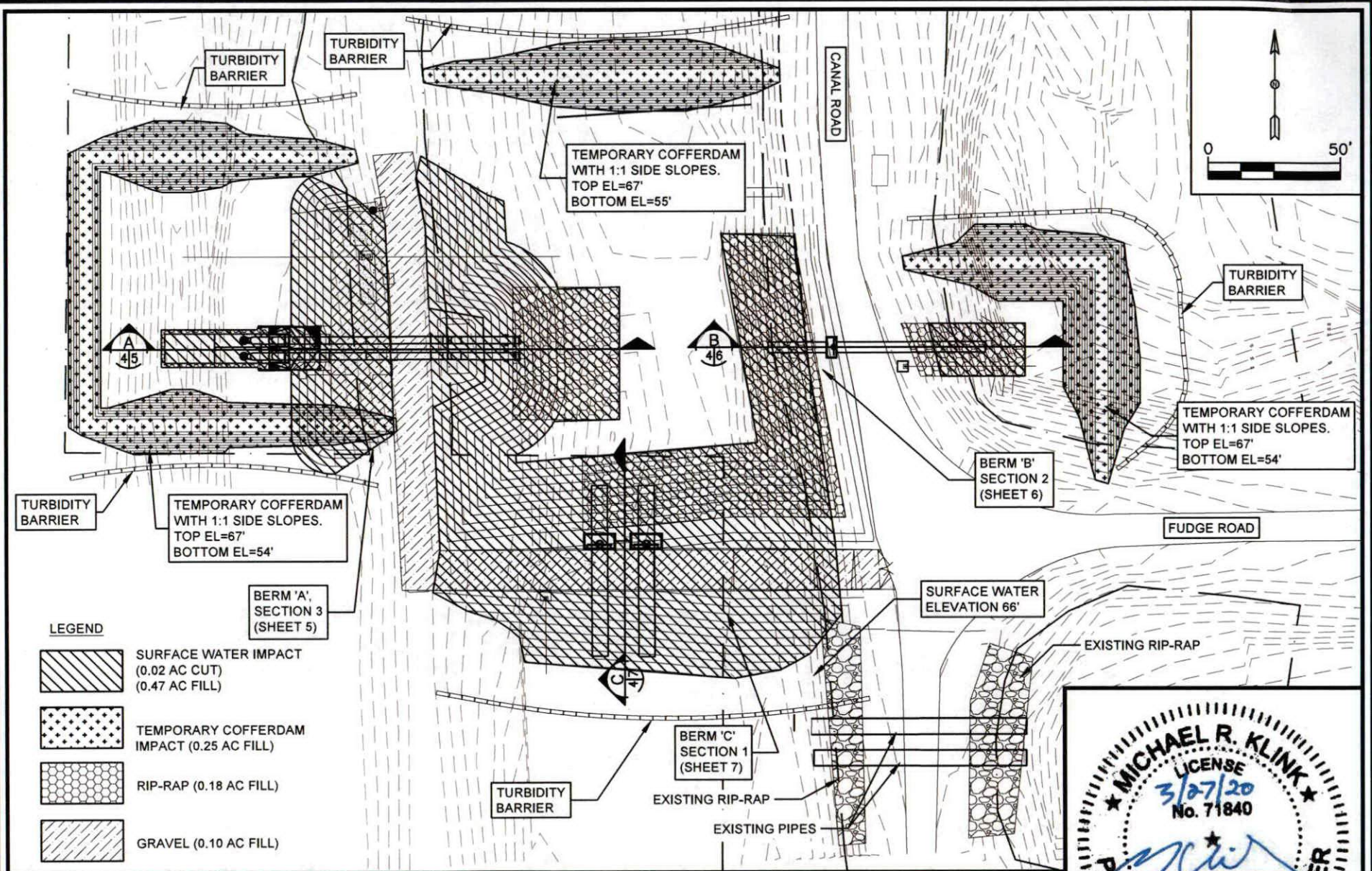
OVERALL SITE PLAN
 UPPER OCKLAWAHA RIVER BASIN/ LAKE APOPKA
 NORTH SHORE INTERCONNECT PUMP STATION
 ORANGE COUNTY, FLORIDA
PERMIT REVIEW SHEET 2



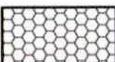



LEGEND

	#57 STONE
	RIP-RAP





- LEGEND**
-  SURFACE WATER IMPACT (0.02 AC CUT) (0.47 AC FILL)
 -  TEMPORARY COFFERDAM IMPACT (0.25 AC FILL)
 -  RIP-RAP (0.18 AC FILL)
 -  GRAVEL (0.10 AC FILL)

FOUR WATERS ENGINEERING
 324 6th AVE N. JACKSONVILLE BEACH, FLORIDA 32250
 904-414-2400 C.O.A.# 31101 WWW.4WENG.COM

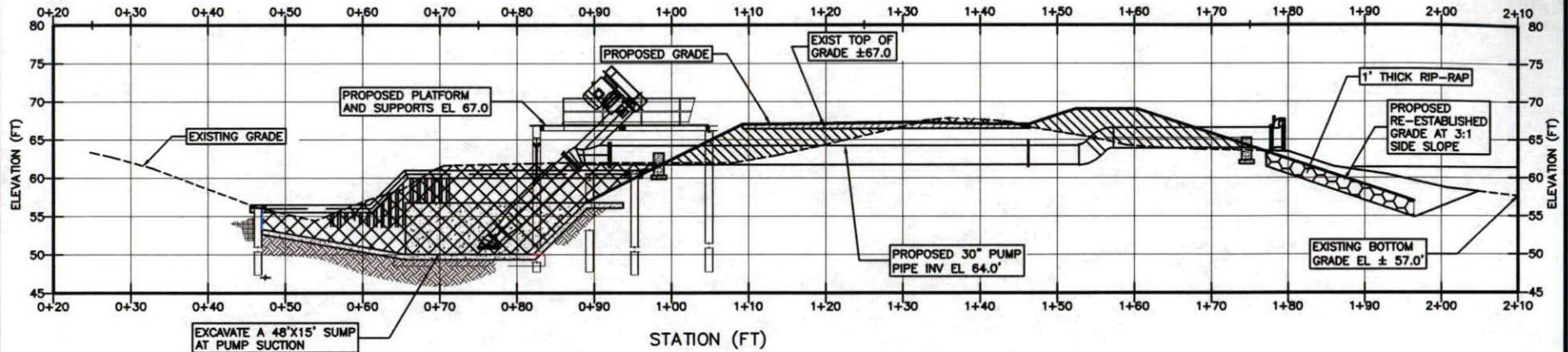
PUMP STATION PLAN

UPPER OCKLAWAHA RIVER BASIN/ LAKE APOPKA
 NORTH SHORE INTERCONNECT PUMP STATION
 ORANGE COUNTY, FLORIDA

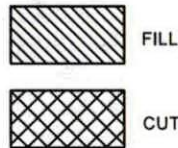
SHEET 4

PERMIT REVIEW





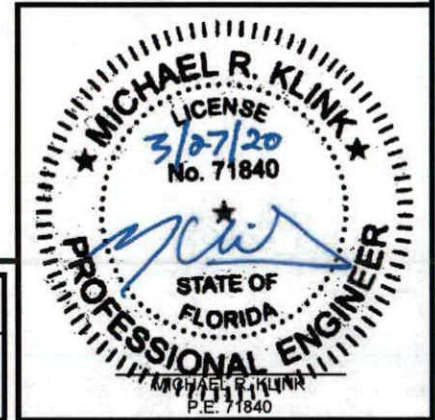
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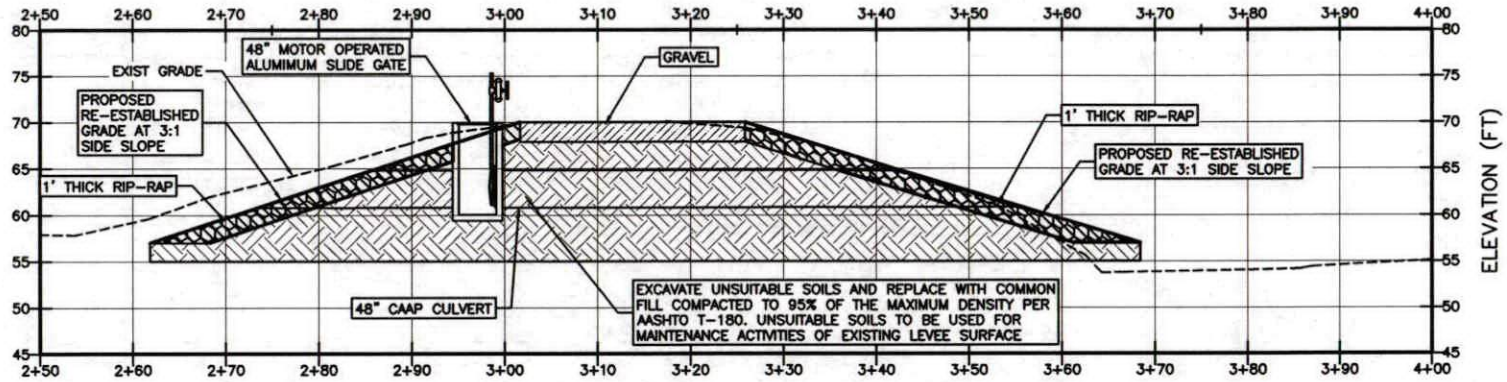


SECTION A

SCALE: 1"=20' HOR.
SCALE: 1"=20' VERT.

SECTION	SECTION LENGTH (FT)	AVERAGE EXIST ELEV (FT)	AREA OF FILL (AC)	VOLUME OF FILL (CU. YD.)	AREA OF CUT (AC)	VOLUME OF CUT (CU. YD.)
BERM A	180	65	0.13	451	0.02	388
TEMPORARY COFFERDAM	310	61	0.11	650	0	0





LEGEND:



FILL

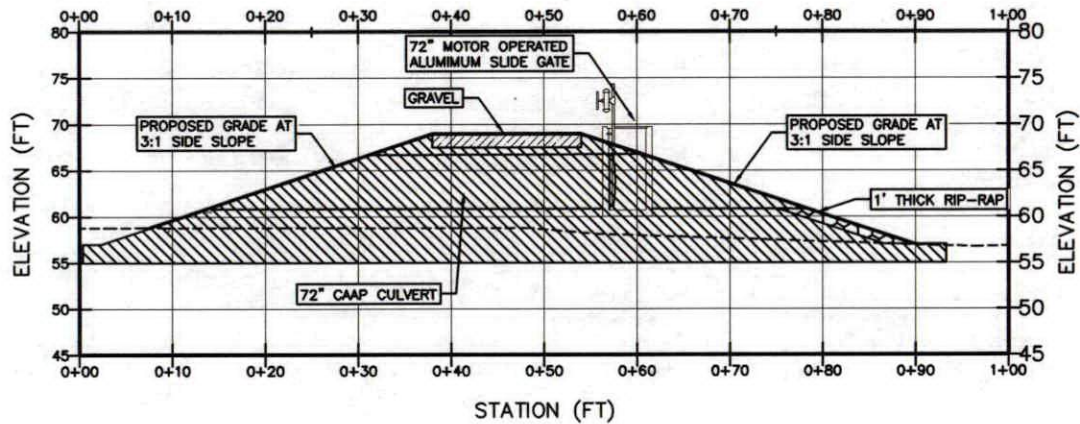
SECTION B

SCALE: 1"=20' HOR.

SCALE: 1"=20' VERT.

SECTION	SECTION LENGTH (FT)	AVERAGE EXIST ELEV (FT)	AREA OF FILL (AC)	VOLUME OF FILL (CU. YD.)
BERM B	115	63	0.07	113
TEMPORARY COFFERDAM	160	61	0.08	517

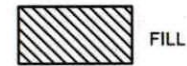




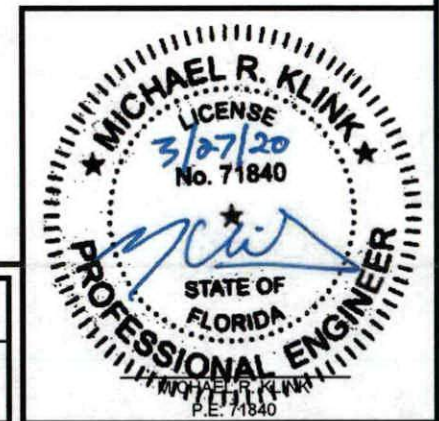
SECTION C

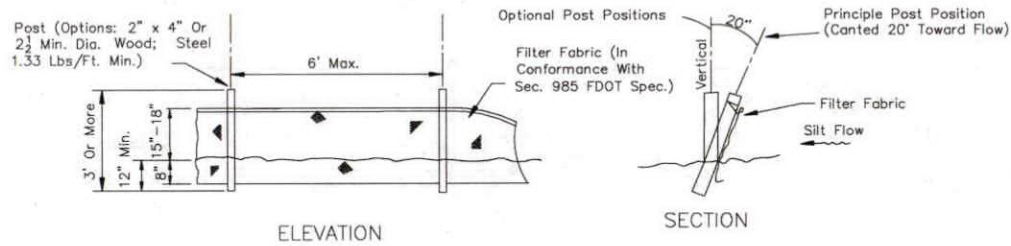
SCALE: 1"=20' HOR.
SCALE: 1"=20' VERT.

LEGEND:

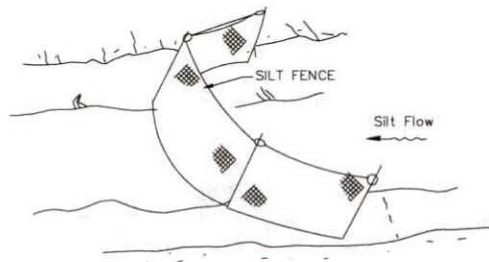


SECTION	SECTION LENGTH (FT)	AVERAGE EXIST ELEV (FT)	AREA OF FILL (AC)	VOLUME OF FILL (CU. YD.)
BERM C	195	61	0.29	1988
TEMPORARY COFFERDAM	135	61	0.06	800

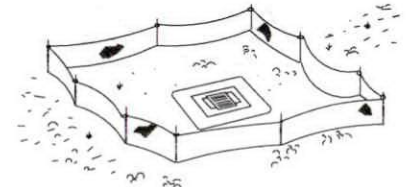
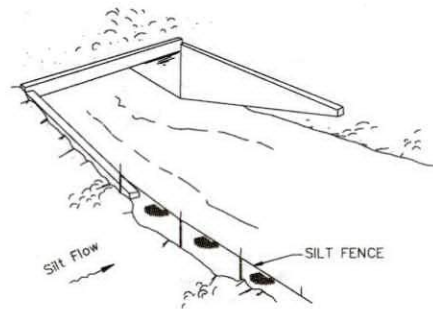




TYPE III SILT FENCE



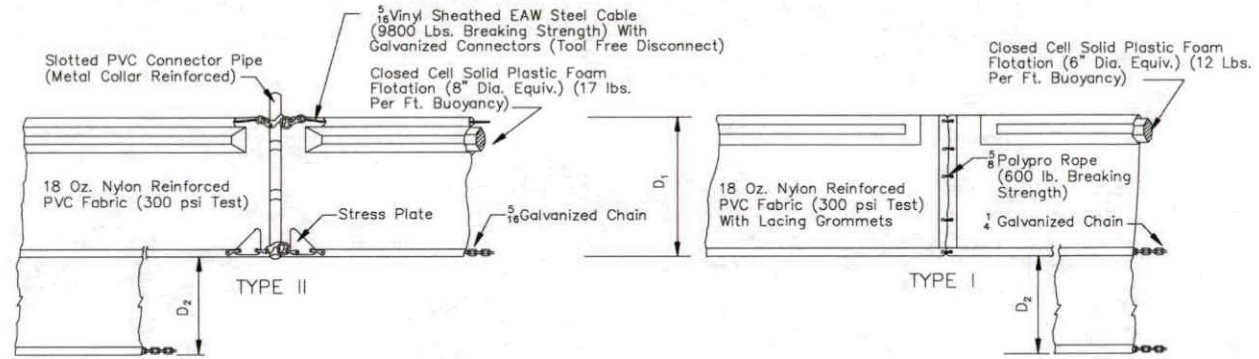
SILT FENCE IN DITCHES WITH INTERMITTENT FLOW



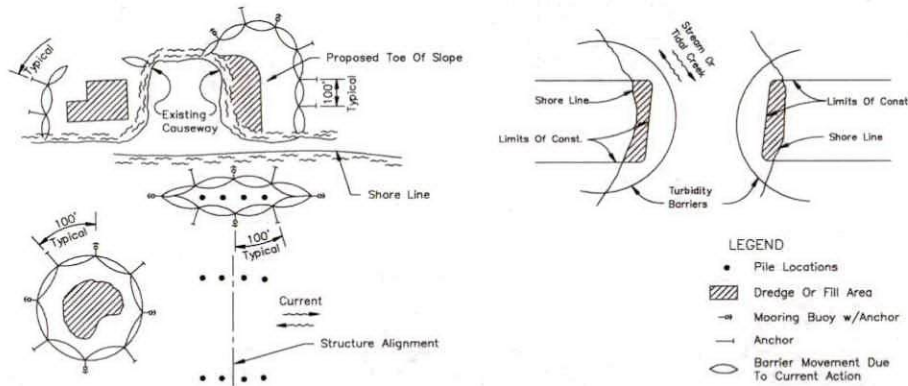
SILT FENCE PROTECTION AROUND DITCH BOTTOM INLETS.

DO NOT DEPLOY IN A MANNER THAT SILT FENCES WILL ACT AS A DAM ACROSS PERMANENT FLOWING WATERCOURSES. SILT FENCES ARE TO BE USED AT UPLAND LOCATIONS AND TURBIDITY BARRIERS USED AT PERMANENT BODIES OF WATER.

TEMPORARY SILT FENCE DETAIL



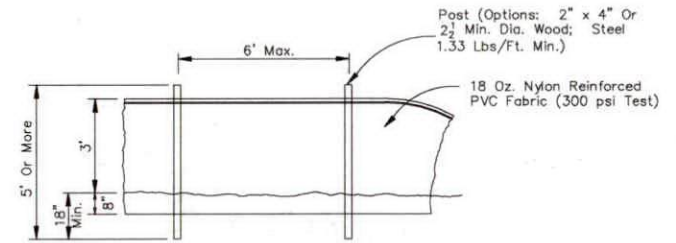
FLOATING TURBIDITY BARRIERS



NOTES:

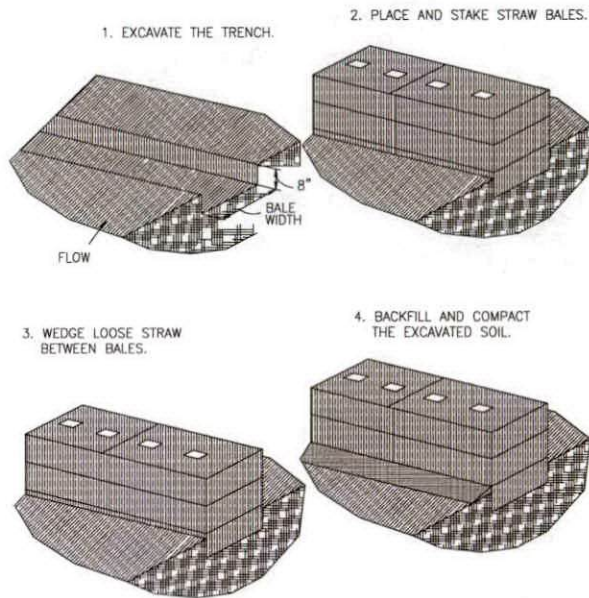
1. TURBIDITY BARRIERS ARE TO BE USED IN ALL PERMANENT BODIES OF WATER REGARDLESS OF WATER DEPTH.
2. NUMBER AND SPACING OF ANCHORS DEPENDENT ON CURRENT VELOCITIES.
3. DEPLOYMENT OF BARRIER AROUND PILE LOCATIONS MAY VARY TO ACCOMMODATE CONSTRUCTION OPERATIONS.
4. NAVIGATION MAY REQUIRE SEGMENTING BARRIER DURING CONSTRUCTION OPERATIONS.
5. FOR ADDITIONAL INFORMATION SEE SECTION 104 OF THE FDOT STANDARD SPECIFICATIONS.

TURBIDITY BARRIER APPLICATIONS



STAKED TURBIDITY BARRIER

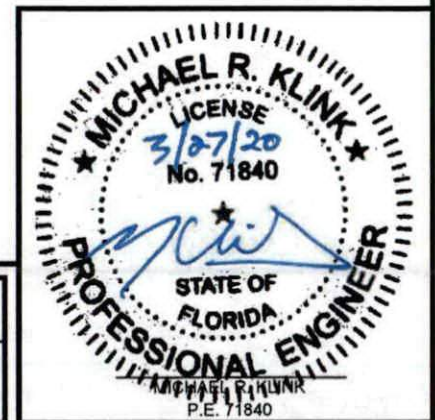




HAY BALE BARRIER CONSTRUCTION DETAILS

EROSION AND SEDIMENT CONTROL NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING SILT FROM SITE IF NOT REUSABLE ON-SITE AND ASSURING PLAN ALIGNMENT AND GRADE IN ALL WORK AT COMPLETION OF CONSTRUCTION.
2. ON-SITE PROTECTION ADDITION TO THE ABOVE MUST BE PROVIDED THAT WILL NOT PERMIT SILT TO LEAVE THE PROJECT CONFINES DE TO UNSEEN CONDITIONS OR ACCIDENTS.
3. THE FILTER BARRIER SHALL BE ENTRENCHED AND BACKFILLED, A TRENCH SHALL BE EXCAVATED TO A MINIMUM DEPTH OF 8 INCHES. THE EXCAVATED SOIL SHALL BE BACKFILLED AND COMPACTED AGAINST THE FILTER BARRIER.
4. FILTER BARRIERS AND SILT FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
5. SHOULD THE FABRIC ON A SILT FENCE OR FILTER BARRIER DECOMPOSE OR BECOME INEFFECTIVE PRIOR TO THE END THE EXPECTED USABLE LIFE AND THE BARRIER STILL BE NECESSARY, THE FABRIC SHALL BE REPLACED IMMEDIATELY.
6. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE SILT FENCE BARRIER IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM WITH THE EXISTING GRADE, PREPARED AND GRASSED.
7. THE CONTRACTOR IS RESPONSIBLE FOR THE BEST EROSION AND SEDIMENT CONTROL PRACTICES AS OUTLINED IN THE PLANS, SPECIFICATIONS, PERMITS, AND ST. JOHNS RIVER WATER MANAGEMENT DISTRICT CRITERIA.
8. FOR ADDITIONAL INFORMATION ON SEDIMENT AND EROSION CONTROL REFER TO THE FLORIDA DEVELOPMENT MANUAL - A GUIDE TO SOUND LAND AND WATER MANAGEMENT FROM THE STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (F.D.E.P.) CHAPTER 6, LATEST EDITION
9. ALL DISTRIBUTED AREAS SHALL BE GRASSED, FERTILIZED, WATERED AND MAINTAINED UNTIL VA PERMANENT VEGETATIVE COVER IS ESTABLISHED. GRASSING SHALL CONFORM TO THE REQUIREMENTS OF SECTIONS 570 AND 981 THRU 933 OF THE FLORIDA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATION FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITIONS. NOTE THAT OTHER GRASSING ALTERNATIVES MAY BE USED WITH PRIOR DISTRICT APPROVAL.



USACE



DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, JACKSONVILLE DISTRICT
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

June 5, 2020

Regulatory Division
West Branch
Tampa Section
Gainesville Field Office
SAJ-2020-01530 (NW-JED)

St. Johns River Water Management District
Attn: Dr. Ann Shortelle
4049 Reid Street
Palatka, FL 32177

Dear Dr. Shortelle:

The U.S. Army Corps of Engineers (Corps) assigned your application for a Department of the Army permit, which the Corps received on April 7, 2020, the file number SAJ-2020-01530. A review of the information and drawings provided indicates that the proposed work involves the construction of a water treatment facility pump station consisting of a fill pad for the pump station, an access road, culverts, a discharge pipe, and riprap revetment to stabilize the intake and outfall requiring the discharge of 2,154 cubic yards of clean fill material, 290 cubic yards of riprap material, 81 cubic yards of gravel, and 27 cubic yards of concrete into a total of 0.49 acre of waters of the United States.

The proposed work is more particularly described on the enclosed drawings which are incorporated into and made part of this verification.

The activities subject to this permit are authorized pursuant to authorities under Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. § 403), and Section 404 of the Clean Water Act (33 U.S.C. § 1344). The project is located at 2803 Lust Road, in Section 5, Township 21 South, Range 27 East, Apopka, Orange County, Florida. (Latitude 28.69814°, Longitude -81.63432°)

Your project, as depicted on the enclosed drawings, is authorized by Nationwide Permit (NWP) Numbers 7 (intake/out fall structures-0.13 acre of fill) and 39 (water treatment facility and attendant structures and access-0.36 acre of fill). In addition, project specific conditions have been enclosed. This verification is valid until **March 18, 2022**. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant nationwide permit is modified or revoked, you will have 12 months from the date of the modification or revocation of the NWP to complete the

activity under the present terms and conditions of this nationwide permit. Please access the U.S. Army Corps of Engineers' (Corps) Jacksonville District's Regulatory Internet page to access Internet links to view the Final Nationwide Permits, Federal Register Vol. 82, dated January 6, 2017, specifically pages 1983 to 2008, and the table of Regional Conditions. The Internet page address is as follows:

<http://www.saj.usace.army.mil/Missions/Regulatory.aspx>

Please be aware this Internet address is case sensitive and should be entered as it appears above. Once there you will need to click on "Source Book"; and, then click on "Nationwide Permits." These files contain the description of the Nationwide Permit authorization, the Nationwide Permit general conditions, and the regional conditions, which apply specifically to this verification for NWP 7 and 39. Enclosed is a list of the six General Conditions, which apply to all Department of the Army authorizations. You must comply with all of the special and general conditions and any project specific condition of this authorization or you may be subject to enforcement action. In the event you have not completed construction of your project within the specified time limit, a separate application or re-verification may be required.

The following special conditions are included with this verification:

1. Reporting Address: The Permittee shall submit all reports, notifications, documentation and correspondence required by the general and special conditions of this permit to either (not both) of the following addresses:

a. For electronic mail (preferred): SAJ-RD-Enforcement@usace.army.mil (not to exceed 15 MB).

b. For standard mail: U.S. Army Corps of Engineers, Regulatory Division, Enforcement Section, P.O. Box 4970, Jacksonville, FL 32232-0019.

The Permittee shall reference this permit number, SAJ-2020-01530(NW - JED), on all submittals.

2. Commencement Notification: Within 10 days from the date of initiating the work authorized by this permit the Permittee shall submit a completed "Commencement Notification" Form, enclosed herein.

3. Self-Certification: Within 60 days of completion of the work authorized by this permit, the Permittee shall complete the attached "Self-Certification Statement of Compliance" form, enclosed herein, and submit it to the Corps. In the event that the

completed work deviates in any manner from the authorized work, the Permittee shall describe the deviations between the work authorized by this permit and the work as constructed on the "Self-Certification Statement of Compliance" form. The description of any deviations on the "Self-Certification Statement of Compliance" form does not constitute approval of any deviations by the Corps.

4. Temporary Impacts: Within 30 days from the date of completing the work authorized by this permit, the Permittee shall restore 0.25 acre of temporary impacts as detailed on Drawing 4 of 10, enclosed herein, to pre-existing contours, elevations, vegetation, habitat type, and hydrology.

5. Assurance of Navigation and Maintenance: The Permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structures or work herein authorized, or if in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the Permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

6. Posting of Permit: The Permittee shall have available and maintain for review a copy of this permit and approved plans at the construction site.

7. Cultural Resources/Historic Properties:

a. No structure or work shall adversely affect impact or disturb properties listed in the *National Register of Historic Places* (NRHP) or those eligible for inclusion in the NRHP.

b. If during the ground disturbing activities and construction work within the permit area, there are archaeological/cultural materials encountered which were not the subject of a previous cultural resources assessment survey (and which shall include, but not be limited to: pottery, modified shell, flora, fauna, human remains, ceramics, stone tools or metal implements, dugout canoes, evidence of structures or any other physical remains that could be associated with Native American cultures or early colonial or American settlement), the Permittee shall immediately stop all work and ground-disturbing activities within a 100-meter diameter of the discovery and notify the Corps within the same business day (8 hours). The Corps shall then notify the Florida State Historic Preservation Officer (SHPO) and the appropriate Tribal Historic Preservation Officer(s) (THPO(s)) to assess the significance of the discovery and devise appropriate actions.

c. Additional cultural resources assessments may be required of the permit area in the case of unanticipated discoveries as referenced in accordance with the above Special Condition ; and if deemed necessary by the SHPO, THPO(s), or Corps, in accordance with 36 CFR 800 or 33 CFR 325, Appendix C (5). Based, on the circumstances of the discovery, equity to all parties, and considerations of the public interest, the Corps may modify, suspend or revoke the permit in accordance with 33 CFR Part 325.7. Such activity shall not resume on non-federal lands without written authorization from the SHPO for finds under his or her jurisdiction, and from the Corps.

d. In the unlikely event that unmarked human remains are identified on non-federal lands, they will be treated in accordance with Section 872.05 Florida Statutes. All work and ground disturbing activities within a 100-meter diameter of the unmarked human remains shall immediately cease and the Permittee shall immediately notify the medical examiner, Corps, and State Archeologist within the same business day (8-hours). The Corps shall then notify the appropriate SHPO and THPO(s). Based, on the circumstances of the discovery, equity to all parties, and considerations of the public interest, the Corps may modify, suspend or revoke the permit in accordance with 33 CFR Part 325.7. Such activity shall not resume without written authorization from the State Archeologist and from the Corps.

8. Turbidity Barriers: Prior to the initiation of any of the work authorized by this permit, the Permittee shall install floating turbidity barriers with weighted skirts that extend to within 1 foot of the bottom around all work areas that are in, or adjacent to, surface waters. The turbidity barriers shall remain in place and be maintained until the authorized work has been completed and all suspended and erodible materials have been stabilized. Turbidity barriers shall be removed upon stabilization of the work area.

9. Erosion Control: Prior to the initiation of any work authorized by this permit, the Permittee shall install erosion control measures along the perimeter of all work areas to prevent the displacement of fill material outside the work area into waters of the United States. Immediately after completion of the final grading of the land surface, all slopes, land surfaces, and filled areas shall be stabilized using sod, degradable mats, barriers, or a combination of similar stabilizing materials to prevent erosion. The erosion control measures shall remain in place and be maintained until all authorized work is completed and the work areas are stabilized.

10. Fill Material: The Permittee shall use only clean fill material for this project. The fill material shall be free from items such as trash, debris, automotive parts, asphalt, construction materials, concrete block with exposed reinforcement bars, and soils

contaminated with any toxic substance, in toxic amounts in accordance with Section 307 of the Clean Water Act.

11. Eastern Indigo Snake Protection Measures and Inspection: Permittee shall comply with U.S. Fish and Wildlife Service's "Standard Protection Measures for the Eastern Indigo Snake" dated August 12, 2013, enclosed herein. All gopher tortoise burrows, active or inactive, shall be evacuated prior to site manipulation in the vicinity of the burrow. If excavating potentially occupied burrows, active or inactive, individuals must first obtain state authorization via a Florida Fish and Wildlife Conservation Commission (FWC) Authorized Gopher Tortoise Agent permit. The excavation method selected shall minimize the potential for injury of an indigo snake. The Permittee shall follow the excavation guidance provided in the most current FWC Gopher Tortoise Permitting Guidelines found at <http://myfwc.com/gophertortoise>. If an indigo snake is encountered, the snake must be allowed to vacate the area prior to additional site manipulation in the vicinity. Holes, cavities, and snake refugia other than gopher tortoise burrows shall be inspected each morning before planned site manipulation of a particular area, and if occupied by an indigo snake, no work shall commence until the snake has vacated the vicinity of the proposed work.

This letter of authorization does not give absolute Federal authority to perform the work as specified on your application. The proposed work may be subject to local building restrictions mandated by the National Flood Insurance Program. You should contact your local office that issues building permits to determine if your site is located in a flood-prone area, and if you must comply with the local building requirements mandated by the National Flood Insurance Program.

If you are unable to access the internet or require a hardcopy of any of the conditions, limitations, or expiration date for the above referenced NWP, please contact me by telephone at 352-264-7672.

Thank you for your cooperation with our permit program. The Corps Jacksonville District Regulatory Division is committed to improving service to our customers. We strive to perform our duty in a friendly and timely manner while working to preserve our environment. We invite you to complete our automated Customer Service Survey at http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey. Please be aware this Internet address is case sensitive; and, you will need to enter it exactly as it appears above. Your input is appreciated – favorable or otherwise.

Sincerely,

James Davidson
Project Manager

Enclosures:

General Conditions (1 page)

Transfer Request (1 page)

Commencement Notification (1 page)

Self-certification Form (1 page)

Standard Protection Measures for the Eastern Indigo Snake (3 pages)

Project Plans (5 pages)

cc:

Rebecca Trudeau, SJRWD

CESAJ-RD-E

GENERAL CONDITIONS
33 CFR PART 320-330

1. The time limit for completing the work authorized ends on **March 18, 2022**.
2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.
3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.
4. If you sell the property associated with this permit you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.
5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.
6. You must allow a representative from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

DEPARTMENT OF THE ARMY PERMIT TRANSFER REQUEST

PERMIT NUMBER: SAJ-2020-01530(NW-JED)

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. Although the construction period for works authorized by Department of the Army permits is finite, the permit itself, with its limitations, does not expire.

To validate the transfer of this permit and the associated responsibilities associated with compliance with its terms and conditions, have the transferee sign and date below and mail to the U.S. Army Corps of Engineers, Enforcement Section, Post Office Box 4970, Jacksonville, FL 32232-0019 or electronic mail at saj-rd-enforcement@usace.army.mil.

(TRANSFEREE-SIGNATURE)

(SUBDIVISION)

(DATE)

(LOT)

(BLOCK)

(NAME-PRINTED)

(STREET ADDRESS)

(MAILING ADDRESS)

(CITY, STATE, ZIP CODE)

SELF-CERTIFICATION STATEMENT OF COMPLIANCE

*Within sixty (60) days of completion of the authorized work, submit this form via electronic mail to saj-rd-enforcement@usace.army.mil (preferred, not to exceed 15MB) **or** by standard mail to U.S. Army Corps of Engineers, Enforcement Section, P.O. Box 4970, Jacksonville, FL 32232-0019.*

1. **Department of the Army Permit Number:** SAJ-2020-01530(NW-JED)

2. **Permittee Information:** Name: _____

Email: _____

Address: _____

Phone: _____

3. **Date Authorized Work Started:** _____ **Completed:** _____

4. **Contact to Schedule Inspection:** Name: _____

Email: _____

Phone: _____

5. **Description of Authorized Work (e.g. bank stabilization, fill placed within wetlands, docks, dredging, etc.):** _____

6. **Acreage or Square Feet of Impacts to Waters of the United States:** _____

7. **Describe Mitigation completed (if applicable):** _____

8. **Describe any Deviations from Permit (attach drawing(s) depicting the deviations):**

I certify that all work and mitigation (if applicable) was done in accordance with the limitations and conditions as described in the permit. Any deviations as described above are depicted on the attached drawing(s).

Signature of Permittee

Printed Name of Permittee

Date

Dated 9/18/2019

COMMENCEMENT NOTIFICATION

*Within ten (10) days of initiating the authorized work, submit this form via electronic mail to saj-rd-enforcement@usace.army.mil (preferred, not to exceed 15 MB) **or** by standard mail to U.S. Army Corps of Engineers, Enforcement Section, P.O. Box 4970, Jacksonville, FL 32232-0019.*

1. Department of the Army Permit Number: SAJ-2020-01530(NW-JED)

2. Permittee Information:

Name: _____

Email: _____

Address: _____

Phone: _____

3. Construction Start Date: _____

4. Contact to Schedule Inspection:

Name: _____

Email: _____

Phone: _____

Signature of Permittee

Printed Name of Permittee

Date

STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE
U.S. Fish and Wildlife Service
August 12, 2013

The eastern indigo snake protection/education plan (Plan) below has been developed by the U.S. Fish and Wildlife Service (USFWS) in Florida for use by applicants and their construction personnel. At least **30 days prior** to any clearing/land alteration activities, the applicant shall notify the appropriate USFWS Field Office via e-mail that the Plan will be implemented as described below (North Florida Field Office: jaxregs@fws.gov; South Florida Field Office: verobeach@fws.gov; Panama City Field Office: panamacity@fws.gov). As long as the signatory of the e-mail certifies compliance with the below Plan (including use of the attached poster and brochure), no further written confirmation or “approval” from the USFWS is needed and the applicant may move forward with the project.

If the applicant decides to use an eastern indigo snake protection/education plan other than the approved Plan below, written confirmation or “approval” from the USFWS that the plan is adequate must be obtained. At least 30 days prior to any clearing/land alteration activities, the applicant shall submit their unique plan for review and approval. The USFWS will respond via e-mail, typically within 30 days of receiving the plan, either concurring that the plan is adequate or requesting additional information. A concurrence e-mail from the appropriate USFWS Field Office will fulfill approval requirements.

The Plan materials should consist of: 1) a combination of posters and pamphlets (see **Poster Information** section below); and 2) verbal educational instructions to construction personnel by supervisory or management personnel before any clearing/land alteration activities are initiated (see **Pre-Construction Activities** and **During Construction Activities** sections below).

POSTER INFORMATION

Posters with the following information shall be placed at strategic locations on the construction site and along any proposed access roads (a final poster for Plan compliance, to be printed on 11” x 17” or larger paper and laminated, is attached):

DESCRIPTION: The eastern indigo snake is one of the largest non-venomous snakes in North America, with individuals often reaching up to 8 feet in length. They derive their name from the glossy, blue-black color of their scales above and uniformly slate blue below. Frequently, they have orange to coral reddish coloration in the throat area, yet some specimens have been reported to only have cream coloration on the throat. These snakes are not typically aggressive and will attempt to crawl away when disturbed. Though indigo snakes rarely bite, they should NOT be handled.

SIMILAR SNAKES: The black racer is the only other solid black snake resembling the eastern indigo snake. However, black racers have a white or cream chin, thinner bodies, and WILL BITE if handled.

LIFE HISTORY: The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands

and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.

PROTECTION UNDER FEDERAL AND STATE LAW: The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. “Taking” of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. “Take” is defined by the USFWS as an attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage in any such conduct. Penalties include a maximum fine of \$25,000 for civil violations and up to \$50,000 and/or imprisonment for criminal offenses, if convicted.

Only individuals currently authorized through an issued Incidental Take Statement in association with a USFWS Biological Opinion, or by a Section 10(a)(1)(A) permit issued by the USFWS, to handle an eastern indigo snake are allowed to do so.

IF YOU SEE A LIVE EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and allow the live eastern indigo snake sufficient time to move away from the site without interference;
- Personnel must NOT attempt to touch or handle snake due to protected status.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Immediately notify supervisor or the applicant’s designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- If the snake is located in a vicinity where continuation of the clearing or construction activities will cause harm to the snake, the activities must halt until such time that a representative of the USFWS returns the call (within one day) with further guidance as to when activities may resume.

IF YOU SEE A DEAD EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and immediately notify supervisor or the applicant’s designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Thoroughly soak the dead snake in water and then freeze the specimen. The appropriate wildlife agency will retrieve the dead snake.

Telephone numbers of USFWS Florida Field Offices to be contacted if a live or dead eastern indigo snake is encountered:

North Florida Field Office – (904) 731-3336
Panama City Field Office – (850) 769-0552
South Florida Field Office – (772) 562-3909

PRE-CONSTRUCTION ACTIVITIES

1. The applicant or designated agent will post educational posters in the construction office and throughout the construction site, including any access roads. The posters must be clearly visible to all construction staff. A sample poster is attached.
2. Prior to the onset of construction activities, the applicant/designated agent will conduct a meeting with all construction staff (annually for multi-year projects) to discuss identification of the snake, its protected status, what to do if a snake is observed within the project area, and applicable penalties that may be imposed if state and/or federal regulations are violated. An educational brochure including color photographs of the snake will be given to each staff member in attendance and additional copies will be provided to the construction superintendent to make available in the onsite construction office (a final brochure for Plan compliance, to be printed double-sided on 8.5" x 11" paper and then properly folded, is attached). Photos of eastern indigo snakes may be accessed on USFWS and/or FWC websites.
3. Construction staff will be informed that in the event that an eastern indigo snake (live or dead) is observed on the project site during construction activities, all such activities are to cease until the established procedures are implemented according to the Plan, which includes notification of the appropriate USFWS Field Office. The contact information for the USFWS is provided on the referenced posters and brochures.

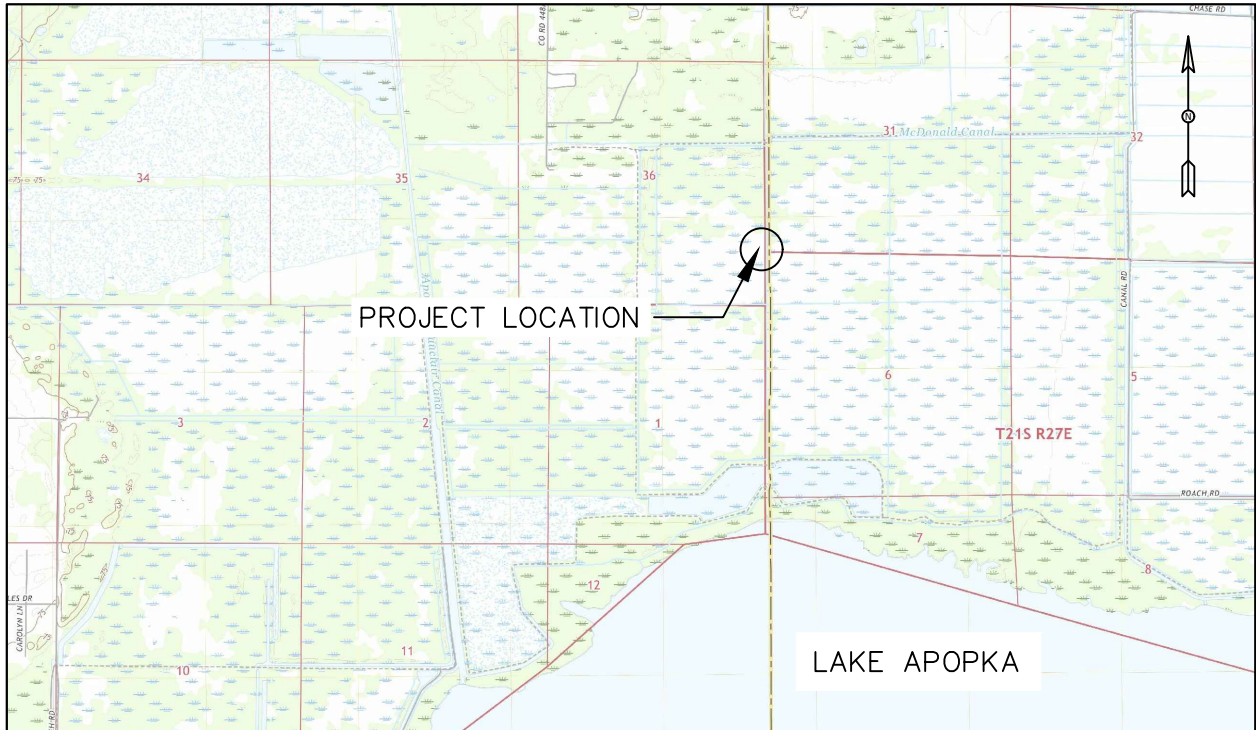
DURING CONSTRUCTION ACTIVITIES

1. During initial site clearing activities, an onsite observer may be utilized to determine whether habitat conditions suggest a reasonable probability of an eastern indigo snake sighting (example: discovery of snake sheds, tracks, lots of refugia and cavities present in the area of clearing activities, and presence of gopher tortoises and burrows).
2. If an eastern indigo snake is discovered during gopher tortoise relocation activities (i.e. burrow excavation), the USFWS shall be contacted within one business day to obtain further guidance which may result in further project consultation.
3. Periodically during construction activities, the applicant's designated agent should visit the project area to observe the condition of the posters and Plan materials, and replace them as needed. Construction personnel should be reminded of the instructions (above) as to what is expected if any eastern indigo snakes are seen.

POST CONSTRUCTION ACTIVITIES

Whether or not eastern indigo snakes are observed during construction activities, a monitoring report should be submitted to the appropriate USFWS Field Office within 60 days of project completion. The report can be sent electronically to the appropriate USFWS e-mail address listed on page one of this Plan.

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT UPPER OCKLAWAHA RIVER BASIN/ LAKE APOPKA NORTH SHORE INTERCONNECT PUMP STATION ORANGE COUNTY, FLORIDA



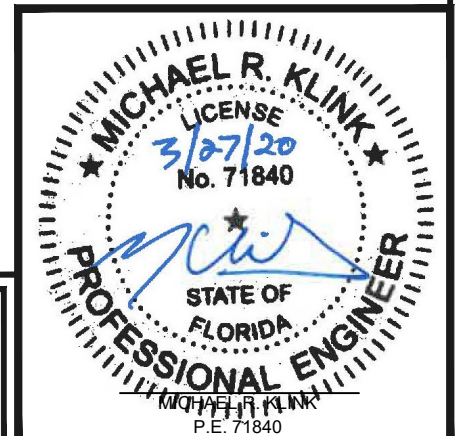
VICINITY MAP

NOT TO SCALE

SHEET INDEX

SHEET NO.	SHEET TITLE
1	COVER SHEET AND VICINITY MAP
2	OVERALL SITE PLAN
3	PUMP STATION LAYOUT
4	PUMP STATION PLAN
5	BERM A CROSS-SECTION
6	BERM B CROSS-SECTION
7	BERM C CROSS-SECTION
8	EROSION AND SEDIMENT CONTROL
9	EROSION AND SEDIMENT CONTROL
10	EROSION AND SEDIMENT CONTROL

NOTE:
1. ALL ELEVATIONS SHOWN
HEREON ARE REFERENCED
TO NAVD(88)



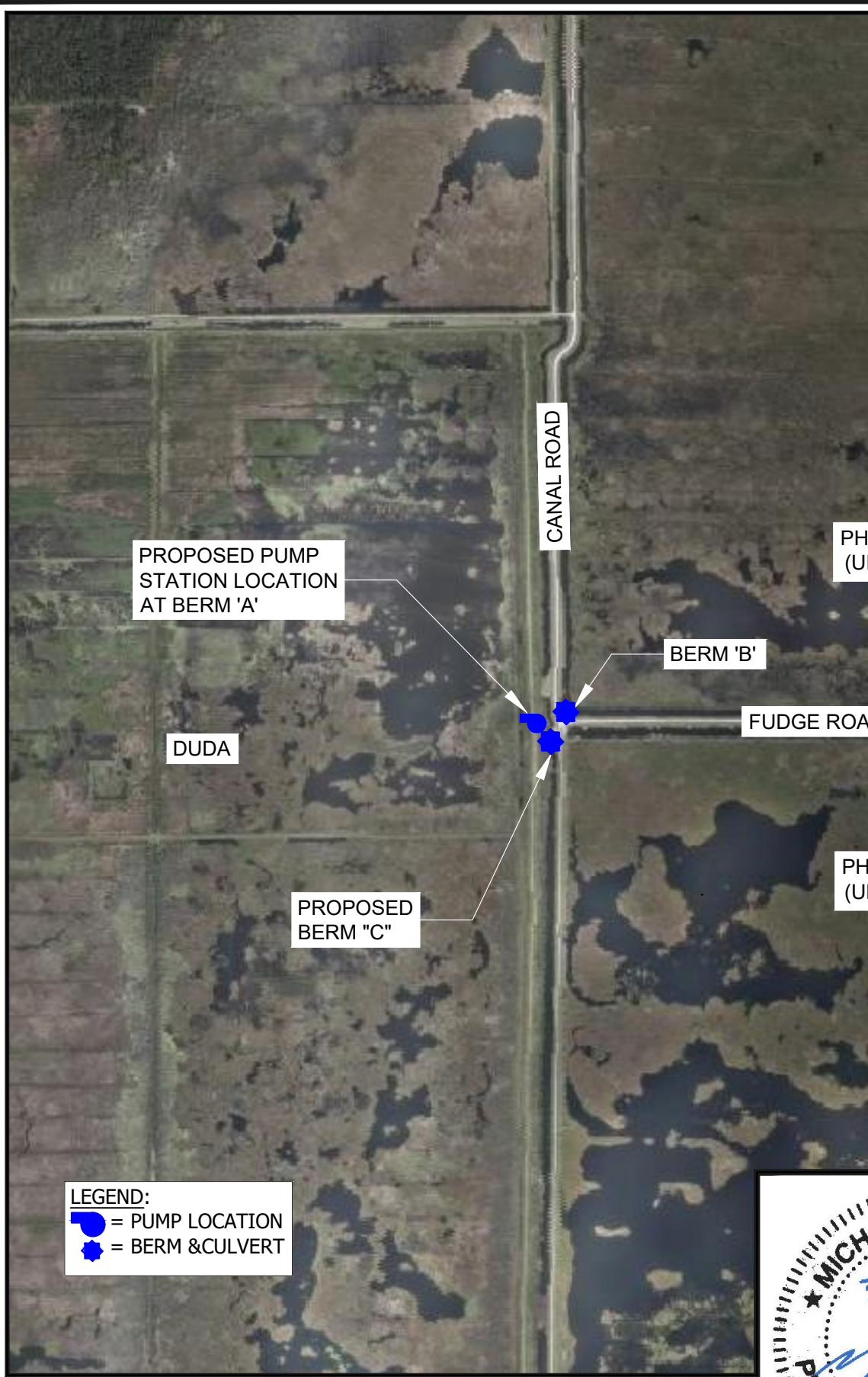
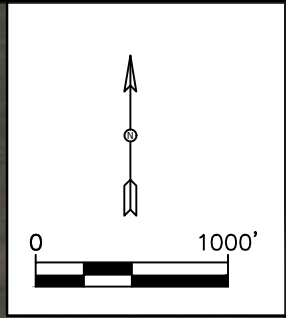
**FOUR WATERS
ENGINEERING**
324 6th AVE N. JACKSONVILLE BEACH, FLORIDA 32250
904-414-2400 C.O.A.# 31101 WWW.4WENG.COM

COVER SHEET AND VICINITY MAP

UPPER OCKLAWAHA RIVER BASIN/ LAKE APOPKA
NORTH SHORE INTERCONNECT PUMP STATION
ORANGE COUNTY, FLORIDA

PERMIT REVIEW

SHEET 1



PROPOSED PUMP STATION LOCATION AT BERM 'A'

PHASE 7 (UNIT 1)

BERM 'B'

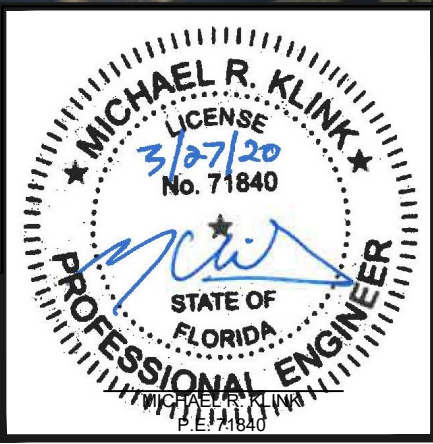
DUDA

FUDGE ROAD

PROPOSED BERM "C"

PHASE 1 (UNIT 2)

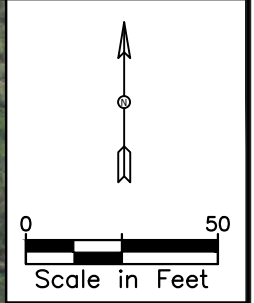
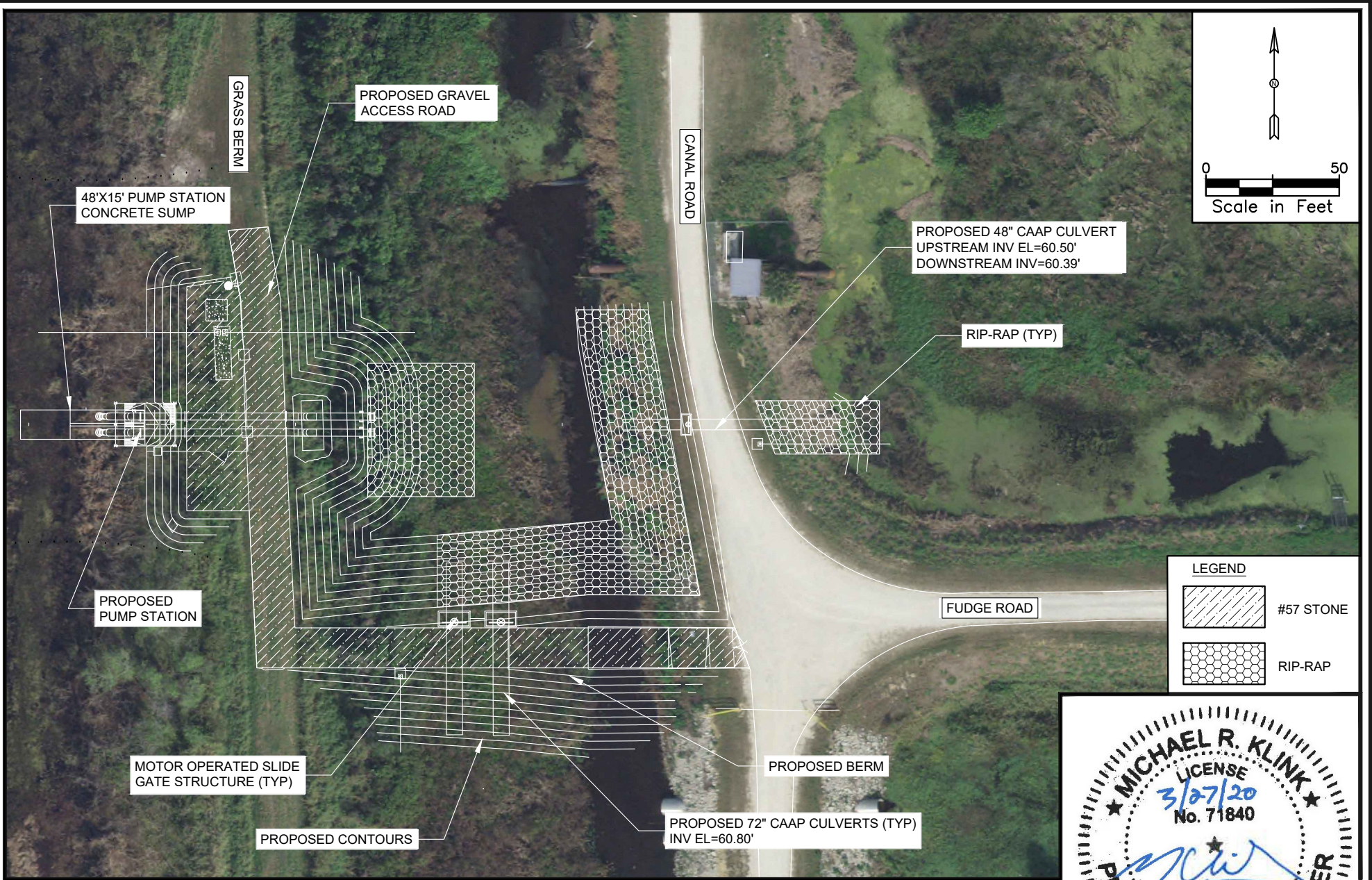
LEGEND:
= PUMP LOCATION
= BERM & CULVERT



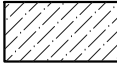
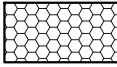
FOUR WATERS ENGINEERING
 324 6th AVE N. JACKSONVILLE BEACH, FLORIDA 32250
 904-414-2400 C.O.A.# 31101 WWW.4WENG.COM

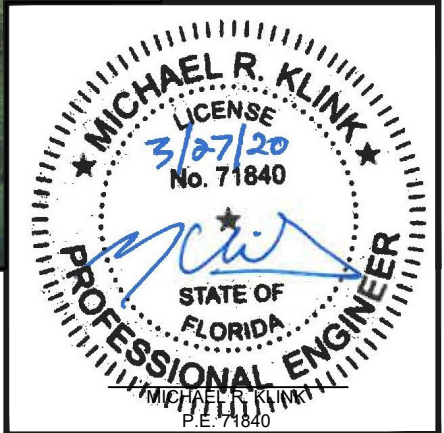
OVERALL SITE PLAN
 UPPER OCKLAWAHA RIVER BASIN/ LAKE APOPKA
 NORTH SHORE INTERCONNECT PUMP STATION
 ORANGE COUNTY, FLORIDA
PERMIT REVIEW SHEET 2

STEVE DUCHARME LOCATION R:\19-1010 LAKE APOPKA\X\CD\PERMIT\LAKE APOPKA PERMIT DRAWINGS_V10.DWG



LEGEND

	#57 STONE
	RIP-RAP

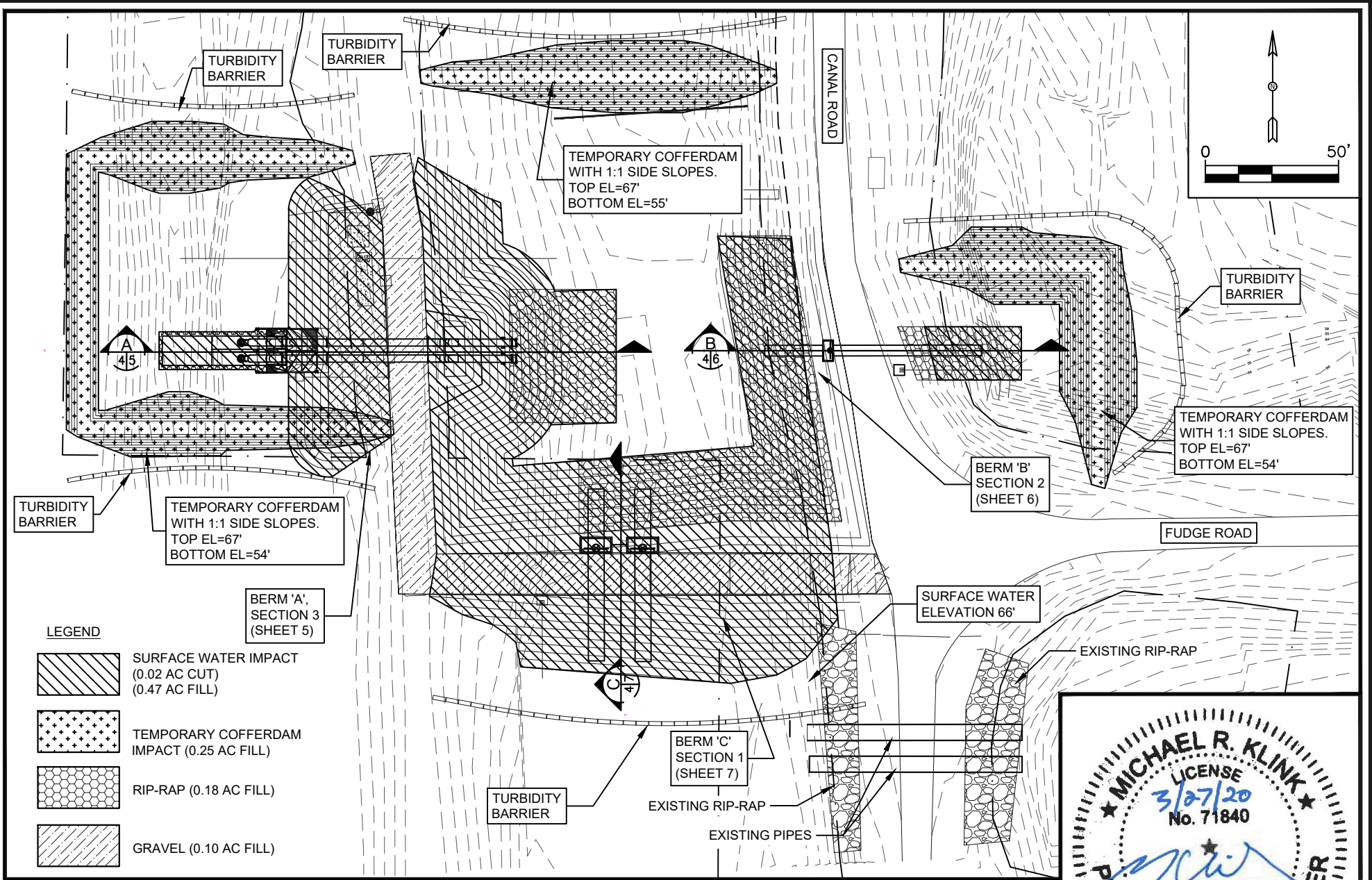


FOUR WATERS ENGINEERING
 324 6th AVE N. JACKSONVILLE BEACH, FLORIDA 32250
 904-414-2400 C.O.A.# 31101 WWW.4WENG.COM

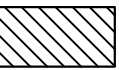
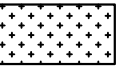
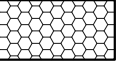

PUMP STATION, CULVERTS, AND BERM SITE LAYOUT

UPPER OCKLAWAHA RIVER BASIN/ LAKE APOPKA
 NORTH SHORE INTERCONNECT PUMP STATION
 ORANGE COUNTY, FLORIDA

PERMIT REVIEW **SHEET 3**



LEGEND

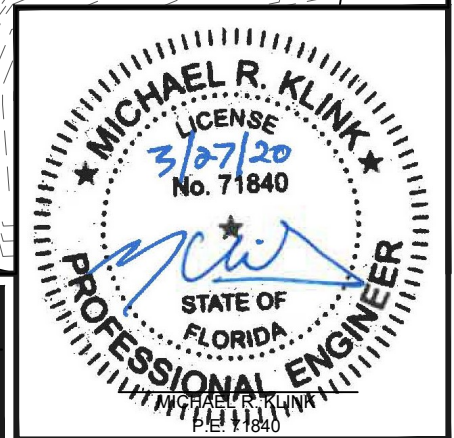
-  SURFACE WATER IMPACT (0.02 AC CUT) (0.47 AC FILL)
-  TEMPORARY COFFERDAM IMPACT (0.25 AC FILL)
-  RIP-RAP (0.18 AC FILL)
-  GRAVEL (0.10 AC FILL)

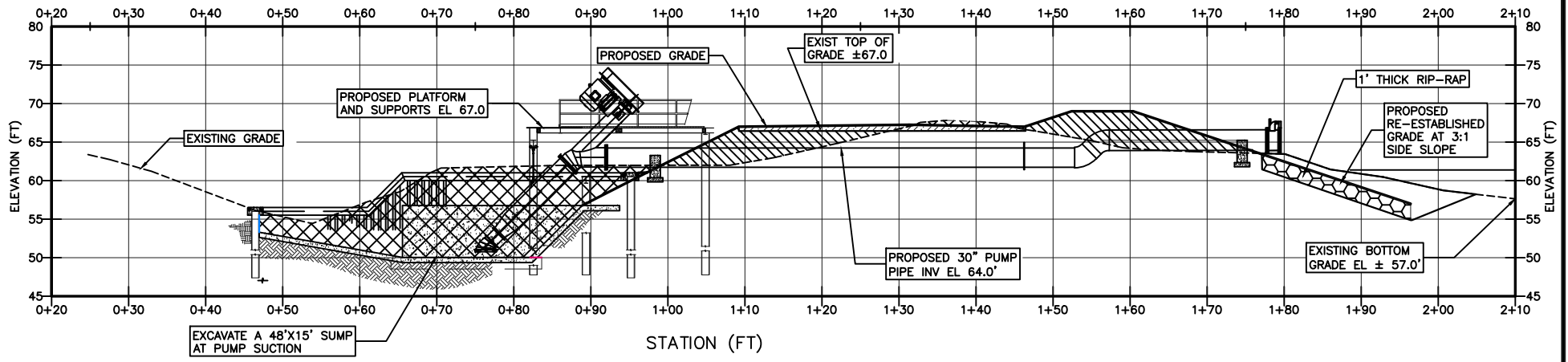
PUMP STATION PLAN



UPPER OCKLAWAHA RIVER BASIN/ LAKE APOPKA
 NORTH SHORE INTERCONNECT PUMP STATION
 ORANGE COUNTY, FLORIDA

PERMIT REVIEW

SHEET 4



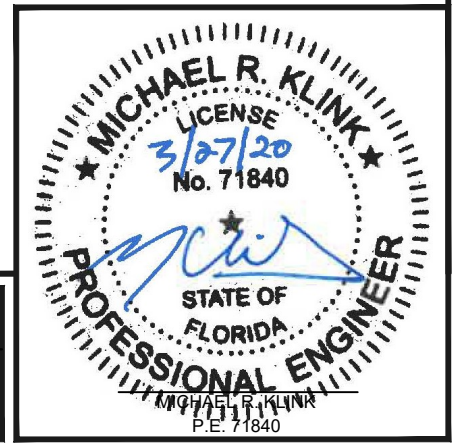


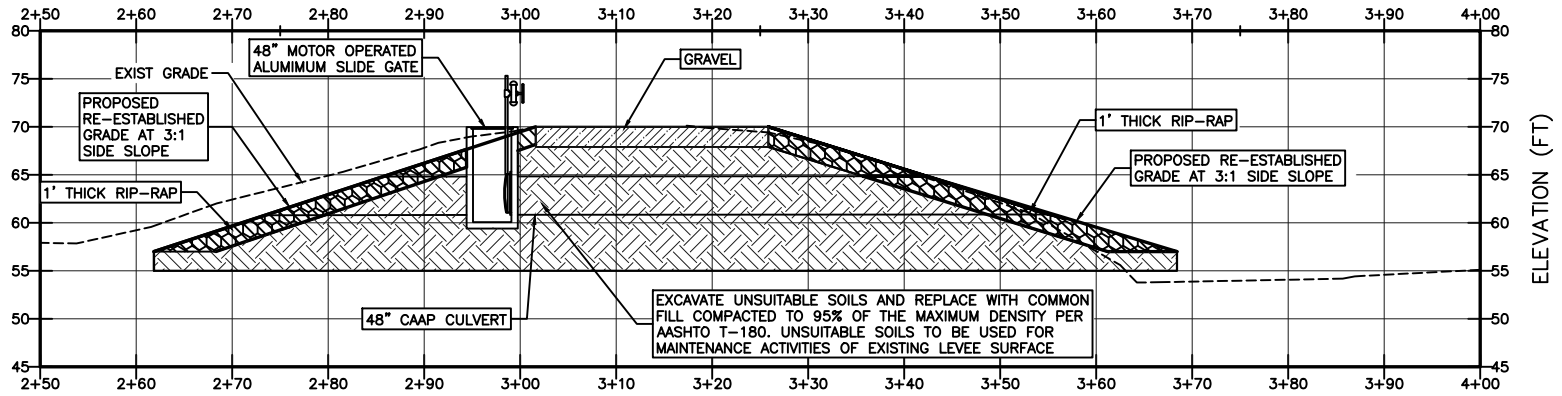
LEGEND:
 FILL
 CUT

SECTION A

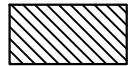
SCALE: 1"=20' HOR.
 SCALE: 1"=20' VERT.

SECTION	SECTION LENGTH (FT)	AVERAGE EXIST ELEV (FT)	AREA OF FILL (AC)	VOLUME OF FILL (CU. YD.)	AREA OF CUT (AC)	VOLUME OF CUT (CU. YD.)
BERM A	180	65	0.13	451	0.02	388
TEMPORARY COFFERDAM	310	61	0.11	650	0	0





LEGEND:

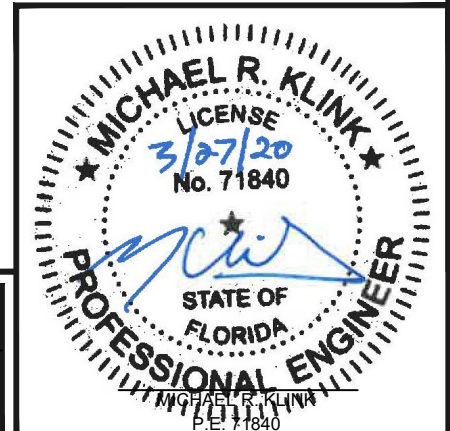


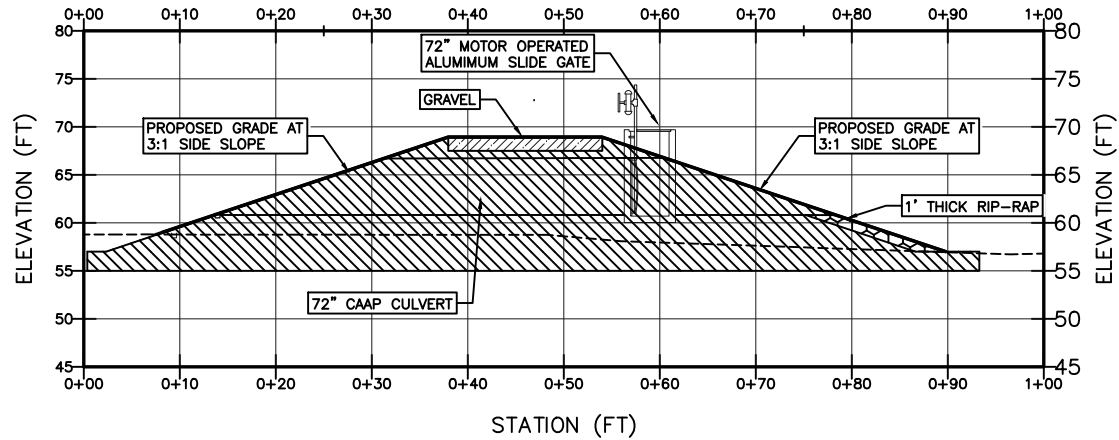
FILL

SECTION B

SCALE: 1"=20' HOR.
SCALE: 1"=20' VERT.

SECTION	SECTION LENGTH (FT)	AVERAGE EXIST ELEV (FT)	AREA OF FILL (AC)	VOLUME OF FILL (CU. YD.)
BERM B	115	63	0.07	113
TEMPORARY COFFERDAM	160	61	0.08	517





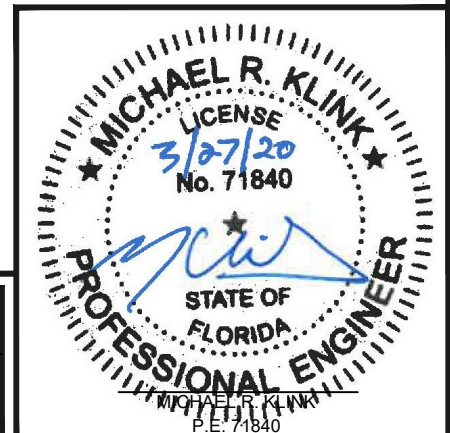
SECTION C

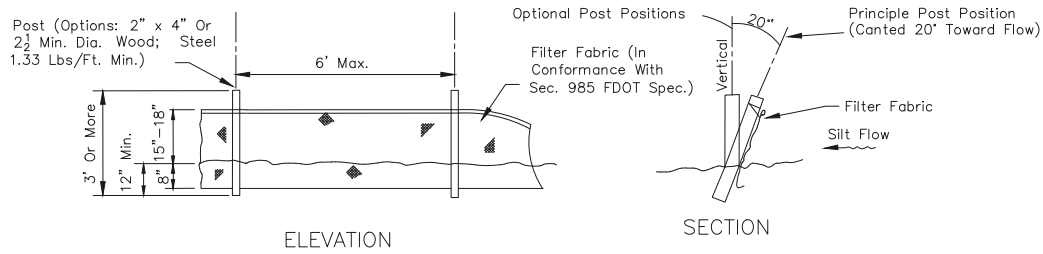
SCALE: 1"=20' HOR.
SCALE: 1"=20' VERT.

LEGEND:

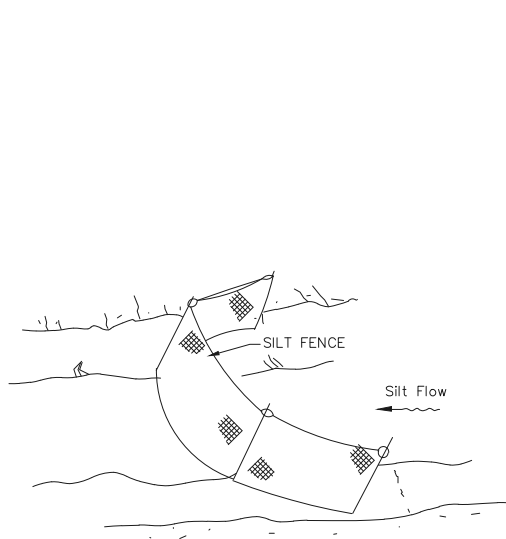


SECTION	SECTION LENGTH (FT)	AVERAGE EXIST ELEV (FT)	AREA OF FILL (AC)	VOLUME OF FILL (CU. YD.)
BERM C	195	61	0.29	1988
TEMPORARY COFFERDAM	135	61	0.06	800

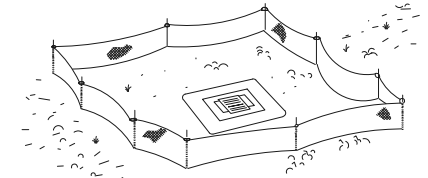
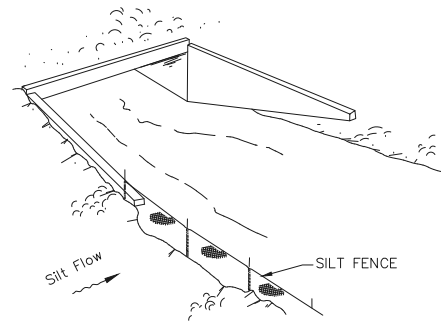




TYPE III SILT FENCE



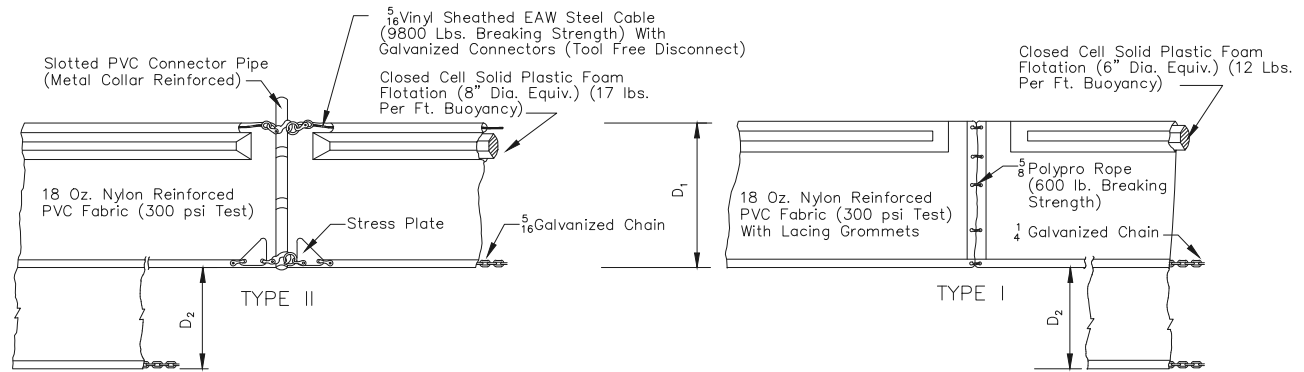
SILT FENCE IN DITCHES WITH INTERMITTENT FLOW



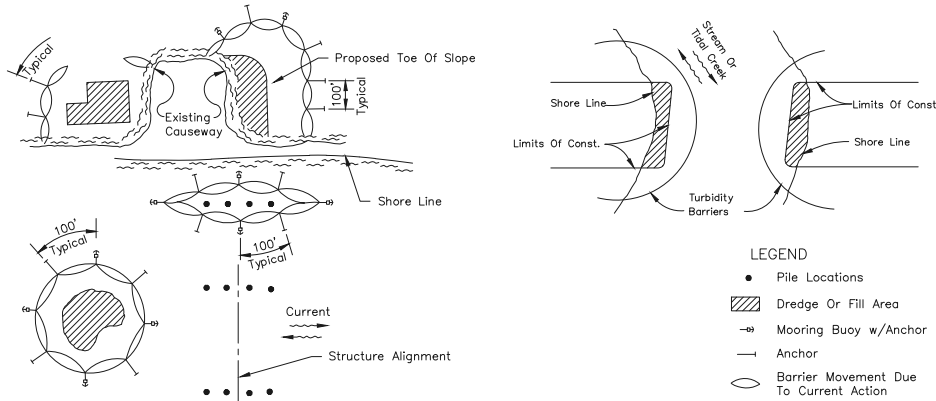
SILT FENCE PROTECTION AROUND DITCH BOTTOM INLETS.

DO NOT DEPLOY IN A MANNER THAT SILT FENCES WILL ACT AS A DAM ACROSS PERMANENT FLOWING WATERCOURSES. SILT FENCES ARE TO BE USED AT UPLAND LOCATIONS AND TURBIDITY BARRIERS USED AT PERMANENT BODIES OF WATER.

TEMPORARY SILT FENCE DETAIL



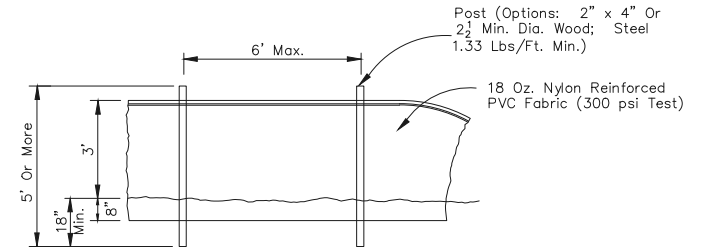
FLOATING TURBIDITY BARRIERS



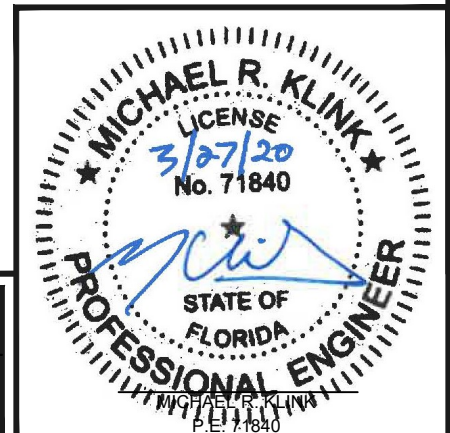
NOTES:

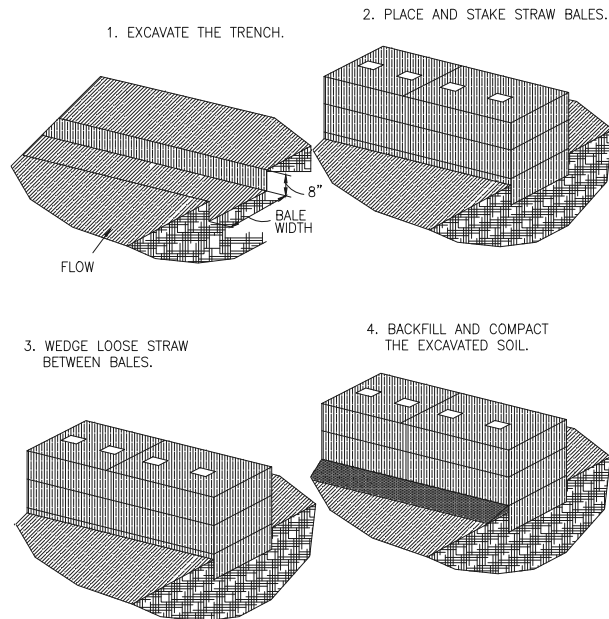
1. TURBIDITY BARRIERS ARE TO BE USED IN ALL PERMANENT BODIES OF WATER REGARDLESS OF WATER DEPTH.
2. NUMBER AND SPACING OF ANCHORS DEPENDENT ON CURRENT VELOCITIES.
3. DEPLOYMENT OF BARRIER AROUND PILE LOCATIONS MAY VARY TO ACCOMMODATE CONSTRUCTION OPERATIONS.
4. NAVIGATION MAY REQUIRE SEGMENTING BARRIER DURING CONSTRUCTION OPERATIONS.
5. FOR ADDITIONAL INFORMATION SEE SECTION 104 OF THE FDOT STANDARD SPECIFICATIONS.

TURBIDITY BARRIER APPLICATIONS



STAKED TURBIDITY BARRIER

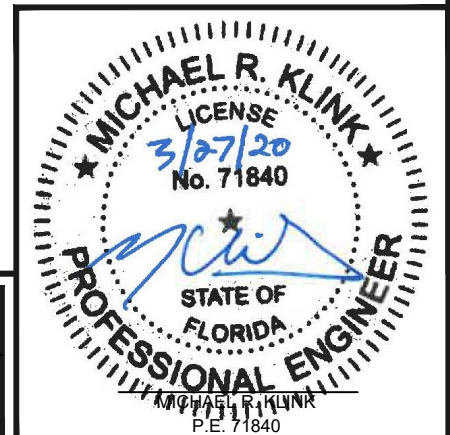




HAY BALE BARRIER CONSTRUCTION DETAILS

EROSION AND SEDIMENT CONTROL NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING SILT FROM SITE IF NOT REUSABLE ON-SITE AND ASSURING PLAN ALIGNMENT AND GRADE IN ALL WORK AT COMPLETION OF CONSTRUCTION.
2. ON-SITE PROTECTION ADDITION TO THE ABOVE MUST BE PROVIDED THAT WILL NOT PERMIT SILT TO LEAVE THE PROJECT CONFINES DE TO UNSEEN CONDITIONS OR ACCIDENTS.
3. THE FILTER BARRIER SHALL BE ENTRENCHED AND BACKFILLED. A TRENCH SHALL BE EXCAVATED TO A MINIMUM DEPTH OF 8 INCHES. THE EXCAVATED SOIL SHALL BE BACKFILLED AND COMPACTED AGAINST THE FILTER BARRIER.
4. FILTER BARRIERS AND SILT FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
5. SHOULD THE FABRIC ON A SILT FENCE OR FILTER BARRIER DECOMPOSE OR BECOME INEFFECTIVE PRIOR TO THE END THE EXPECTED USABLE LIFE AND THE BARRIER STILL BE NECESSARY, THE FABRIC SHALL BE REPLACED IMMEDIATELY.
6. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE SILT FENCE BARRIER IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM WITH THE EXISTING GRADE, PREPARED AND GRASSED.
7. THE CONTRACTOR IS RESPONSIBLE FOR THE BEST EROSION AND SEDIMENT CONTROL PRACTICES AS OUTLINED IN THE PLANS, SPECIFICATIONS, PERMITS, AND ST. JOHNS RIVER WATER MANAGEMENT DISTRICT CRITERIA.
8. FOR ADDITIONAL INFORMATION ON SEDIMENT AND EROSION CONTROL REFER TO THE FLORIDA DEVELOPMENT MANUAL - A GUIDE TO SOUND LAND AND WATER MANAGEMENT FROM THE STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (F.D.E.P.) CHAPTER 6, LATEST EDITION
9. ALL DISTRIBUTED AREAS SHALL BE GRASSED, FERTILIZED, WATERED AND MAINTAINED UNTIL VA PERMANENT VEGETATIVE COVER IS ESTABLISHED. GRASSING SHALL CONFORM TO THE REQUIREMENTS OF SECTIONS 570 AND 981 THRU 933 OF THE FLORIDA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATION FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITIONS. NOTE THAT OTHER GRASSING ALTERNATIVES MAY BE USED WITH PRIOR DISTRICT APPROVAL.



ORANGE COUNTY CONSERVATION IMPACT AREA



ENVIRONMENTAL PROTECTION DIVISION

David D. Jones, P.E., CEP, Manager

3165 McCrory Place, Suite 200
Orlando, FL 32803
407-836-1400 ▪ Fax 407-836-1499
www.ocfl.net

July 6, 2020

Dr. Ann Shortelle
St. Johns River Water Management District
C/o Rebecca Trudeau
Email: rtrudeau@sjrwmd.com

**Subject: Conservation Area Impact Permit Application
SJRWMD North Shore Restoration Area
Subject Site Address: 3451 Lust Road
Parcel ID No.: 12-21-27-0000-00-006
Application No.: CAI-20-07-047
Orange County Commission District: 2**

Dear Ms. Trudeau:

The Environmental Protection Division (EPD) received a copy of the site plans and a copy of the Florida Department of Environmental Protection Environmental Resource General Permit #0386773-001 Orange on June 29, 2020. The proposed work is for the restoration of existing levees and the installation of an internal pump station. This restoration project includes deminimus conservation area impacts, and for tracking purposes, has been assigned a different project number (#CAI-20-07-047) than the previous permit issued last year for similar activities.

EPD staff has reviewed the proposed activities and determined that the restoration of the levees is considered maintenance of the work previously approved under Conservation Area Impact (CAI) permits #07-014 and #CAI-19-06-030. In addition, the installation of an internal pump station is a continuation of the restoration activities approved under the same permits, CAI #07-014 and #CAI-19-06-030. Pursuant to Chapter 15, Section 15-376, the proposed activities have been determined to not materially affect the conservation area in any adverse way; therefore, no permit is required.

If you should have any questions concerning this review, please contact me at (407) 836-1496 or Karen.Garrett-Kraus@ocfl.net.

Sincerely,

A handwritten signature in black ink that reads "Karen Garrett-Kraus".

Karen Garrett-Kraus
Senior Environmental Specialist

Handwritten initials "KGK/NT/TMH" and "ERJ/DJ/gfdjr" in black ink.

KGK/NT/TMH/ERJ/DJ/gfdjr:

C: Dr. Ann Shortelle, St. Johns River Water Management District, ashortelle@sjrwmd.com

Serving our community by conserving, protecting, and enhancing the environment for current and future generations.