



City of Port St. Lucie

20260079

**GLADES WASTEWATER TREATMENT FACILITY DEEP INJECTION WELL  
NO. 2**

RELEASE DATE: November 12, 2025

RESPONSE DEADLINE: January 12, 2026, 3:00 pm

Please refer to the project timeline in this document for all important deadlines.

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### Attachments:

A - Sample Contract

B - PSL\_Glades\_IW-2\_100%\_Technical\_Specifications

C - PSL Glades IW-2 100% Technical Specifications - Appendices

D - PSL Glades IW2 100% Design Drawings

# 1. Introduction

## 1.1. Purpose of Procurement

Pursuant to the City of Port St. Lucie Code of Ordinances, [Section 35.07](#), this electronic Invitation for Bid (“IFB”) is being issued to establish a Contract with one or more qualified Contractors who will provide Glades Wastewater Treatment Facility Deep Injection Well No. 2 to the City of Port St. Lucie (hereinafter, “City”) as further described in this IFB.

A descriptive overview of the City can be found at <https://www.cityofpsl.com/discover-us/about-psl> . Please visit the City’s website to familiarize yourself with how our city is structured and operates. Please contact the Issuing Officer with any questions.

## 1.2. Overview of the IFB Process

The objective of the IFB is to select one (1) or more qualified Contractor (as defined by Section 1 – “Purpose of Procurement”) to provide the goods and/or services outlined in this IFB to the City. This IFB process will be conducted to gather and evaluate responses from Contractors for potential award. All qualified Contractors are invited to participate by submitting responses, as further defined below. After evaluating all Contractor’s responses received prior to the closing date of this IFB and resolution of any Contract exceptions, the preliminary results of the IFB process will be publicly announced, including the names of all participating Contractors and the evaluation results. Subject to the protest process, final Contract award(s) will be publicly announced thereafter.

NOTE TO CONTRACTORS: The general instructions and provisions of this document have been drafted with the expectation that the City may desire to make one award or multiple awards. For example, this document contains phrases such as “contract(s)” and “award(s)”. Please refer to Section 1 – “Purpose of Procurement” and Section 9 – “Evaluation and Award,” for information concerning the number of Contract awards expected.

## 1.3. Schedule of Events

The Schedule of Events set out herein represents the City’s best estimate of the schedule that will be followed. However, delays to the procurement process may occur, which may necessitate adjustments to the proposed schedule. If a component of this schedule, such as the close date, is delayed, the rest of the schedule may be shifted as appropriate. Any changes to the dates up to the closing date of the IFB will be publicly posted prior to the closing date of this IFB. After the close of the IFB, the City reserves the right to adjust the remainder of the proposed dates, including the dates for evaluation, negotiations, award, and the Contract term, on an as-needed basis, with or without notice.

Release of IFB:	November 12, 2025
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<b>Pre-Proposal Meeting (Non-Mandatory):</b>	November 24, 2025, 10:00am Glades Wastewater Treatment Facility 10700 NW Glades Cutoff Road, Port St. Lucie, FL 34987 Conference Room Attendance is highly suggested
<b>Question Submission Deadline:</b>	December 5, 2025, 5:00pm
<b>Question Response Deadline:</b>	December 15, 2025, 5:00pm
<b>Response Submission Deadline:</b>	January 12, 2026, 3:00pm 121 SW Port St Lucie Blvd 3rd Floor Conference Room 390

The City reserves the right to proceed to award without further discussions after receipt of the initial proposals, in which case, evaluation committee reviews, negotiations, and proposal revisions may not be required.

**1.4. Official Issuing Officer (Procuring Agent)**

India Barr, Procurement Contracting Officer II

O. 772-344-4055

ibarr@cityofpsl.com

**1.5. Definition of Terms**

Please review the following terms:

- Contractor(s) – companies desiring to do business with the City (Also called “Bidder,” “Proposer,” or “Offeror.”)
- City of Port St. Lucie (“City”) – the governmental entity identified in “Purpose of Procurement,” of this IFB.
- Immaterial Deviation – does not give the Contractor a substantial advantage over other Contractors.
- Material Deviation – gives the Contractor a substantial advantage over other Contractors and thereby restricts or prevents competition.

- Procurement Management Division (“PMD”) – the City department that is responsible for the review and possible sourcing of all publicly sourced solicitations.
- Responsible – means the Contractor, whether a company or an individual, has appropriate legal authority to do business in the City, a satisfactory record of integrity, appropriate financial, organizational, and operational capacity and controls, and acceptable performance on previous governmental and/or private contracts, if any.
- Responsive – means the Contractor whether a company or an individual, has submitted a timely offer which materially conforms to the requirements and specifications of the solicitation.
- Sourcing Platform – OpenGov.

Any special terms or words which are not identified in this IFB may be identified separately in one or more attachments to the IFB.

## **1.6. Contract Term**

The Initial term of the contract(s) is for one (1) calendar year from the execution date .

In the event that the Contract(s), if any, resulting from the award of this IFB shall terminate or be likely to terminate prior to the making of an award for a new Contract for the identified products and/or services, the City may, with the written consent of the awarded Contractor(s), extend the Contract(s) for such period of time as may be necessary to permit the City’s continued supply of the identified products and/or services. The Contract(s) may be amended in writing from time to time by mutual consent of the parties. Unless this IFB states otherwise, the resulting award of the Contract(s) does not guarantee volume or a commitment of funds.

### **1.6.1 Hours of Service**

The standard hours of work allowed in the City’s rights-of-way are from 7:00 a.m. to sundown Monday through Friday. Any work performed by the Contractor outside of the aforementioned time limit requires special authorization by the City and requires that the Contractor obtain a noise permit from the Port St. Lucie Police Department (PSLPD). All equipment operated at night shall comply with the noise levels established by the City of Port St. Lucie noise ordinance. Any additional costs associated with work outside of the hours of work allowed shall be borne by the Contractor. This shall include, but is not limited to, costs of inspection, testing, police assistance, and construction administration.

All night, Saturday, Sunday, and/or Holiday work must be authorized by the City and requires that the Contractor obtain a noise permit from the PSLPD. All night work within the City’s rights-of-way requires a minimum forty-eight (48) hour prior notice to the City. This clause shall not pertain to crews organized to perform maintenance work on equipment or to operate and maintain special

equipment such as dewatering pumps, which may be required to work twenty-four (24) hours per day.

### **1.7. Potential Funding Source and Requirements**

Contractor acknowledges that City may elect to compensate Contractor under the resulting Contract through state or federal grant funding. Although there is no current funding source, such funding has been used under the City's contract for the similar work in the past. Contractor agrees that, upon being made aware that a project is to be funded through grant funding, Contractor shall perform all tasks related to this Contract in accordance with the applicable grant agreements, laws, rules, regulations, or guidance, which may include, but not be limited to, 2 C.F.R. part 200, including the Build America, Buy America Act, the Davis-Bacon Act, and federal prevailing wage standards; FHWA 1273; as well as others. In addition, the City may unilaterally amend terms of this Contract by notice to Contractor to comply with the requirements of law or any grant agreement that the City determines it may wish to utilize to compensate Contractor. Contractor's agreement to comply with these requirements is a material part of the Contract, and Contractor's failure to so comply shall be a breach of this Contract.

## 2. Scope of Work

### 2.1. Scope of Work

#### Project Overview

The City of Port St. Lucie Utility Systems Department (USD) intends to construct a new Class I deep injection well, designated as **IW-2**, at the Glades WWTF. This well will be located approximately **140 feet west of MW-1** (and no more than 150 feet) and will follow a **Class I Municipal design**. The well will include a **pit pipe with a minimum diameter of 66 inches**, and concentric steel casings of **58, 48, 40, and 30 inches** in diameter.

#### Scope of Work

The Contractor shall perform the following tasks, including but not limited to:

- **Pad Monitoring Wells**
  - Install four shallow water-table monitoring wells.
- **Injection Well IW-2**
  - Construct and test the new deep injection well IW-2.
  - Conduct one injection test at IW-2.
  - Construct a concrete slab.
  - Install electrical systems, instrumentation, piping, valves, and pumps.
  - Complete paving, general site civil work, and all necessary appurtenances to deliver a fully operational system.
- **Existing Well IW-1**
  - Perform hydrostatic pressure testing on existing Class I injection well IW-1.
  - Conduct one 12-hour injection test at IW-1.
- **Final Site Restoration**
  - Complete all restoration activities to return the site to its intended condition.

#### Contractor Requirements

#### **Licensing & Certification**

- Must be duly licensed by the State of Florida and all applicable authorities.
- Must hold a valid Water Well Contractor license for the State of Florida, St. Lucie County, and the City of Port St. Lucie.

### **Equipment Standards**

- Must provide drilling rigs and components of sufficient size and condition.
- Drilling rigs must have a **maximum rated static hook load capacity** (as defined by the American Petroleum Institute) of at least **1.5 times the maximum anticipated casing string weight**.

### **Experience Requirements**

- Must have successfully completed **two large-diameter UIC Class I deep injection wells in Florida** within the past **five years**.
- Each well must have a final casing diameter of **at least 24 inches** and a setting depth of **at least 2,000 feet below pad level**.

### **Demonstrated experience in:**

- Drilling and well construction in **highly permeable carbonate formations**, including formation fluid and drilling fluid management.
- **Artesian head control up to 80 feet above land surface** during all aspects of drilling and testing.
- **Reverse air drilling techniques** and equipment required to create suitable velocities to remove cuttings from the borehole.

### **3. Instructions to Contractors**

This section contains general business requirements. By submitting a response, the Contractor is certifying its agreement to comply with all the identified requirements of this section and that all costs for complying with these general business requirements are included in the Contractor's submitted pricing.

By submitting a response to the IFB, the Contractor is acknowledging that the Contractor:

1. Has read the information and instructions, and
2. Agrees to comply with the information and instructions contained herein.

#### **3.1. General Information and Instructions**

##### **3.1.1 Familiarity with Laws and Regulations**

It is the responsibility of responding Contractors to be familiar with all Federal, State, and local laws, ordinances, rules, and regulations, that may affect the work. Ignorance on the part of the Awarded Contractor will in no way relieve it from Contract responsibility.

##### **3.1.2 Restrictions on Communicating with Staff/ Cone of Silence**

From the issue date of this IFB until the time of City Council's approval of the award or the City Manager's approval when proposal amount is below the required formal solicitation threshold (or the IFB is officially canceled), Contractors are not allowed to communicate for any reason with any City staff or elected officials except through the Issuing Officer named herein, during the Bidders'/Offerors' conference (if any), as defined in this IFB, or as provided by existing work agreement(s). This is commonly known as a Cone of Silence during the procurement process as identified in the City Code of Ordinances, [Section 35.13](#). Prohibited communication includes all contact or interaction, including but not limited to, telephonic communications, emails, faxes, letters, or personal meetings, such as lunch, entertainment, or otherwise. The City reserves the right to reject the response of any Contractor violating this provision. Further information on this topic can be found on the Cone of Silence and IFB Communication Document.

##### **3.1.3 Submitting Questions**

All questions concerning this IFB must be submitted in writing on the OpenGov Platform during the Question and Answer open period. Please select the Question and Answer tab in the IFB project and click the "Ask Question" option. Once the question has been entered, select the "Submit Question" button. Enter a subject in the Subject field and then type the question in the Question field below. Once finished, select "Submit." No questions other than written will be accepted. No response other than written will be binding upon the City. All Contractors must submit questions by the deadline identified in the Schedule of Events for submitting questions. Contractors are cautioned that the

City may or may not elect to entertain late questions or questions submitted by any other method than as directed by this section.

### **3.1.4 Attending Bidders'/Offerors' Conference**

The Bidders'/Offerors' Conference or any other information session (if indicated in the Schedule of Events) will be held at the locations referred to in "Schedule of Events," of this IFB. Unless indicated otherwise, attendance is not mandatory, although Contractors are strongly encouraged to attend. However, in the event the conference has been identified as mandatory, then a representative of the Contractor must attend the conference in its entirety to be considered eligible for Contract award. The Contractor is strongly encouraged to allow ample travel time to ensure arrival in the conference meeting room prior to the beginning of any mandatory conference. The City reserves the right to consider any representative arriving late to be "not in attendance." Therefore, all Contractors are strongly encouraged to arrive early to allow for unexpected travel contingencies.

### **3.1.5 The City's Right to Request Additional Information- Contractor's Responsibility**

Prior to Contract award, the City must be assured that the selected Contractor has all the resources to successfully perform under the Contract. This includes, but is not limited to, adequate number of personnel with required skills, availability of appropriate equipment in sufficient quantity to meet the on-going needs of the City, financial resources sufficient to complete performance under the Contract, and experience in similar endeavors. If, during the evaluation process, the City is unable to assure itself of the Contractor's ability to perform, if awarded, the City has the option of requesting from the Contractor any information deemed necessary to determine the Contractor's responsibility. If such information is required, the Contractor will be notified and will be permitted approximately ten (10) business days to submit the information requested.

### **3.1.6 Failing to Comply with Submission Instructions**

Responses received after the identified due date and time or submitted by any other means than those expressly permitted by the IFB will not be considered. Contractor's response must be complete in all respects, as required in each section of this IFB.

### **3.1.7 Rejection of Proposals; The City's Right to Waive Immaterial Deviation**

The City reserves the right to reject any or all responses, to waive any irregularity or informality in a Contractor's response, and to accept or reject any item or combination of items, when to do so would be to the advantage of the City. The City reserves the right to waive mandatory requirements, provided that, all the otherwise Responsive proposals failed to meet the mandatory requirements and/or doing so does not otherwise materially affect the procurement of requested commodities and/or services. It is also within the right of the City to reject responses **that do not contain all elements and information requested in this IFB**. A Contractor's response will be rejected if the response contains any defect or irregularity and such defect or irregularity constitutes a Material

Deviation from the IFB requirements, which determination will be made by the City in its sole discretion and on a case-by-case basis.

**NOTE: The City reserves the right to reject the Bid of any Contractor who has previously failed in the performance of an award, to deliver contracts of a similar nature on time, or who is not in a position to perform properly under this award. This includes the firm, employees, and financial or legal interests. The City will not enter into a contract or conduct business with any firm or any personnel that is listed on the Federal, State, or other local government agencies' Excluded Parties List, Suspended List, or Debarment List. Please see section 287.133, Florida Statutes, for further information regarding business transactions with companies that have been convicted of public entity crimes.**

### **3.1.8 The City's Right to Amend and/or Cancel the IFB**

The City reserves the right to amend this IFB. All revisions must be made in writing prior to the IFB closing date and time. If a responding entity discovers any ambiguity, conflict, discrepancy, omission, or other error in the IFB, it shall immediately notify the City of such error in writing and request modification or clarification of the document. Any modification made to this IFB will be issued as an addendum. If a responding entity fails to notify the City prior to the date and time fixed for submission of an error or ambiguity in the IFB known to it, or an error or ambiguity that reasonably should have been known to it, it shall not be entitled to additional time by reason of the error/ambiguity or its late resolution. By submitting a response, the Contractor shall be deemed to have accepted all terms and agreed to all requirements of the IFB (including any revisions/additions made in writing prior to the close of the IFB, whether or not such revision occurred prior to the time the Contractor submitted its response), unless expressly stated otherwise in the Contractor's response. THEREFORE, EACH CONTRACTOR IS INDIVIDUALLY RESPONSIBLE FOR REVIEWING THE REVISED IFB AND MAKING ANY NECESSARY OR APPROPRIATE CHANGES AND/OR ADDITIONS TO THE CONTRACTOR'S RESPONSE PRIOR TO THE CLOSE OF THE IFB. All Notice(s) to Proceed with Negotiations and/or Notice of Intent to Award (NOIAs) will be posted as referenced in Section 9.8 - "Public Award Announcement," of this document. **Finally, the City reserves the right to amend or cancel this IFB at any time.**

### **3.1.9 Assigning of the Contract & Use of Subcontractors**

Except as may be expressly agreed to in writing by the City, Contractor shall not assign, sell, transfer, or otherwise dispose of the awarded Contract or any portion thereof, or of the work provided for therein, or of its right, title, or interest therein, to any person, firm, or corporation without the prior written consent of the City.

Each Contractor shall list all subcontractors and the work provided by the suppliers in the area provided on the Bid Reply Sheet. The successful Contractor(s) shall provide a listing of all subcontractors, suppliers, and other persons and organizations (including those who are to furnish

the principal items of material and equipment), other than those identified in the Bid Reply, to the City within ten (10) days after the bid opening. Such a list shall be accompanied by an experience statement for each such subcontractor, supplier, person, or organization, if requested by the City. The City, if after due investigation, has reasonable objection to any proposed subcontractor, supplier, other person or organization, the City may, before the Notice of Intent Award is given, request apparent successful Contractor to submit an acceptable substitute without an increase in Bid price.

If the apparent successful Contractor(s) declines to make any such substitution, the City may award the Contract to the next acceptable Contractor(s) that proposes to use acceptable subcontractors, suppliers, and other persons and organizations. Declining to make requested substitutions will not constitute grounds for sacrificing the Bid security of any Contractor(s). Any subcontractor, supplier, other person, or organization listed and to whom the City does not make written objection prior to the giving of the Notice of Intent to Award, shall be deemed acceptable to City, subject to revocation of such acceptance after the effective date of the Contract.

No subcontract which Contractor enters into with respect to performance of obligations or work assigned under the Contract shall in any way relieve Contractor of any responsibility, obligation, or liability under the Contract, and for the acts and omissions of all subcontractors, agents, and employees. All restrictions, obligations, and responsibilities of the Contractor under the Contract shall also apply to the subcontractors. Any contract with a subcontractor must also preserve the rights of the City. The City shall have the right to request the removal of a subcontractor from performing work under the Contract at any time, with or without cause.

### **3.1.10 Proposal of Additional Services**

If a Contractor indicates an offer of services in addition to those required by and described in this IFB, these additional services may be added to the original Contract at the sole discretion of the City.

### **3.1.11 Protest Process**

Contractors should familiarize themselves with the procedures set forth in City Code of Ordinances, [Section 35.15](#). By submitting a response to this IFB, the Contractor certifies that it is on notice of Section 35.15, understands the procedures set forth therein, and acknowledges it is bound by the protest process therein.

### **3.1.12 Costs for Preparing Responses**

Each Contractor's response should be prepared simply and economically, avoiding the use of elaborate promotional materials beyond those sufficient to provide a complete presentation. The cost for developing the response and participating in the procurement process (including the protest process) is the sole responsibility of the Contractor. The City will not provide reimbursement for such costs.

### **3.1.13 Public Access to Procurement Records**

Solicitation opportunities will be publicly advertised as required by City ordinances and state and federal laws. Any material that is submitted in response to this IFB, including anything considered by the Contractor to be confidential or a trade secret, will become a public document pursuant to [Chapter 119, Florida Statutes](#). Any claim of confidentiality is waived upon submission, effective after the City's opening of the proposals pursuant to section 119.07, Florida Statutes. Therefore, the Contractor is hereby cautioned NOT to submit any documents that the Contractor does not want to be made public. The City is allowed to assess a reasonable charge to defray the cost of reproducing documents. A City employee must be present during the time of onsite inspection of documents. PLEASE NOTE: Even though information (financial or other information) submitted by a Contractor may be marked as "confidential," "proprietary," etc., the City will make its own determination regarding what information may or may not be withheld from disclosure. Contractors should review [Chapter 119, Florida Statutes](#) for all updates before requesting exceptions from Chapter 119.

## **3.2. Submittal Instructions**

### **Submittal Instructions to Electronic Bidding System**

Listed below are key action items related to this IFB. The **Schedule of Events** Section identifies the dates and time for these key action items. This portion of the IFB provides high-level instructions regarding the process for reviewing the IFB, preparing a response to the IFB, and submitting a response to the IFB.

#### **3.2.1 IFB Released**

The release of the IFB is through the posting of this project in OpenGov, the City's electronic bidding system. Each Contractor interested in competing to win a Contract award must complete and submit a response to this IFB in OpenGov. Therefore, each Contractor MUST carefully review the submittal instructions.

#### **3.2.2 IFB Review**

The IFB 20260079 consists of the following: this document, entitled "Glades Wastewater Treatment Facility Deep Injection Well No. 2," and any and all information included in the IFB, as posted to OpenGov, including any and all documents provided by the City as attachments to the IFB or links contained within the IFB or its attached documents.

Please carefully review all information, including all documents available as attachments or available through links. Any difficulty accessing or opening provided links or documents should be reported immediately to the Issuing Officer.

#### **3.2.3 Preparing a Response**

When preparing a response, the Contractor must consider the following instructions:

1. Use the provided Cost Table to prepare your response. Enter your responses directly into the Cost Table. Unless otherwise directed, do not insert “see attached file” (or similar statements) in the worksheet to reference separate documents.
2. Answer each question in sufficient detail for evaluation while using judgment with regards to the length of response.
3. Proofread your response and make sure it is accurate and readily understandable.
4. Label any and all uploaded files using the corresponding section numbers of the IFB as specified by the City.
5. Use caution in creating electronic files to be uploaded. If the City is unable to open an electronic file due to a virus or because the file has become corrupted, the Contractor’s response may be considered incomplete and disqualified from further consideration.
6. Use commonly accepted software programs to create electronic files. The City has the capability of viewing documents submitted in the following formats: Microsoft Office and portable document format file (PDF). Unless the IFB specifically requests the use of another type of software or file format than those listed above, please contact the Issuing Officer, India Barr, prior to utilizing another type of software and/or file format. In the event that the City is unable to open an electronic file because the City does not have ready access to the software utilized by the Contractor, the Contractor’s response will be considered incomplete and disqualified from further consideration.

### **3.2.4 Reviewing, Revising, or Withdrawing a Submitted Response**

After the response has been submitted, the Contractor may view and/or revise its response by logging into OpenGov. Please take note of the following:

A. **BID SUBMISSION**. All bids shall be submitted by completing and uploading all required documents. All submittals are required to be electronic. No hard copies will be accepted.

- Cost Work Sheet **will be completed through Cost Table in OpenGov.**
- **Upload** files in the following order (Provided in Section 12-Vendor Submission Requirements and Attestations):

#### **1. Mandatory Forms:**

- 1.1 Contractor’s General Information Worksheet, and
- 1.2 E-Verify Form, and
- 1.3 Non-Collusion Affidavit, and

- 1.4 Supplier Location Certification (Local vendors only), and
- 1.5 Debarment Form (Contractor and all subcontractors to fill them out and sign them), and
- 1.6 Lobbying Form (Contractor and all subcontractors to fill them out and sign them), and
- 1.7 Buy America Certification, and
- 1.8 Copy of W-9 (*Vendor to provide*), and
- 1.9 Copy of Certificate of Insurance (*Vendor to provide*), and
- 1.10 Florida Well Water Contractor License (*Vendor to provide*), and
- 1.11 Copy of the bid bond as reflected in Section Bonds and/or Letter of Credit, Permits (*Vendor to provide*).

**2. Confirm electronically** the following forms (Provided in Section 12-Vendor Submission Requirements and Attestations):

- 2.1 Cone of Silence and Communication Document, and
- 2.2 Contractor's Code of Ethics, and
- 2.3 Drug Free Workplace, and
- 2.4 Affidavit of Nongovernment Entity Anti-Human Trafficking Laws, and
- 2.5 Vendor Scrutinized Companies List Certification, and
- 2.6 The Contractor will comply with C.F.R. 200.318 through 200.326.

**B. REVIEW AND REVISE.** Contractors may modify their submittal electronically via the City's electronic bidding system at any time prior to the scheduled due date and time for submission. In order to revise, the Contractor must navigate to their submitted response via the City's electronic bidding system and then click "Unsubmit Response." At this point, Contractor's response is no longer submitted. Contractor should make the changes required and promptly re-submit its response before the submission date and time.

**C. WITHDRAW.** Contractors may withdraw their submittal electronically via the Portal at any time prior to the scheduled due date and time for submission. In order to withdraw, the Contractor must navigate to their submitted proposal via the City's electronic bidding system and then click "Unsubmit Response". In the event a Contractor desires to withdraw its response after the closing date and time, the Contractor must submit a request in writing to the Issuing Officer.

Add Item

Invitation For Bid (IFB) #20260079

Title: Glades Wastewater Treatment Facility Deep Injection Well No. 2

## **4. General Insurance**

The Proposer shall, on a primary basis and at its sole expense, agree to maintain in full force and effect at all times during the life of this Contract, insurance coverage and limits, including endorsements, as described herein. The requirements contained herein, as well as City's review or acceptance of insurance maintained by the Proposer are not intended to and shall not in any manner limit or qualify the liabilities and obligations assumed by Proposer under the Contract.

The parties agree and recognize that it is not the intent of the City of Port St. Lucie that any insurance policy/coverage that it may obtain pursuant to any provision of this Contract will provide insurance coverage to any entity, corporation, business, person, or organization, other than the City of Port St. Lucie and the City shall not be obligated to provide any insurance coverage other than for the City of Port St. Lucie or extend its immunity pursuant to Section 768.28, Florida Statutes, and as may be amended from time to time, under its self-insured program. Any provision contained herein to the contrary shall be considered void and unenforceable by any party. This provision does not apply to any obligation imposed on any other party to obtain insurance coverage for this project, and/or any obligation to name the City of Port St. Lucie as an additional insured under any other insurance policy or otherwise protect the interests of the City of Port St. Lucie as specified in this Contract.

### **4.1. Indemnification/Hold Harmless**

Proposer agrees to indemnify, defend, and hold harmless, the City, its officers, agents, and employees from, and against any and all claims, actions, liabilities, losses, and expenses including, but not limited to, attorney's fees for personal, economic, or bodily injury, wrongful death, loss of or damage to property, at law or in equity, which may arise or may be alleged to have arisen from the negligent acts, errors, omissions or other wrongful conduct of Proposer, agents, laborers, subcontractors or other personnel entity acting under Proposer control in connection with the Proposer's performance of services under the Contract. To that extent, Proposer shall pay any and all such claims and losses and shall pay any and all such costs and judgements which may issue from any lawsuits arising from such claims and losses including wrongful termination or allegations of discrimination or harassment, and shall pay all costs and attorney's fees expended by the City in defense of such claims and losses, including appeals. That the aforesaid hold-harmless agreement by Proposer shall apply to all damages and claims for damages of every kind suffered, or alleged to have been suffered, by reason of any of the aforesaid operations of Proposer or any agent laborers, subcontractors, or employee of Proposer regardless of whether or not such insurance policies shall have been determined to be applicable to any of such damages or claims for damages. Proposer shall be held responsible for any violation of laws, rules, regulations, or ordinances affecting in any way the conduct of all persons engaged in or the materials or methods used by Proposer on the work. This indemnification shall survive the termination of the Contract.

### **4.2. Workers' Compensation Insurance & Employer's Liability**

The Proposer shall agree to procure and maintain Workers' Compensation Insurance & Employers' Liability in accordance with Section 440, Florida Statutes. Employers' Liability must include limits of at least \$100,000.00 each accident, \$100,000.00 each disease/ employee, and \$500,000.00 each disease/maximum. A Waiver of Subrogation endorsement must be provided. Coverage shall apply on a primary basis. Should scope of work performed by Proposer qualify its employee(s) for benefits under Federal Workers' Compensation Statute (for example, U.S. Longshore & Harbor Workers Act or Merchant Marine Act), proof of appropriate Federal Act coverage must be provided.

**4.3. Commercial General Liability Insurance**

The Proposer shall agree to procure and maintain Commercial General Liability insurance, issued under an Occurrence form basis, including Contractual liability, to cover the hold harmless agreement set forth herein, with limits of not less than:

Each occurrence	\$1,000,000
Personal/advertising injury	\$1,000,000
Products/completed operations aggregate	\$2,000,000
General aggregate	\$2,000,000
Fire damage	\$100,000 any 1 fire
Medical expense	\$10,000 any 1 person

**4.4. Additional Insured**

An Additional Insured endorsement must be attached to the certificate of insurance (should be CG2026) under the General Liability policy. Coverage is to be written on an occurrence form basis and shall apply as primary and non-contributory. Defense costs are to be in addition to the limit of liability. A waiver of subrogation is to be provided in favor of the City. Coverage shall extend to independent consultants and fellow employees. Contractual Liability is to be included. Coverage is to include a cross liability or severability of interests provision as provided under the standard ISO form separation of insurers clause.

Except as to Workers' Compensation and Employers' Liability insurance, Certificates of Insurance and policies shall clearly state that coverage required by the Contract has been endorsed to include the City of Port St. Lucie, a municipality of the State of Florida, its officers, agents and employees as Additional Insured for Commercial General Liability and Business Auto Liability policies. The name for

the Additional Insured endorsement issued by the insurer shall read: "**City of Port St. Lucie, a municipality of the State of Florida, its officers, employees and agents shall be listed as additional insured and shall include Contract #20260079 - Glades Wastewater Treatment Facility Deep Injection Well No.2.**" Copies of the Additional Insured endorsements shall be attached to the Certificate of Insurance. The policies shall be specifically endorsed to provide thirty (30) days written notice to the City prior to any adverse changes, cancellation, or non-renewal of coverage thereunder. Formal written notice shall be sent to City of Port St. Lucie, 121 SW Port St. Lucie Blvd., Port St. Lucie, FL 34984, Attn: Procurement. In the event that the statutory liability of the City is amended during the term of this Contract to exceed the above limits, the Contractor shall be required, upon thirty (30) days written notice by the City, to provide coverage at least equal to the amended statutory limit of liability of the City. Copies of the Additional Insured endorsement shall be attached to the Certificate of Insurance.

#### **4.5. Business Automobile Liability Insurance**

The Proposer shall agree to maintain Business Automobile Liability at a limit of liability not less than \$1,000,000.00 each accident covering any auto, owned, non-owned and hired automobiles. In the event the Proposer does not own any automobiles, the Business Auto Liability requirement shall be amended allowing the Proposer to agree to maintain only Hired & Non-Owned Auto Liability. This amended requirement may be satisfied by way of endorsement to the Commercial General Liability, or separate Business Auto Coverage form. Certificate holder must be listed as additional insured. A waiver of subrogation shall be provided. Coverage shall apply on a primary and non-contributory basis.

#### **4.6. Waiver of Subrogation**

By entering into this Contract, the Proposer agrees to a Waiver of Subrogation for each required policy. When required by the insurer, or should a policy condition not permit an Insured to enter into a pre-loss Contract to waive subrogation without an endorsement then the Vendor shall agree to notify the insurer and request the policy be endorsed with a Waiver of Transfer of Rights of Recovery Against Others, or its equivalent. This Waiver of Subrogation requirement shall not apply to any policy where a condition to the policy specifically prohibits such an endorsement, or voids coverage should Proposer enter into such a Contract on a pre-loss basis.

#### **4.7. Deductibles**

All deductible amounts shall be paid for and be the responsibility of the Proposer for any and all claims under this Contract. Where an SIR or deductible exceeds \$5,000, the City reserves the right, but is not obligated, to review and request a copy of the bidder's most recent annual report or audited financial statement.

#### **4.8. Compliance**

It shall be the responsibility of the Proposer to ensure that all independent contractors and/or subcontractors comply with the same insurance requirements referenced herein. It shall be the responsibility of the Proposer to obtain Certificates of Insurance from all independent contractors and subcontractors listing the City as an Additional Insured without the language “when required by written contract”. If the Proposer, independent contractor and/or subconsultant maintain higher limits than the minimums shown above, the City requires and shall be entitled to coverage for the higher limits maintained by the Proposer/independent contractor/subcontractor.

The Proposer may satisfy the minimum limits required above for either Commercial General Liability, Business Auto Liability, and Employers’ Liability coverage under Umbrella or Excess Liability. The Umbrella or Excess Liability shall have an Aggregate limit not less than the highest "Each Occurrence" limit for either Commercial General Liability, Business Auto Liability, or Employers’ Liability. When required by the insurer, or when Umbrella or Excess Liability is written on Non-Follow Form, the City shall be endorsed as an "Additional Insured."

The City by and through its Risk Management Department reserves the right, but is not obligated, to review, modify, reject or accept any required policies of insurance, including limits, coverages or endorsements, herein from time to time throughout the term of this Contract. All insurance carriers must have an AM Best rating of at least A:VII or better.

A failure on the part of the Proposer to execute the contract and/or punctually deliver the required insurance certificates and other documentation may be cause for annulment of the award.

#### **4.9. Builder's Risk Insurance**

Proposer shall purchase and maintain Builder's Risk insurance in an amount equal to 100% of the completed value of the project including any amendments thereto (without coinsurance). Proposer’s policy shall be written on an “ALL Risk” Builders Risk form that shall cover physical loss or damage to the Work, temporary buildings, construction forms and scaffolding, materials, and equipment in transit or in storage/at temporary locations, and should extend coverage to foundations, excavations, and other underground property. Coverage shall insure against at least the following perils or causes of loss: fire; lightning; windstorm/and hail; theft (including theft of materials, whether or not attached to any structure); vandalism and malicious mischief; flood; earthquake; collapse; and such other perils or causes of loss as may be specifically required. The policy shall include coverage for pollutant cleanup, debris removal, demolition and increased cost of construction, water damage, backup of sewers and drains, testing and startup of building systems (including hot testing), and mold & fungus remediation. The Builders Risk coverage shall include a waiver of subrogation rights endorsement in favor of the City.

The “ALL RISK” Builder’s Risk Insurance must also cover: soft costs, including additional advertising/promotional; additional license and permit fees; additional legal/accounting fees; insurance premiums, including builder’s risk; and architects’ and engineers’ fees that may be

necessary to provide plans and specifications and supervision of work for the repair and/or replacement of property damage caused by a covered peril.

This policy must include insurance for the City of Port St. Lucie, Proposer, Subcontractors, Architect/Engineer, and Consultants for their interest in covered property. The City's policy will not provide coverage related to this project.

Proposer has the right to purchase coverage or self-insure any exposures not required by these specifications, but shall be held liable for all losses, deductibles, and self-insurance for coverages not required.

Proposer is responsible for all deductibles. including those for windstorms.

#### **4.10. Pollution Insurance**

Proposer shall procure and agree to maintain in full force during the term of this Contract, Pollution Liability Insurance in limits not less than \$1,000,000 per occurrence and \$2,000,000 aggregate, for any operations relating to the handling, storage, and transportation of hazardous materials and/or waste. The City of Port St. Lucie shall be listed as an additional insured. A waiver of subrogation shall be provided in favor of the City. Coverage shall apply on a primary and non-contributory basis.

#### **4.11. Requirements for Insurance**

Within ten (10) business days of award, the awarded Proposer must procure the required insurance and provide the City with an executed Certificate of Insurance. Certificates must reference the contract number and the City as the Additional Insured party, as identified herein. The Proposer's submitted pricing must include the cost of the required insurance. No contract performance shall occur unless and until the required insurance certificates and endorsements are provided.

## 5. Bonds and/or Letter of Credit, Permits

### 5.1. Bid Bond

Each responding Contractor must supply a Bid Bond or Bid Deposit (certified check, cashier's check, bank money order, bank draft of any national or state bank), in a sum of not less than 5% of the bid total made payable to the City. As a **Mandatory Requirement**, the Bid Bond or Bid Deposit must be scanned and uploaded as part of the Vendor Submission along with all other required documents, thus showing evidence that a Bid Bond or Bid Deposit was obtained. Responding Contractors must send the Original Bid Bond or Bid Deposit to the City within ten (10) business days after the IFB Due Date as reflected above in the Schedule of Events. The responding Contractor's proposal will be considered non-Responsive if the Bid Bond or Bid Deposit is not received within the specified time frame. Responding Contractors must submit a Bid Bond or Bid Deposit made payable to the City in a sealed envelope to:

India Barr  
121 S.W. Port St. Lucie Blvd.  
Port St. Lucie, FL 34984  
Attn: Procurement Management Division

Bonds must be issued by a Surety authorized to do business in the State of Florida, in order to guarantee that the Contractor will enter into a contract to deliver products and/or related services outlined in this solicitation, strictly within the terms and conditions stated in the Contract.

### 5.2. Certification

#### Proposal Certification

By responding to this solicitation, the Contractor understands and agrees to the following:

1. That this electronically submitted proposal constitutes an offer, which, when accepted in writing by the City, and subject to the terms and conditions of such acceptance, will constitute a valid and binding contract between the Contractor and the City; and
2. That the Contractor guarantees and certifies that all items included in the Contractor's response meet or exceed any and all of the solicitation's identified specifications and requirements, except as expressly stated otherwise in the Contractor's response; and
3. That the response submitted by the Contractor shall be valid and held open for a period of **one hundred and twenty (120) days** from the final solicitation closing date and that the Contractor's offer may be held open for a lengthier period subject to the Contractor's consent; and
4. That the Contractor's response is made without prior understanding, agreement, or connection with any corporation, firm, or person submitting a response for the same materials, supplies, equipment, or services and is in all respects fair and without collusion or fraud. Contractor

understands and agrees that collusive bidding is a violation of City ordinance and state and federal laws and can result in fines, prison sentences, and civil damage awards.

### **5.3. Payment and Performance Bonds**

By responding to this solicitation, the Contractor understands and agrees to the following:

1. The Contractor shall furnish an acceptable recorded Performance and Payment Bond complying with the statutory requirements set forth in [section 255.05, Florida Statutes](#), and 2 CFR 200.326 in the amount equal to one hundred percent (100%) of the Contract price. Additionally, upon any Contract price increase, Contractor shall obtain a bond rider to ensure that the Performance and Payment Bond never drops below 100% of the Contract Price. For clarity, this means that if there is any amendment, change order, purchase order, or any other approval for additional funds under the Contract, Contractor shall obtain a bond rider covering 100% of the increase. The bond shall be issued by a Corporate Surety authorized to do business with the State of Florida. The performance bond/letter of credit must be submitted to the City within ten (10) calendar days of the date the Contract is approved by City Council or the City Manager (if within his or her threshold), but in any event, prior to the beginning of any Contract performance by the awarded Contractor. The Performance and Payment Bond shall remain in full force and effect a minimum of one (1) year after the work has been completed and final acceptance of the work is issued by the City.
2. Should the Surety become irresponsible during the time the Contract is in force, the City may require additional and sufficient sureties and the Contractor shall furnish same to the satisfaction of the City within ten (10) calendar days after written notice to do so. In default thereof, the Contractor may be suspended/terminated as herein provided.

### **5.4. Permits**

The selected Contractor shall be responsible for obtaining all permits, licenses, certifications, etc., required by federal, state, county, and municipal laws, regulations, codes, and ordinances for the performance of the work required in these specifications and to conform to the requirements of said legislation. Permit fees can be found on the [City's Building Department Website](#). All permit fees shall be included in the Contract amount and paid by the successful Contractor(s).

## 6. IFB Bid Factors

This section contains the detailed technical requirements and related services for this Sourcing Event. The City has determined that it is best to define its own needs, desired operating objectives, and desired operating environment. The City will not tailor these needs to fit particular solutions Contractors may have available; rather, the Contractors shall propose to meet the City's needs as defined in this IFB. All claims shall be subject to demonstration. Contractors are cautioned that conditional proposals, based upon assumptions, may be deemed non-Responsive.

Unless requested otherwise, all responses must be provided in the format identified in the Section 3.2 - "Submittal Instructions." Except as otherwise indicated, all requested forms and documents must be submitted electronically via the sourcing tool as an uploaded document to the Contractor's response.

By submitting a bid, the Bidder acknowledges the detailed technical requirements and related services for this Sourcing Event.

### 6.1. IFB Introduction

All the items described in this section are service levels and/or terms and conditions that the City expects to be satisfied by the selected Contractor. Each Contractor must indicate its willingness and ability to satisfy these requirements in their response.

Unless otherwise specified, references to brand name or trade name/mark products are intended to be descriptive, but not restrictive, and are used to indicate the quality and characteristics of products that may be offered. Other products may be considered for award if such products are clearly identified and are determined by the City to meet its needs in all respects. Each Contractor's response must indicate the brand name and model, or series number of the product offered and include such specifications, catalog pages, or other data that will provide an adequate basis for determining the quality and functional capabilities of the product offered.

### 6.2. Contractor's General Information

Each Contractor must complete all the requested information in the **Contractor's General Information Worksheet** in the Vendor Submission Requirements and Attestations Section.

### 6.3. Mandatory Requirements

As noted in the preceding section, this IFB contains mandatory requirements (e.g. product specifications, service or quality levels, staff requirements, experience or license requirements, etc.) which must be met by the Contractor in order to be considered Responsive, and, therefore, eligible for Contract award. These mandatory requirements will be defined in one or more of the following ways:

1. Requirements in this IFB document.

2. Requirements contained in any attachment to the Sourcing Event, including any Mandatory Forms, Electronic Acknowledgements, and Cost Table.
3. Copy of Current Insurance Certificate, Licenses, required Certifications, etc.

A Pass/Fail evaluation will be utilized for all mandatory requirements. Please review the Sourcing Event and its attachments carefully and respond as directed.

Some requirements may require a "Yes" or "No" response. Ordinarily, to be considered Responsive, Responsible, and eligible for award, all requirements identified as mandatory must be marked "Yes" to pass. There may be rare instances in which a response of "NO" is the correct and logical response in order to meet the mandatory requirements (e.g., responding "NO" that the Contractor does not possess any conflicts of interest). Otherwise, any mandatory questions marked "NO" will fail the technical requirements and will result in disqualification of the Contractor's response, except as otherwise provided in Section 9 - "Evaluation and Award," of this IFB. Please note some requirements may require the Contractor to provide product sheets or other technical materials.

It is strongly encouraged that all Contractors review all documents that are electronically attached to this IFB. Reviewing the documentation ensured that Contractors understand the full scope of the City's request.

#### **6.4. Additional Information**

Please access and review all the attachments provided by the City within the Project. If supplemental materials are requested by the City to be submitted by the Contractor as part of the technical proposal, the Contractor should upload these additional materials as directed by the City.

## 7. Cost Table

### GLADES WWTF INJECTION WELL IW-2 PROJECT NO. 63-0007

Cost Table

Line Item	Description	Quantity	Unit of Measure	Unit Cost	Total
<b>Base Bid Item No.1 - Construction of Injection Well IW-2</b>					
1	General Conditions, Mobilization, and Demobilization	1	LS		
2	Drill pilot hole from 665 feet to 3,500 feet	2,835	FT		
3	Provide and install drillable bridge plug at 2,600 feet	1	LS		
<b>Boreholes and Reamed Holes</b>					
4	64-inch diameter - pad level to approximately 195 feet	195	FT		
5	58-inch - diameter - approximately 195 feet to 665 feet	470	FT		
6	48-inch diameter - approximately 665 feet to 1,605 feet	940	FT		
7	40-inch diameter - approximately 1,605 feet to 2,605 feet	1,000	FT		
8	30-inch diameter - approximately 2,605 feet to 3,500 feet	895	FT		
<b>Casing</b>					
9	Furnish and install 58-inch carbon steel casing	190	FT		

Line Item	Description	Quantity	Unit of Measure	Unit Cost	Total
10	Furnish and install 48-inch carbon steel casing	660	FT		
11	Furnish and install 40-inch carbon steel casing	1,600	FT		
12	Furnish and install 30-inch carbon steel casing	2,600	FT		
<b>Furnish and Emplace Cement and Additives</b>					
13	Cement 58-inch casing; includes cement-top temperature logs	190	LF		
14	Cement 48-inch casing; includes cement-top temperature logs	660	LF		
15	Backplug pilot hole with cement - approximately 810 feet to 1,700 feet	890	LF		
16	Cement 40-inch casing; includes cement-top temperature logs	1,600	LF		
17	Backplug pilot hole with cement - approximately 1,750 feet to 2,600 feet	850	LF		
18	Cement 30-inch casing; includes cement-top temperature logs	2,600	LF		
<b>Geophysical Logging:</b>					
19	Perform borehole logging from 0 to 195 feet	1	LS		
20	Perform borehole logging from 190 to 665 feet	1	LS		

Line Item	Description	Quantity	Unit of Measure	Unit Cost	Total
21	Perform pilot hole logging from 660 to 1,700 feet; static and dynamic	1	LS		
22	Perform reamed hole logging from 660 to 1,605 feet	1	LS		
23	Perform pilot hole logging from 1,600 to 3,500 feet; static and dynamic	1	LS		
24	Perform reamed hole logging from 1,600 to 2,605 feet	1	LS		
25	Perform reamed hole logging from 2,600 to 3,500 feet	1	LS		
26	Perform cement-bond, downhole video, background gamma-ray, and RTS logging	1	LS		
27	Collect and analyze 10-foot cores	8	EA		
28	Set up and perform inflatable packer testing	11	EA		
29	Set up and perform pressure test on 30-inch casing	1	LS		
30	Develop and collect final water quality sample in IW-2	1	LS		
31	Perform laboratory water quality analyses	1	LS		
32	Setup and Perform Injection Test of IW-2	1	LS		
33	Setup and Perform Annular Pressure Test of IW-1	1	LS		

Line Item	Description	Quantity	Unit of Measure	Unit Cost	Total
34	Setup and Perform Injection Test of IW-1	1	LS		
35	Furnish and Install Injection Well IW-2 Wellhead and Surface Facilities (Inc. Concrete Pad)	1	LS		
36	Furnish and Install Buried Piping, Valves and Fittings	1	LS		
37	General Sitework (Including Restoration)	1	LS		
38	Electrical and Instrumentation Work	1	LS		
<b>Base Bid Item NO.2 - Standby Time</b>					
39	Standby Time	60	HR		
<b>TOTAL</b>					

**SET AMOUNTS BY CITY**

Owners Contingency

Line Item	Description	Quantity	Unit of Measure	Unit Cost	Total
40	Owner's Contingency	1	LS	\$500,000.00	
<b>TOTAL</b>					

## 8. Cost/Pricing

### 8.1. General Pricing Rules

By submitting a response, the Contractor agrees that it has read, understood, and will abide by the following instructions/rules:

1. The submitted pricing must include all costs of performing pursuant to the resulting Contract; and
2. All quantities and/or estimates are for information or tabulation purposes only; and
3. No warranty or guarantee is expressed or implied on the volume of products and/or services that the City may require through the negotiated Contract period; and
4. Bids containing a minimum order/ship quantity or dollar value, unless otherwise called for in the IFB, will be treated as non-Responsive and may not be considered for award; and
5. The Contractor is required to provide net prices. In the event there is discrepancy between a Contractor's unit price and extended price, the unit price shall govern; and
6. In the event there is a discrepancy between (1) the Contractor's pricing as quoted in Cost Table, and (2) the Contractor's pricing as quoted by the Contractor in one or more single line entries directly into the Sourcing Event screen, the former shall govern; and
7. The prices quoted and listed in the response shall be firm throughout the term of the resulting Contract, unless otherwise noted in the IFB or Contract; and
8. Unless otherwise specified in any terms and conditions attached to the IFB, all product deliveries will be F.O.B. destination and all shipping charges must be included in the quoted pricing structure; and
9. Unless expressly permitted by the IFB, responses containing provisions for late or interest charges cannot be awarded a Contract. Contractors must "strikethrough" any such provisions in printed forms and initial such revisions prior to submitting a response to the City; and
10. Contractor responses requiring prepayment and/or progress payment requirements may be determined non-Responsive, unless otherwise permitted by the IFB; and
11. Unless permitted by the IFB, responses requiring payment from the City in less than thirty (30) days will be considered non-Responsive.

### 8.2. Cost Structure and Additional Instructions

The City's intent is to structure the cost format in order to facilitate comparison among all Contractors and foster competition to obtain the best market pricing. Consequently, the City requires that each Contractor's cost be structured as directed in the IFB. Additional and/or alternative cost structures

will not be considered. Each Contractor is cautioned that failure to comply with the instructions listed below, submission of an incomplete offer, or submission of an offer in a different format than the one requested, may result in the rejection of the Contractor's response.

Enter all information directly into the Cost Table. Enter numbers on each cost sheet in “number” (two-place decimal), not “currency” or other format, unless otherwise stated. That is, omit dollar signs, commas, and any other non-essential symbols (e.g., \$7.90 should be entered as 7.90). Prices must be in US Dollars. Enter “n/a” to indicate not available or “0” if there is no charge. Cells left blank will be interpreted as “no offer.”

Complete the Cost Table, save and submit in the response section.

### **8.3. Payment by City's Visa Card Program**

The City currently utilizes the State of Florida [Visa Program](#). The awarded Contractor can take advantage of this program and in consideration, may receive payment within several days instead of NET 30 terms. Any percentage off the quoted bid price for the acceptance of payment by Visa will be taken into the account for consideration of the best value to the City. If no percentage is provided in the cost proposal, the City shall assume a zero (0) percent discount applies.

### **8.4. Payment**

To ensure proper payment the awarded Contractor must comply with the following:

1. The City shall have not less than thirty (30) days to pay for any products and/or services.
2. Invoices must clearly show the description of products and/or services to include the number of each product or line item fulfilled.
3. All invoices must reference the Contract Number as established by the City.
4. Under no circumstance, will interest of any kind be required as payment to the Awarded Contractor.
5. All charges, e.g., set up costs, must be included in the cost proposal. No charges will be allowed unless specified in the IFB and agreed upon by the City.
6. Any discrepancies noted by the City must be corrected by the Awarded Contractor within forty-eight (48) hours.
7. The payment amount due on invoices shall not be altered by the City personnel. Once disputed items are resolved, the Awarded Contractor must submit an amended invoice, or a credit memorandum for the disputed amount.
8. The City will not make partial payments on an invoice where there is a dispute, except as required by law.

9. The City will only make payments on authorized transactions.

10. All invoices must be sent to: The Project Manager.

## 9. Evaluation and Award

All timely responses will be evaluated in accordance with the following steps. The objective of the evaluation process is to identify the most competitive bid. Once the evaluation process has been completed, the apparent successful Contractor(s) will be required to enter into discussions with the City to resolve any exceptions to the City's Contract. The City will announce the results of the IFB as described further in section "Public Award Announcement" of this IFB.

### 9.1. Administrative/Preliminary Review

First, the proposals will be reviewed by the Issuing Officer to determine the proposal's compliance with the following requirements:

1. Response was submitted by the deadline.
2. Response is complete and contains all required documents.

### 9.2. Best Value Analysis - See City Code of Ordinances, Section 35.12.

The following criteria will be used to select the bid that will provide the best value to the City:

- Skill, workmanship, experience, and past performance demonstrated by the bidder or proposer in performing the same type of work or services as those sought by the City, or the experience, expertise and quality of services demonstrated by the bidder or proposer for professional, consulting and other services;
- Ability to meet the minimum qualifications or requirements of the solicitation;
- Adherence to specifications, design, or the approach to the project or study, as applicable;
- The Bidder's capacity to perform in terms of personnel, equipment, facilities, licensing, and ability to meet time requirements and schedules;
- The Bidder's capacity to perform in terms of financial viability, ability to provide required insurance and business tax receipts, and bonding capacity, if applicable;
- Prices, costs, or rates in relation to the goods, supplies, materials, equipment or services sought to be procured, except as provided by Consultant's Competitive Negotiation Act (CCNA), as applicable. Lowest price is not the sole determining factor of best value;
- Life cycle costs of the goods, supplies, materials, equipment or services to be procured;
- Any other factor specific to the particular solicitation that is specifically described in the procurement solicitation document;
- City Code of Ordinances, [Section 35.14](#), Local Preference in Purchasing or Contracting;

- The total cost of ownership of the products or services and their impact on the City's budget in future years.

The element of price is but one of the criteria elements. When considering a proposal, the City will:

- Evaluate the pricing offered by the Bidder; consider lifecycle costing, depreciation, and service contracts.
- Determine what proposal provides the best value to the City.

Value Added: The amount or dollar value of a service that the Bidder may be able to provide the City:

- Value added may be an actual amount given to the City as a signing bonus.
- Value added may be equipment or services given to the City. In this case, the value will be determined by the City for the goods or services, not the Bidder.

Any prior conviction for bribery, theft, forgery, embezzlement, falsification, or destruction of records, antitrust violations, honest services fraud or other offenses indicating a lack of business integrity or honesty; or any prior violation of the City's ethical standards may be considered when determining best value and may result in a Contractor not being awarded the project.

### **9.3. Evaluating Bid Factors**

If the Contractor's response passes the Administrative/Preliminary Review, the Contractor's responses to Section 6 - "IFB Bid Factors," will be evaluated. Responses to mandatory requirements will be evaluated on a pass/fail basis. If a response fails to meet a mandatory requirement, the City will determine if the deviation is Material. A Material Deviation will be cause for rejection of the response. An Immaterial Deviation will be processed as if no deviation had occurred.

### **9.4. Evaluating Cost**

The City may utilize lowest cost, lowest total cost, and total cost of ownership (TCO) or greatest savings to determine the most competitive pricing. The cost proposal may be scored on an overall basis or at the category/subcategory/line level (as applicable) relative to other responses/bids.

### **9.5. Selection and Award - Single Award**

The City reserves the right to: (a) waive minor irregularities, variances, or non-material defects in a response; (b) reject any and all responses, in whole or in part; (c) request clarifications from all Contractors; (d) request resubmissions from all Contractors; (e) award in whole, in part; or by line item; and (f) take any other action as permitted by law. The City reserves the right to provide for similar and/or additional services from other companies if the City so deems necessary. If the City elects to exercise this right, the Contract awarded under this solicitation shall remain in effect as to all terms, agreements, and conditions without penalty or diminution of ongoing services to the City as contained

therein. Proposer agrees and understands that any Contract awarded pursuant to this solicitation shall not be construed as an exclusive arrangement and further agrees that the City may, at any time, secure similar or identical services, or award more than one Contract under this solicitation, at its sole option.

### **Single Award**

Any Contract award resulting from IFB will be made to the Lowest Responsive and Responsible Contractor that meet all required specifications and with whom the City has reached agreement on all Contract items and conditions.

### **9.6. Local Preference in Purchasing or Contracting (City Code of Ordinances, Section 35.14)\***

Except where otherwise provided by federal or state law, other funding source restrictions, or as otherwise set forth in the purchasing policy, the City shall give preference to local businesses in the following manner:

1. In purchasing of, or letting of contracts for procurement of, personal property, materials, contractual services, and construction of improvements to real property or existing structures for which a request

for proposals is developed with evaluation criteria, a local preference of the total score may be assigned as follows:

1. Local Businesses which meet all the criteria for a Local Business as set forth in this section (City Code of Ordinances, Section 35.14), shall be given a preference in the amount of five percent (5%) of the total score of the Local Business.
2. The City Procurement Management Division shall have the sole discretion to determine if a Contractor meets the definition of a "Local Business."

#### **2. Limitations**

1. The provisions of this section shall apply only to procurements which are above the formal bid threshold as set forth in the City Code and the City of Port St. Lucie Procurement Manual.
2. The provisions of this section shall not apply where prohibited by Federal or Florida law or where prohibited under the conditions of any grant.
3. The provisions of this ordinance shall not apply to any purchase exempted from the provisions of the City of Port St. Lucie Procurement Manual.
4. The provisions of this ordinance shall not apply to contracts made under the Consultants Competitive Negotiation Act (CCNA), Section 287.55, Florida Statutes.

5. The provisions of this section shall not apply to any procurement where the local nature of a business has been addressed through the scoring criteria.

**\* Please review [City Code of Ordinances, Section 35.14](#), for the full governing ordinance.**

### **9.7. Site Visits, Samples, and Oral Presentations**

The City reserves the right to conduct site visits, request product/work samples, or to invite Contractors to present their product(s) and or service solutions to the evaluation team. Unless prohibited by federal, state, county, or local laws and/or ordinances, all Contractor requested presentations shall be performed in an in-person meeting. An oral presentation or product demonstration is not a negotiation and Contractors are not permitted to revise their responses as part of the presentation and/or demonstration. Samples of items, when required, must be furnished free of expense and, if not destroyed, will upon request, be returned at the Contractor's expense. Request for the return of samples must be made within thirty (30) days following opening of bids. Each individual sample must be labeled with Contractor's name, bid number, and item number. Failure of Contractor to either deliver required samples or to clearly identify samples as indicated may be reason for rejection of the bid. Unless otherwise indicated, samples should be delivered to the Procurement Management Division.

### **9.8. Public Award Announcement**

The preliminary results of the evaluation will be announced through the public posting of a Notice of Intent to Award ("NOIA") on the Electronic Bidding System. The NOIA is not notice of an actual Contract award; instead, the NOIA is notice of the City's expected Contract award(s) pending resolution of the protest process period, pursuant to City Code of Ordinances, [Section 35.15](#), and final approval by the City Council at a publicly noticed meeting. The NOIA (if any) will identify the apparent successful Contractor(s) and unsuccessful Contractor(s). NO CONTRACTOR SHOULD ASSUME PERSONAL NOTICE OF THE NOIA WILL BE PROVIDED BY THE CITY. INSTEAD, ALL CONTRACTORS SHOULD FREQUENTLY CHECK THE ELECTRONIC BIDDING SYSTEM FOR NOTICE OF THE NOIA.

## 10. Contract Terms and Conditions

The Contract that the City expects to award as a result of this IFB will be based upon the IFB, the successful Contractor's final response as accepted by the City, and the Contract terms and conditions, which terms and conditions can be downloaded from Attachments Section listed as **Attachment A – Sample Contract**. The "successful Contractor's final response as accepted by the City," shall mean: the response submitted by the awarded Contractor, written clarifications, and any other terms deemed necessary by the City, except that no objection or amendment by a Contractor to the IFB requirements or the Contract terms and conditions shall be incorporated by reference into the Contract unless the City has explicitly accepted the Contractor's objection or amendment in writing.

Please review the City's contract terms and conditions prior to submitting a response to this IFB. Contractors should plan on the Contract terms and conditions contained in this IFB being included in any award as a result of this IFB. Therefore, all costs associated with complying with these requirements should be included in any pricing quoted by the Contractors. The Contract terms and conditions may be supplemented or revised before Contract execution and are provided to enable Contractors to better evaluate the costs associated with the IFB and the potential resulting Contract.

### Exception to Contract

By submitting a response, each Contractor acknowledges its acceptance of the IFB specifications and the Contract terms and conditions without change except as otherwise expressly stated in the submitted proposal. If a Contractor takes exception to a Contract provision, the Contractor must state the reason for the exception and state the specific Contract language it proposes to include in place of the provision. Any exceptions to the Contract must be uploaded and submitted as an attachment to the Contractor's response. Proposed exceptions must not conflict with or attempt to preempt mandatory requirements specified in the IFB.

In the event the Contractor is selected for potential award, the Contractor will be required to enter discussions with the City to resolve any contractual differences before an award is made. These discussions are to be finalized and all exceptions resolved within the period identified in the Schedule of Events. Failure to resolve any Contractual issues will lead to rejection of the Contractor's response. The City reserves the right to proceed to discussions with the next best ranked Contractor.

The City reserves the right to modify the Contract to be consistent with the apparent successful offer, and to negotiate other modifications with the apparent successful Contractor. Exceptions that materially change the terms or the requirements of the IFB may be deemed non-Responsive by the City, in its sole discretion, and rejected. Contract exceptions which grant the Contractor an impermissible competitive advantage, as determined by the City, in its sole discretion, will be rejected. If there is any question whether a particular Contract exception would be permissible, the Contractor is strongly encouraged to inquire via written question submitted to the Issuing Officer prior to the deadline for submitting written questions as defined by the Schedule of Events.

This IFB and the proposal response documents submitted shall be incorporated into the final Contract by reference. Therefore, all requirements in the IFB not specifically addressed in an exception statement in the proposal and accepted in the Contract documents, shall stand as contractual responsibilities of the proposal respondent. The Contract shall be the controlling document over the Proposal response and the IFB; the IFB shall be the ruling document over the Proposal response for all requirements in the IFB not specifically addressed in an exception statement in the proposal. Statement and requirements in the IFB shall rule over the Proposal document.

**Order of Preference**

In the case of any inconsistency or conflict among the specific provisions of the executed Contract (including any amendments accepted by both the City and the Contractor attached thereto), the IFB (including any subsequent addenda and written responses to Bidders' questions), and the Contractor's Response, any inconsistency or conflict shall be resolved as follows:

**(i)** First, by giving preference to the specific provisions of the executed Contract.

**(ii)** Second, by giving preference to the specific provisions of the IFB.

**(iii)** Third, by giving preference to the specific provisions of the Contractor's Response, except that objections or amendments by a Contractor that have not been explicitly accepted by the City in writing shall not be included in the Contract and shall be given no weight or consideration.

## **11. List of IFB Documents**

### **11.1. List of IFB Documents**

A - Sample Contract

B - PSL Glades IW-2 100% Technical Specifications

C - PSL Glades IW-2 100% Technical Specifications - Appendices

D - PSL Glades IW-2 100% Design Drawings

## 12. Vendor Submission Requirements and Attestations

### 12.1. Mandatory Forms

#### *Contractor's General Information Worksheet\**

It is understood and agreed that the following information is to be used by the City to determine the qualifications of prospective Contractor to perform the work required. The Contractor waives any claim against the City that might arise with respect to any decision concerning the qualifications of the Contractor.

The undersigned attests to the truth and accuracy of all statements made on this questionnaire. Also, the undersigned hereby authorizes any public official, Engineer, Surety, bank, material or equipment manufacturer, or distributor, or any person, firm or corporation to furnish the City any pertinent information requested by the City deemed necessary to verify the information on this questionnaire.

Please download the below documents, complete, and upload.

- [PSL- Contractor's General I...](#)

\*Response required

#### *E-Verify Form \**

Please download the below documents, complete, and upload.

- [E-Verify Form.pdf](#)

\*Response required

#### *Non-Collusion Affidavit \**

Please download the below documents, complete, and upload.

- [Non-Collusion Affidavit-fil...](#)

\*Response required

#### *Supplier Location Certification*

Please download the below documents, complete, and upload.

- [Supplier\\_Location\\_Certifica...](#)

#### *Debarment Form\**

Please download the below documents, complete, and upload.

- [Debarment\\_form-fillable.pdf](#)

\*Response required

***Lobbying Form\****

Please download the below documents, complete, and upload.

- [Lobbying\\_form-fillable.pdf](#)

\*Response required

***Buy America Certificate of Compliance \****

Please download the below documents, complete, and upload.

- [BABA Certificate - Construc...](#)

\*Response required

***Copy of W-9\****

\*Response required

***Copy of Certificate of Insurance \****

\*Response required

***Florida Well Water Contractor License\****

\*Response required

***Copy of Bid Bond \****

\*Response required

**12.2. Electronic Confirmation**

***Cone of Silence and Communication Document\****

To ensure fair consideration is given for all Proposers, it must be clearly understood that upon release of the proposal and during the proposal process, firms and their employees of related companies as well as paid or unpaid personnel acting on their behalf shall not contact or participate in any type of contact with City employees, department heads or elected officials, up to and including the Mayor and City Council. The “Cone of Silence” is in effect for this solicitation from the date the solicitation is advertised on the OpenGov Portal, until the time an award decision has been approved by City Council and fully executed by all parties. Information about the Cone of Silence can be found under the City Code of Ordinances, Section 35.13. Contact with anyone other than the Issuing Officer may result in the vendor being disqualified. All contact must be coordinated through the Issuing Officer, for the procurement of these services.

Please confirm

\*Response required

### *Contractor's Code of Ethics\**

The City of Port St Lucie (“City”), through its Procurement Management Division (“Procurement Management Division”) is committed to a procurement process that fosters fair and open competition, is conducted under the highest ethical standards and enjoys the complete confidence of the public. To achieve these purposes, Procurement Management Division requires each vendor who seeks to do business with the City to subscribe to this Contractor’s Code of Ethics.

- ◆ A Contractor’s bid or proposal will be competitive, consistent and appropriate to the bid documents.
- ◆ A Contractor will not discuss or consult with other Vendors intending to bid on the same Contract or similar City Contract for the purpose of limiting competition. A Vendor will not make any attempt to induce any individual or entity to submit or not submit a bid or proposal.
- ◆ Contractor will not disclose the terms of its bids or proposal, directly or indirectly, to any other competing Vendor prior to the bid or proposal closing date.
- ◆ Contractor will completely perform any Contract awarded to it at the contracted price pursuant to the terms set forth in the Contract.
- ◆ Contractor will submit timely, accurate and appropriate invoices for goods and/or services actually performed under the Contract.
- ◆ Contractor will not offer or give any gift, item or service of value, directly or indirectly, to a City employee, City official, employee family member or other vendor contracted by the City.
- ◆ Contractor will not cause, influence or attempt to cause or influence, any City employee or City Official, which might tend to impair his/her objectivity or independence of judgment; or to use, or attempt to use, his/her official position to secure any unwarranted privileges or advantages for that Vendor or for any other person.
- ◆ Contractor will disclose to the City any direct or indirect personal interests a City employee or City official holds as it relates to a Vendor contracted by the City.
- ◆ Contractor must comply with all applicable laws, codes or regulations of the countries, states and localities in which they operate. This includes, but is not limited to, laws and regulations relating to environmental, occupational health and safety, and labor practices. In addition, Contractor must require their suppliers (including temporary labor agencies) to do the same. Contractor must conform their practices to any published standards for their industry. Compliance with laws, regulations and practices include, but are not limited to, the following:
  - o Obtaining and maintaining all required environmental permits. Further, Contractor will endeavor to minimize natural resource consumption through conservation, recycling and substitution methods.

o Providing workers with a safe working environment, which includes identifying and evaluating workplace risks and establishing processes for which employee can report health and safety incidents, as well as providing adequate safety training.

o Providing workers with an environment free of discrimination, harassment and abuse, which includes establishing a written antidiscrimination and anti-bullying/harassment policy, as well as clearly noticed policies pertaining to forced labor, child labor, wage and hours, and freedom of association.

DISCLAIMER: This Code of Ethics is intended as a reference and procedural guide to Contractors. The information it contains should not be interpreted to supersede any law or regulation, nor does it supersede the applicable Contractor Contract. In the case of any discrepancies between it and the law, regulation(s) and/or contractor contract, the law, regulatory provision(s) and/or vendor contract shall prevail.

Please confirm

\*Response required

### *Drug Free Workplace\**

The undersigned Contractor in accordance with section 287.087, Florida Statutes, hereby certifies that they comply fully with the below requirements.

1. Publish a statement notifying employees that 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 employees for violations of such prohibition.

2. Inform 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.

3. Give each employee engaged in providing the commodities or contractual services that are under proposal a copy of the statement specified in subsection (1).

4. In the statement specified in subsection (1), notify the employees that, as a condition of working on the commodities or contractual services that are under proposal, 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 Florida Statutes or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction.

5. Impose 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 who is so convicted.

6. Make a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

Please confirm

\*Response required

***Affidavit of Nongovernment Entity Anti-Human Trafficking Laws\****

In accordance with section 787.06(13), Florida Statutes, the representative of the nongovernmental entity bidder ("Entity"), attests under penalty of perjury that the Entity does not use coercion for labor or services as defined in section 787.06.

Please confirm

\*Response required

***Vendor Scrutinized Companies List Certification\****

Sections [287.135](#) and [215.473](#), Florida Statutes, prohibit Florida municipalities from contracting with companies, for goods or services over \$1,000,000 that are on either the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or to engage in any Business operations with Cuba or Syria. Sections 287.135 and 215.4725 also prohibit Florida municipalities from contracting with companies, for goods or services in any amount that are on the list of Scrutinized Companies that Boycott Israel.

The list of "Scrutinized Companies" is created pursuant to Section 215.473, Florida Statutes. A copy of the current list of "Scrutinized Companies" can be found at the following link:

[https://www.sbafla.com/media/mqodaonn/2024\\_12\\_17\\_-israel-scrutinized-companies-list-for-web.pdf](https://www.sbafla.com/media/mqodaonn/2024_12_17_-israel-scrutinized-companies-list-for-web.pdf)

As the person authorized to sign on behalf of the Respondent Vendor, I hereby certify that the company identified above in the section entitled "Respondent Vendor Name" is not listed on either the Scrutinized Companies with Activities in Sudan List; or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List; is not participating in a boycott of Israel; and does not have any business operations with Cuba or Syria. I understand that pursuant to Sections 287.135 and 215.473, Florida Statutes, the submission of a false certification may subject the Respondent Vendor to civil penalties, attorney's fees, and/or costs.

I understand and agree that the City may immediately terminate any contract resulting from this solicitation upon written notice if the company referenced above are found to have submitted a false certification or any of the following occur with respect to the company or a related entity: (i) for any contract for goods or services in any amount of monies, it has been placed on the Scrutinized Companies that Boycott Israel List, or is engaged in a boycott of Israel, or (ii) for any contract for goods or services of one million dollars (\$1,000,000) or more, it has been placed on the Scrutinized

Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or it is found to have been engaged in business operations in Cuba or Syria.

Please confirm

\*Response required

*Compliance with 2 C.F.R. 200.318 through 200.326\**

The Contractor will comply with all applicable federal and state laws and regulations, to include 2 C.F.R. 200.318 through 200.326 as well as Appendix II to 2 C.F.R. Part 200 entitled "Contract Provisions for Non-Federal Entity Contracts Under Federal Awards".

Please confirm

\*Response required

*I certify that I have read, understood, and agreed to the terms outlined in this solicitation, including all Addenda, Notices, and the Question & Answer section.  
Furthermore, I confirm that I am authorized to submit this response on behalf of my company.\**

Please confirm

\*Response required

Invitation For Bid (IFB) #20260079

Title: Glades Wastewater Treatment Facility Deep Injection Well No. 2

CITY OF PORT ST. LUCIE  
GLADES WASTEWATER TREATMENT FACILITY  
CLASS I INJECTION WELL IW-2  
PSLUD PROJECT: 63-0007

100% TECHNICAL SPECIFICATIONS

Prepared for:

CITY OF PORT ST. LUCIE UTILITY SYSTEMS DEPARTMENT



Prepared by:

McNabb-Miller Hydrogeologic Consulting, Inc.

and

Holtz Consulting Engineers, Inc.



October 2025

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## SECTION 01001 – GENERAL REQUIREMENTS

### PART 1 -- GENERAL

#### 1.1 SUMMARY

- A. Construct Work as described in the Contract Documents.
1. Provide the materials, equipment, and incidentals required to make the Project completely and fully operable.
  2. This section briefly describes the Work to be performed as part of the City of Port St. Lucie, Glades Wastewater Treatment Facility Injection Well System located in St. Lucie County at 10700 Glades Cutoff Road, Port St. Lucie, Florida 34986. Detailed requirements and extent of work are stated in applicable specification sections and shown on the Drawings. It is the intent of these specifications that project elements constructed be fully integrated and compatible with each other in all aspects for a complete and operable injection well system.
  3. Provide the labor, equipment, tools, and consumable supplies required for a complete Project.
  4. Provide the civil, structural, mechanical, electrical, instrumentation and all other Work required for a complete and operable Project.
  5. Test and place the completed Project in operation.
  6. Provide the special tools, spare parts, lubricants, supplies, or other materials as indicated in Contract Documents for the operation and maintenance of the Project.
  7. Arrange and coordinate with Supplier for deliveries of OWNER purchased products in accordance with construction schedule, coordinate to avoid conflict with work and conditions at the site. Unload the products at the site, and store and protect the products in accordance with the Supplier's instructions.
  8. The WORK shall be complete, and all work, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the WORK in good faith shall be provided by the CONTRACTOR and coordinated with the CONSULTANT as though originally so indicated, at no increase in cost to the OWNER.
  9. CONTRACTOR shall comply with all applicable federal, state and local safety regulations, laws and standards, as well as any specific St. Lucie County or City of Port St. Lucie requirements while completing the work.
  10. Except as specifically noted, the CONTRACTOR shall provide and pay for:
    - a. Labor, materials, and equipment.
    - b. Tools, equipment and machinery.
    - c. Water, electricity, and other utilities required to complete the project.

- d. Other facilities and services necessary for proper execution and completion of the work.
    - e. Permits, surveys, and testing. CONTRACTOR shall provide to the CONSULTANT a copy of each permit obtained prior to commencing any work.
  - B. The CONTRACTOR and its SUBCONTRACTORS shall meet the qualification requirements as defined.

## 1.2 DESCRIPTION OF WORK

- A. Work is described in general, non-inclusive terms as:
  - 1. One Class I injection well (IW-2), with a final casing string of 30-inch outside diameter and total open-hole depth of 3,500 feet below pad level, that may be permitted to accept an injection rate of approximately 19.63 million gallons per day (MGD) at an injection velocity within the final casing string of 10 feet per second. The injection well shall include the installation of wellhead components suitable for the connection and operation of a completed system.
  - 2. Four water-table monitor wells that will either be plugged and abandoned in place or completed with flush mounted vaults and lockable caps at the end of the project.
  - 3. Concrete slab for well pad
  - 4. Completion of one successful 12-hour injection test.
  - 5. All electrical, instrumentation, piping, valves, pumps, paving, general site civil, and other appurtenances to complete a fully functioning system.
  - 6. Hydrostatic pressure testing performed in existing onsite Class injection well IW-1
  - 7. Completion of one 12-hour injection test at existing onsite well IW-1
  - 8. A finished site that is acceptable to the CONSULTANT and OWNER.

## 1.3 CONTRACT METHOD

- A. The WORK hereunder will be constructed under a single lump sum contract.

## 1.4 WORK UNDER OTHER CONTRACTS

- A. Where two or more contracts are being performed at one time on the same Site or adjacent land in such manner that work under one contract may interfere with work under another, the OWNER will determine the sequence and order of the Work in either or both contracts. When the Site of one contract is the necessary or convenient means of access for performance of work under another, the OWNER may grant privilege of access or other reasonable privilege to the CONTRACTOR so desiring, to the extent, amount, and in manner and at time that the OWNER may determine. No OWNER determination of method or time or sequence or order of the work or access privilege shall be the basis for a claim for delay or damage except under provisions of the General Conditions for temporary suspensions of the work. The CONTRACTOR shall conduct its

operations so as to cause a minimum of interference with the work of such other CONTRACTOR's and shall cooperate fully with such CONTRACTOR's to allow continued safe access to their respective portions of the Site, as required to perform work under their respective contracts.

- B. Interference with Work on Utilities: The CONTRACTOR shall cooperate fully with all utility forces of the OWNER or forces of other public or private agencies engaged in the relocation, altering, or otherwise rearranging of any facilities which interfere with the progress of the work, and shall schedule the work to minimize interference with said relocation, altering, or other rearranging of facilities.
- C. Obtain clarification from the OWNER in the case of a disagreement and those specified elsewhere in the Contract Documents.
- D. Completion of the Work described in this Contract may impact the construction and testing of the items listed above.
  - 1. Coordinate construction activities through the OWNER.
  - 2. Pay claims for damages which result from the late completion of the Project or any specified Milestones.

#### 1.5 WORK SEQUENCE

- A. The following items represent and identify the general outline of work to be performed by the CONTRACTOR. The detailed sequence of work for the construction and testing of the wells is outlined in Section 02700 Well Construction Sequence.
  - 1. Obtain necessary permits, provide submittals and prepare a video recording of pre-existing site conditions.
  - 2. Establish site security and site access.
  - 3. Selectively clear construction site as required.
  - 4. Mobilization of drilling equipment to the site.
  - 5. Set pit pipes.
  - 6. Construction of temporary drilling pad and installation of water-table monitoring wells.
  - 7. Construct temporary water supply well(s) as required for drilling make-up water and other water supply needs for construction.
  - 8. Survey location and elevation of pad monitor wells and survey the pad elevation to North American Vertical Datum (NAVD) of 1988 prior to drilling startup.
  - 9. Construction and testing of IW-2.
  - 10. Performance of short-term injection test at IW-2.

11. Hydrostatic pressure testing at existing injection well (IW-1)
12. Performance of short-term injection test at IW-1
13. Installation of all electrical, instrumentation, piping, and valves
14. Extend asphalt road to IW-2
15. Startup
16. Demobilization.
17. Site Restoration.

- B. During the construction and testing of IW-2, FDEP approval is required prior to proceeding with certain stages of the Work as outlined in Section 02700.

#### 1.6 PRESERVING WATER QUALITY

- A. The waters of the project area are classified Class III. Adequate silt containment procedures and equipment shall be used to control turbidity at all times at no additional expense to the OWNER. The injection well and deep monitor well will be drilled into aquifers containing saline water under positive (Artesian) pressure. The shallow aquifer contains fresh water at the well site.
- B. Requirements are set forth in these specifications regarding the handling of brackish water, injection-zone effluent, drilling fluids, and cuttings. Requirements also are set forth for controlling the flow of the wells during construction and providing a closed, circulation system for all drilling operations.
- C. It is essential that brackish or salty water produced from any source during drilling operations is prevented from contaminating the shallow aquifer which contains fresh water. Any water produced during drilling shall be confined in a closed-circulation system. Temporary drilling pads will be required to enclose the proposed injection well and deep monitor well and shall be constructed to retain spillage of water from drilling and related operations.
- D. Water-table monitor wells shall be installed as specified. Due precautions shall be taken to prevent spills; any spillage of fluids shall be returned to the closed-circulation systems. In the event of any unusual occurrences during construction activities (e.g. on-site spills, artesian flows, large volumes of circulation losses, etc.), the CONTRACTOR shall inform the CONSULTANT immediately and act in accordance with the FDEP construction permit.
- E. The CONTRACTOR shall be responsible for the cost of all cleanup activities attributable to his drilling operations at the well construction site, including installation and pumping of additional monitor wells at the site, as directed by the CONSULTANT.

- F. Flowing conditions in IW-2 shall be kept under control at all times. Salt may be used as a flow-suppression additive when drilling through formations under artesian pressure (ie within the Floridan Aquifer System).

#### 1.7 WATER

- A. The CONTRACTOR shall provide and maintain, at his own expense, an adequate supply of water for his use for construction and domestic consumption, and to install and maintain necessary connections and piping for same, but only at such locations and in such manner as may be approved by the CONSULTANT.
- B. All water connections points to the City system shall be equipped with a reduced pressure principle type backflow preventer and meter. Both devices shall be installed according to City and County standards and any or all devices shall be obtained from the OWNER if the OWNER requires that their devices are to be installed.
- C. Prior to final acceptance, temporary connections and piping installed by the CONTRACTOR shall be removed in a manner satisfactory to the CONSULTANT.
- D. The CONTRACTOR shall be responsible for securing permits, licenses, or approvals that must be obtained for sources of water required for construction.
- E. The CONTRACTOR shall provide the OWNER and CONSULTANT a description of their water supply needs at a required pre-construction meeting.

#### 1.8 CONTRACTOR USE OF SITE

- A. The CONTRACTOR's use of the Site shall be limited to its construction operations, including on-site storage of materials, on-site fabrication facilities, and field offices to areas designated on the Drawings.
- B. The CONTRACTOR may use only the access designated by the OWNER and as shown on the drawings for access to the work locations. The CONTRACTOR shall be responsible for maintaining, protecting and restoring the routes to the satisfaction of the OWNER and CONSULTANT. The CONTRACTOR shall be responsible for obtaining any permits necessary to use the access.
- C. The CONTRACTOR shall submit a detailed construction schedule prior to the commencement of any site work. The construction schedule shall include a proposed spud date.
- D. The CONTRACTOR may perform the well construction and testing activities at the site 24 hours per day, 7 days per week.
- E. The CONTRACTOR shall schedule all work or tests, which will be attended (as required by the permit) by representatives of the FDEP, during regular FDEP working hours.

#### 1.9 OUTAGE PLAN AND REQUESTS

- A. Unless the Contract Documents indicate otherwise, the CONTRACTOR shall not remove from service, de-energize, or modify settings for any existing operating tank

pipeline, valve, channel, equipment, structure, road, or any other facility without permission from the CONSULTANT.

- B. Where the WORK requires modifications to existing facilities or construction of new facilities and connection of new facilities to existing facilities, the CONTRACTOR shall submit a detailed outage plan and schedule for the CONSULTANT'S approval a minimum of 2 weeks in advance of the time that such outage is planned.
  - C. A completed System Outage Request form (blank furnished by the CONSULTANT) shall accompany each outage plan. The outage plans shall be coordinated with the construction schedule and shall meet the restrictions and conditions of the Contract Documents. The outage plan shall describe the CONTRACTOR's method for preventing bypassing of other treatment units; the length of time required to complete said operation; any necessary temporary power, controls, instrumentation or alarms required to maintain control, monitoring, and alarms for the treatment plant processes; and the manpower, plant, and equipment which the CONTRACTOR will furnish for proper operation of associated treatment units. All costs for preparing and implementing the outage plans shall be at no increase in cost to the OWNER.
  - D. The CONSULTANT shall be notified in writing at least one week in advance of the required outage if the schedule for performing the work has changed or if revisions to the outage plan are required.
  - E. The CONTRACTOR shall provide written confirmation of the shutdown date and time two (2) working days prior to the actual shutdown.
- 1.10 OWNER USE OF THE SITE AND OCCUPANCY
- A. The CONTRACTOR shall cooperate and coordinate with the OWNER to facilitate the OWNER's operations and to minimize interference with the CONTRACTOR's operations at the same time. In any event, the OWNER shall be allowed access to the Site during the period of construction.
  - B. Testing of equipment and appurtenances including specified test periods, training, and startup does not constitute acceptance for operation.
  - C. OWNER may accept the facility for continued use after startup and testing at the option of the OWNER. If acceptance is delayed at the option of the OWNER, shut down facilities per approved Operation and Maintenance procedures.
  - D. The execution of bonds indicates the consent of the surety to these provisions for occupancy of the structures and use of equipment.
  - E. Provide an endorsement from the insurance carrier permitting occupancy of the structures and use of equipment during the remaining period of construction.
  - F. Conduct operations to ensure the least inconvenience to the OWNER and general public.

#### 1.11 POWER AND ELECTRICAL SERVICES

- A. Pay for temporary power, including but not limited to construction cost, meter connection, fees and permits.
- B. CONTRACTOR may use the permanent power source in lieu of temporary power source when permanent power is available at the Site. However, approval from the OWNER is required.
  - a. Notify CONSULTANT and OWNER to use the permanent power source.
  - b. Arrange with the power utility and pay the charges for connections and monthly charges for use of this power.
- C. Pay for the power consumed until the Project has been accepted as substantially complete, unless noted otherwise.
- D. The CONTRACTOR shall furnish and install the electric meter base, current transformers including cabinet (if required) in accordance with electrical standards and requirements.
- E. The utility company is to provide the electric meter and shall install and connect upon notification of completed work by the CONTRACTOR.
- F. Utility pole mounted transformer to be provided and installed to the new overhead lines by the utility company.
- G. The utility is to provide power cable from the secondary of the transformer to the weatherhead.

#### 1.12 SANITARY FACILITIES

- A. The CONTRACTOR shall provide temporary restroom facilities for field crews.

#### 1.13 SAFETY PRECAUTIONS

- A. The CONTRACTOR is specifically cautioned that various dangerous chemicals and high voltage electrical power will be in routine use at the treatment facility. The CONTRACTOR shall educate all field and supervisory personnel regarding standard safety practices and first aid procedures for accidental exposure to any, and all, compounds in use at the site.

#### 1.14 HURRICANE SAFETY PRECAUTIONS

- A. Upon the issuance of a "Hurricane Watch" by the National Weather Service, the CONTRACTOR shall make appropriate site preparations. At a minimum these preparations shall include securing all on-site salt and stockpiled additive materials to prevent surface and/or groundwater contamination. The CONTRACTOR shall also properly secure drilling equipment and rig(s) to prevent damage to well(s) and on-site treatment process equipment.

1.15 SECURITY

- A. The CONTRACTOR shall be fully responsible for the safety and security of the work and site. Any temporary measures required to maintain the security of the area shall be the CONTRACTOR's responsibility. This shall include but not be limited to temporary fencing, security guards (as needed and as approved), etc., and any related permits.

1.16 CONSTRUCTION TRAILER

- A. The CONTRACTOR shall provide an on-site office with telephone and electric service as required for his use. Plant facilities will not be available for use by the CONTRACTOR.

1.17 FIELD OFFICE

- A. The CONTRACTOR shall provide a suitable, weatherproof field office for use by the CONSULTANT and his representatives. The field office may incorporate additional space for the CONTRACTOR's use as a construction trailer with a separate lockable facility, subject to CONSULTANT's approval. The office shall be located in a position which, in the opinion of the CONSULTANT, is adequate for the inspection of the work, including at least one full-size window facing the drill rig(s). The field office shall be supplied with reliable internet service. The CONTRACTOR shall maintain the field office in good repair and acceptable appearance, provide weekly cleaning and monthly pest control services and maintenance and replenishment, as applicable, of paper towels, soap, toilet paper and bottled-water service. The field office shall consist of one or more trailer-type, mobile structures with the following features and equipment, new or like new in appearance and function, and shall include, at a minimum:

All metal frame	All metal exterior, sides and roof
Toilet and wash basin with running water and drains	Sanitary facilities in compliance with State and local health authorities for the trailer
Insulated double walls, floor and roof	Self-contained, built in electric heater with self-contained air-conditioning unit
Fluorescent or LED ceiling lights	110-volt electric wall outlets
Minimum interior height: 7 feet	Minimum interior width: 12 feet
Minimum interior length: 25 feet	Entrance door(s) equipped with cylinder locks
Railed stairway to all entrances	Minimum of one (1) window
Bottled water service	Full size refrigerator
Work surface (1), 30 inches wide and 10 feet in length at desk height	Desk, 30 inches by 60 inches
Swivel chairs (2)	Wastepaper basket (2)
First-aid kit	Highest quality internet service available
Office copier and scanner	CO2 fire extinguisher, 10lb capacity
Hurricane anchors and all other precautions as regulated by the permitting authority	Pest control as necessary (insect, rodent, etc.)

1.18 REQUIREMENTS OF OTHER AGENCIES

- A. When performing Work on facilities owned by agencies other than OWNER, comply with all requirements of such agencies which are more restrictive than those specified herein.

#### 1.19 PROTECTION OF EXISTING STRUCTURES

- A. The CONTRACTOR shall assume full responsibility for the protection of all existing buildings, structures, poles, signs, services to buildings, hydrants, drains, ductbanks and electric and telephone cables, whether or not they are shown on the Drawings. The CONTRACTOR shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the CONTRACTOR's operations shall be repaired by the CONTRACTOR at CONTRACTOR's expense.
- B. Protection and temporary removal and replacement of existing structures as described in this Section shall be a part of the Work under the Contract and all costs in connection therewith shall be included in the Lump Sum.

#### 1.20 STAGING AREA

- A. All construction trailers and equipment storage shall occur only within the designated staging area. All CONTRACTOR parking shall be within the staging area unless prior written approval for additional parking areas is provided by the CONSULTANT.
- B. The CONTRACTOR shall take note that some improvements to the staging area may be required to facilitate its use and shall be responsible for all costs for any and all improvements to the staging area. No vehicles may be stopped on existing pavement or walkways for parking or unloading without the approval of the CONSULTANT. A site layout plan must be approved by the CONSULTANT before any equipment or materials may be placed onsite.

#### 1.21 PROJECT MANAGER, PROJECT SUPERINTENDENT, AND DRILLER

- A. Project Manager: The CONTRACTOR shall provide a Project Manager to this project as a supervisor to oversee proper performance of the Work. The Project Manager shall have the authority to make decisions on behalf of the Prime CONTRACTOR. The Project Manager shall be responsible for all coordination, document handling, submittal review and processing, quality control and project scheduling. The Project Manager shall be a direct employee of the Prime CONTRACTOR and shall fluently speak, read and write English. The Project Manager, once approved by the OWNER and the CONSULTANT shall not be replaced without prior consent by the CONSULTANT.
- B. Superintendent: The CONTRACTOR shall provide, on a full-time basis, a dedicated Project Superintendent specific to this project as an onsite supervisor to oversee proper performance of the Work. The Superintendent shall be onsite during construction activities. The Project Superintendent shall be a direct employee of the Prime CONTRACTOR. The Superintendent shall fluently speak, read and write English. The Project Superintendent, once approved by the OWNER and the CONSULTANT shall not be replaced without prior consent by the CONSULTANT. The CONTRACTOR shall be capable of staffing the project such that at least one Superintendent, meeting the criteria above, can be onsite at all times when there is construction activity on IW-2.
- C. Driller: The CONTRACTOR shall provide, on a full-time basis, at least one Driller. The CONTRACTOR shall be capable of staffing the project such that at least one Driller will be onsite at all times when there is construction activity on IW-2.

## 1.22 SPECIAL CONSIDERATIONS

- A. **Project Inspection:** The CONSULTANT will be inspecting the work on a non-full time basis. The CONTRACTOR shall provide appropriate notice of need for inspections and allow time for scheduling. No work shall be covered, nor test results accepted without prior witness by the CONSULTANT. Inspections by the CONSULTANT shall not be performed in lieu of other inspections required by City, County, State or Federal requirements. Many activities require inspection during the performance of the work. This includes but not limited to casing installation, annular grouting, and geophysical logging. The CONTRACTOR shall provide the CONSULTANT a 12-hour notice of the anticipated time the activity will begin. The CONTRACTOR shall provide a second notice at 2 hours prior to the scheduled start time. The intent of the second notice is to confirm activities are on schedule. Every effort shall be made to provide accurate scheduling to the CONSULTANT.
- B. **Existing Facilities:** The construction drawings do not show all existing piping, valving, electric conduit, instrument conduit, or telephone lines which may interfere with this construction. The size, location and material of existing facilities which are being connected to or deflected in this project shall be field confirmed prior to ordering or submitting shop drawings or ordering materials.
- C. **CONTRACTOR Coordination:** The CONTRACTOR shall assume that other construction work will be simultaneously underway at the construction site. Other CONTRACTORS may use the site access route. Should this be the case, the CONTRACTOR shall coordinate the continued use of staging area, access points and the construction area. Site security shall be maintained at all times to the satisfaction of the OWNER and CONSULTANT. The CONTRACTOR shall be required to coordinate all work to accommodate other CONTRACTORS as required by the CONSULTANT.
- D. **Noise and Vibration:** The CONTRACTOR shall employ all necessary means and methods necessary to comply with all applicable OWNER and County noise ordinances. All CONTRACTOR equipment shall be equipped with hospital grade silencers, as applicable. The CONTRACTOR shall be responsible for any damage due to excessive vibration or sound.

## 1.23 MATERIALS

- A. All materials used on the project which are in contact with potable water directly or indirectly, shall be NSF 60/61 approved for contact with potable water and acceptable to agencies with jurisdiction. It shall be the CONTRACTOR's sole responsibility to ensure and confirm that all materials used on this project comply with this requirement.

## 1.24 DISPOSAL OF DRILL CUTTINGS AND FLUIDS

- A. Drill cuttings and drilling fluid shall be removed from the drilling site and disposed of at a regulatory agency-approved location. The CONTRACTOR shall furnish to the CONSULTANT and OWNER, prior to beginning construction, the name and location of his disposal site along with documentation that the site has been approved by the appropriate regulatory agencies.

## 1.25 CONDITIONS AND HAZARDS

- A. The CONTRACTOR is advised and should be aware of difficult drilling conditions and problems he may encounter during the drilling, construction, and testing of the wells. Difficult drilling conditions and problems include, but are not limited to, lost circulation, cavities and fractured zones in the Floridan Aquifer; and potential squeezing zones and sand intervals within the Hawthorn Group clays, along with attendant caving problems.
- B. A priority requirement of these Specifications is the drilling of straight holes and setting of all casings to specified depths. Hole straightness, which will permit casings to be set at specified depths and facilitate achievement of proper cement seals, shall not be sacrificed for drilling speed. These and other pertinent factors shall be taken into consideration by the CONTRACTOR in planning and executing the work.
- C. The goal of this program is the successful completion of the injection well and associated dual-zone deep monitor well described in these Contract Documents. In the event of any problems or difficulty which, in the CONSULTANT's opinion, may jeopardize the successful completion of a well in accordance with the construction permit, current regulations, or Contract Documents and approved changes, it is the CONTRACTOR's responsibility to perform work required to successfully remedy any problem and perform such surveys and testing as necessary to demonstrate the problem has been solved and the well is in compliance with the Contract documents.
- D. The CONTRACTOR shall bear all costs of testing, surveys and work deemed necessary by the CONSULTANT, OWNER and/or the appropriate regulatory agencies to confirm that the problem has been resolved or corrected and that the construction is in compliance with the Technical Specifications and any approved changes, the permit and all appropriate regulations.
- E. The CONTRACTOR shall submit to the CONSULTANT a detailed plan of action to identify and/or solve the problem and the CONSULTANT shall review the plan of action. In the event that the problem is considered serious enough to jeopardize the successful completion of the well, in accordance with the drawings and Specifications, the CONSULTANT may request technical concurrence from the regulatory and scientific agencies in accordance with the construction permit. No compensation (standby time or otherwise) shall be paid for the time spent by the CONTRACTOR during the entire period of review and approval. The CONSULTANT shall notify the CONTRACTOR that:
  - a. The CONTRACTOR's plan of action is acceptable;
  - b. The CONTRACTOR's plan of action is acceptable with the CONSULTANT's suggested modifications;
  - c. The CONTRACTOR's plan of action is unacceptable.
- F. Under (a.), the CONTRACTOR shall proceed with the plan of action. The CONTRACTOR shall bear all costs of surveys associated with detecting the problem, implementing his plan of action and tests to confirm that the plan of action was carried to successful completion and to obtain the approval of the CONSULTANT. If the CONSULTANT is satisfied that the problem has been solved by the CONTRACTOR,

then the CONTRACTOR shall proceed with the construction of the well, bearing all costs of the plan of action and the CONSULTANT's program to confirm successful completion.

- G. Under (b.), the CONTRACTOR shall re-submit his plan of action to the CONSULTANT with necessary backup and justification for a revised plan of action. The CONSULTANT shall notify the CONTRACTOR that the revised plan of action is either acceptable or unacceptable.
- H. Under (c.), if the plan of action is not acceptable to the CONSULTANT and the CONTRACTOR elects to pursue the unacceptable plan of action, then two options exist for the CONSULTANT:
  - a. OPTION 1: If the unacceptable plan of action jeopardizes the well construction, completion or operation in the CONSULTANT's opinion, and the CONTRACTOR elects to implement the unacceptable plan of action, the CONSULTANT may declare the well defective and require abandonment by the CONTRACTOR. A determination shall be made by the CONSULTANT whether to abandon the well or attempt to correct the existing well. The CONTRACTOR shall bear all costs of rig time, etc., from original verbal notification and all cost of either abandoning the well or taking steps to complete a successful well.
  - b. OPTION 2: If the unacceptable plan of action does not jeopardize the well construction, completion, or operation in the CONSULTANT's opinion, the CONTRACTOR may, at his own risk, proceed with his plan of action. The CONTRACTOR shall bear all costs associated with his plan of action including testing, remedies, surveys and programs to solve the problem. When completed, the CONTRACTOR shall notify the CONSULTANT that the problem has been solved. The CONTRACTOR shall bear all costs of testing, surveys and work deemed necessary by the CONSULTANT to confirm that the problem has been solved. If the CONSULTANT is satisfied that the problem has been solved by the CONTRACTOR, then the CONTRACTOR shall proceed with the construction of the well, bearing all costs of the plan of action and the CONSULTANT's program to confirm successful completion.

**PART 2 -- PRODUCTS (NOT USED)**

**PART 3 -- EXECUTION (NOT USED)**

**END OF SECTION**

## SECTION 01025 – MEASUREMENT AND PAYMENT

### PART 1 -- GENERAL

#### 1.1 THE SUMMARY

- A. Payment for the various items of the Bid Schedule, as further specified herein, shall include all compensation to be received by the CONTRACTOR for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, and incidentals appurtenant to the items of work being described, as necessary to complete the various items of the WORK all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of permits and cost of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). No separate payment will be made for any item that is not specifically set forth in the Bid Schedule, and all costs therefore shall be included in the prices named in the Bid Schedule for the various appurtenant items of work.

#### 1.2 ADMINISTRATIVE SUBMITTALS

- A. Schedule of Values: Submit schedule on SUPPLIER's standard form.
- B. Application for Payment.
- C. Final Application for Payment.

#### 1.3 CONTINGENCY ALLOWANCE

- A. Funds will only be drawn from the contingency allowance by Change Order.
- B. Any funds remaining in the Contingency Allowance at the end of the project will revert to the OWNER, and a final Change Order will be enacted to reduce the overall Contract amount by the corresponding amount.

#### 1.4 SCHEDULE OF VALUES

- A. Reflect schedule of values format included in conformed Bid Form, specified allowances, alternates, and equipment selected by the OWNER, as applicable.
- B. List Bonds and insurance premiums, mobilization, demobilization, facility startup, and contract closeout separately.
- C. Break down by Divisions 2 through 16 with appropriate subdivision of each Specification for each of the Project facilities.
- D. An unbalanced or front-end-loaded schedule will not be acceptable.
- E. Summation of the complete schedule of values representing all Work shall equal the Contract Price.
- F. Quantities listed in the attached BID FORM shall be used for calculation of payment amount for each line item for progress payments. The proportion of each line item

completed during the progress payment period compared to the quantities listed in the BID FORM should be paid. Upon completion of the line item, it shall be billed at 100% complete.

#### 1.5 EQUIPMENT AND MATERIALS IN STORAGE

- A. Partial payment for materials and equipment in proper storage at the site of the Work will be made for those items for which the CONTRACTOR has submitted the following:
  - 1. Invoice for each item in storage. The invoice shall not exceed the value of the item stored as determined by the amount paid to the manufacturer (subcontractor fabrication costs excluded).
  - 2. List of items in storage.
  - 3. With following pay estimate, release of liens for the full amount less retainage of each item listed as stored materials for the previous pay estimate. Any item for which the full amount less retainage release of lien is not supplied shall be considered as having been removed from the site.
- B. No payment for any offsite storage of material will be made. Any payment for stored material shall not include labor or profit by the CONTRACTOR or any sub-contractor. The CONTRACTOR is specifically advised that this procedure may require full payment for some stored materials or shop work significantly ahead of the time when payment is issued by the Owner.

#### 1.6 PAYMENT SCHEDULE

- A. The following schedule shall be adhered to:
  - 1. 20th of the Month - Cutoff date
  - 2. 23rd of the Month - Pay estimate to the Inspector
  - 3. 25th of the Month - Pay estimate to the CONSULTANT
  - 4. 30th the following Month - Payment by the Owner
- B. When the cutoff date occurs on a holiday or weekend, the date shall be the last work day preceding the 20th.

#### 1.7 PAY ESTIMATE FORMS

- A. The CONTRACTOR shall submit a pay application form for approval.
- B. Failure of the CONTRACTOR to sign the pay estimate or attach appropriate documentation shall be grounds for returning the pay estimate with no action by the OWNER or CONSULTANT. The CONTRACTOR shall provide an updated schedule with each pay application. The schedule must include the original estimated start and finish dates as provided in the schedule submitted prior to starting construction. The updated schedule also shall provide actual start and finish dates as construction progresses.

1.8 LUMP SUM PAYMENT ITEMS

- A. Measurement for progress payments of lump sum items will be made on the basis of the earned value for each item shown as a percentage of the cost for the lump sum item as listed in the Schedule of Values. The CONTRACTOR shall submit a schedule of values to the CONSULTANT for approval.
- B. Payment will be made at the lump sum price as named in the Bid Schedule which price shall constitute full compensation for the complete and proper construction of the Work as shown on the Contract Drawings and specified herein. Payment at Final Completion will be equal to the total lump sum amount for that item.

1.9 UNIT PRICE PAYMENT ITEMS

- A. Measurement for progress payments will be as indicated for each unit price item as listed in the attached Bid Schedule.
- B. Payment will be made at the unit price as named in the Bid Schedule which price shall constitute full compensation for the complete and proper construction of the Work as shown on the Contract Drawings and specified herein.

1.10 MEASUREMENTS - GENERAL

- A. Units of measure shown on the Bid Schedule Form shall be as follows unless otherwise specified in the Contract Documents.

UNIT	MEASUREMENT
CF	Cubic Feet – Field measure by CONSULTANT within the limits specified or shown
EA	Each – Field Count
HR	Hours – Number of hours of work performed as documented by the CONSULTANT
LF	Linear Feet - Field measure by CONSULTANT
LS	Lump Sum – Unit is one. No measurement is made

- B. The CONTRACTOR will be paid for work performed under this contract according to CONSULTANT approved percentage of completion for each lump sum item on the schedule of values and adjusted per the unit adjustment prices set forth in these documents to the extent the actual placed quantities differ from the quantities shown on the bid schedule, all as further described and set forth below and in other sections of this document. The items included in the sections below describe the lump sum items and unit adjustment items included on the bid schedule.

1.11 GENERAL CONDITIONS (BID ITEM 1)

- A. This pay item shall include the costs to comply with all elements of the General Conditions of the Contract, including but not limited to: compliance with the requirements of the General Conditions, record keeping, safety and permitting. This item shall include all compensation for bonds, and insurance in accordance with the Contract documents. This

item shall include all work, materials and equipment necessary to complete all work in contract documents that is not specifically identified in other bid items.

- B. Mobilization/Demobilization: This item includes the preparatory work and operations in mobilizing/demobilizing for beginning Work on the Project, including, but not limited to, those operations necessary for the movement of personnel, equipment, materials, supplies and incidentals to the Project site, and for the establishment of temporary offices, buildings, safety equipment and first aid supplies, sanitary and other facilities, as required by these Specifications, and State and local laws and regulations. The costs of any other pre-construction expense necessary for the start of the Work, excluding the cost of construction materials referenced in other bid items, is to be included in the lump sum bid item.
- C. Payment for all work, materials and equipment will be made at a lump sum amount. Payment for this item will not exceed 50% of the total bid item amount upon: mobilization of all equipment and personnel, setup of all equipment, installation of pad monitor wells, installation of pit casing, providing acceptable preconstruction documentation as determined by the CONSULTANT, and initiation of drilling at IW-2 below the base of the pit casing.
- D. Payment for this item will not exceed 90% of the total bid item amount upon: completion of the subsurface portion of IW-2, completion of injection testing, plugging and abandonment of the pad monitor wells, and demobilization of the drilling rig and associated drilling equipment.
- E. Full 100% payment for this item will be made upon: completion of all wellhead and surface facilities, installation of all conveyance piping and valving to IW-2, completion of all electrical and instrumentation, completion of site restoration, providing all acceptable documentation necessary for the completion of the work as determined by the CONSULTANT, and completion of all other work required in the Contract.

#### 1.12 INDEMNIFICATION (BID ITEM 2)

- A. Basis of Payment: Payment shall include all compensation for indemnification in accordance with the Contract documents. This item includes costs to indemnify the OWNER against harm, losses, damages, or legal liabilities caused by the CONTRACTOR.

#### 1.13 DRILLING 12-INCH PILOT HOLES (BID ITEM 3)

- A. Payment for all work, materials and equipment will be made at the unit adjustment price **per foot drilled**. This unit adjustment price includes collecting drill cutting samples, collecting water-quality samples, performing inclination surveys and geograph recording as specified. There will be no payment for re-drilling a previously cemented or filled pilot hole or borehole (overlapping holes), or for re-drilling due to dredging.

#### 1.14 INSTALL DRILLABLE BRIDGE PLUG (BID ITEM 4)

- A. Payment for all work, materials and equipment will be made at the lump sum price to install a drillable bridge plug in the pilot hole completed to 3,500 feet below pad level (bpl) to near the top of the injection zone as determined by the CONSULTANT.

1.15 DRILLING BOREHOLES AND REAMED HOLES (BID ITEM NO. 5A THROUGH 5E)

- A. Payment for all work, materials and equipment will be made at the unit adjustment price **per foot drilled**. This unit adjustment price includes inclination surveys and geograph recording. There will be no payment for re-drilling due to dredging. This unit adjustment includes collecting drill cutting samples through strata not previously intersected by a pilot hole.

1.16 CASING INSTALLATION (BID ITEM NO. 6A THROUGH 6D)

- A. Payment for all work, materials and equipment will be made at the unit adjustment price **per foot of casing installed below pad level**. This item includes properly welded connections and centering guides.

1.17 CEMENT AND ADDITIVES (BID ITEM NO. 7A THROUGH 7F)

- A. Payment for all work, materials and equipment will be made at the unit adjustment price **per linear vertical foot installed from the base of casings to pad level and for linear vertical foot installed within pilot holes as directed by the CONSULTANT**. This unit adjustment item includes: cement plans prior to each stage; all additives; cement samples; cement tags; cement-top temperature logging and time for cement setting.
- B. If gravel is necessary, as described below, payment for gravel will be made at the same cost per unit as cement. The measurement for payment for gravel will be per vertical linear foot.
- C. Conditions for gravel placement: CONTRACTOR shall provide cement plans to CONSULTANT for approval for each stage of cement. Cement plans shall include theoretical cement lifts based on XY caliper results. After performing a specific cement stage, cement-top temperature logging and a physical tag shall be performed, consistent with Contract conditions. If the physical tag and cement-top temperature log show an actual cement lift less than 10% of the theoretical cement lift, the CONTRACTOR shall perform another cement stage. If the subsequent cement stage indicates an actual cement lift of less than 10% compared to the theoretical cement lift, the CONTRACTOR may request to install gravel. The size and material of the gravel shall be approved by the CONSULTANT prior to placement. The CONTRACTOR shall install the approved gravel by the tremie method. The amount of gravel shall be approved by the CONSULTANT, but shall not exceed a total of 20 contiguous vertical linear feet. After the approved amount of gravel is installed, measured in vertical feet, the CONTRACTOR shall resume with cement stages. The CONTRACTOR may again request the placement of additional gravel after two successive cement stages resulting in cement lifts less than 10% of theoretical.

1.18 GEOPHYSICAL AND DOWNHOLE VIDEO LOGGING (BID ITEM NO. 8A THROUGH 8H)

- A. Payment for all work, materials and equipment will be made at the **lump sum price** for each logging and video event. No measurement is made for these items. This item includes performing logging as specified. There will be no additional payment for performing additional logging if the logging tools are unable to be lowered to the total borehole depth or if the borehole is not sufficiently conditioned to successfully complete the logging as specified. There is no additional payment for performing additional logging

under dynamic/pumping conditions if the CONTRACTOR is unable to pump out of the borehole at an acceptable rate or if the CONTRACTOR has insufficient storage onsite to contain the pumped water prior to completing dynamic logging. Payment for cement-top temperature logging is included in the applicable items for cementing.

1.19 COLLECT AND ANALYZE CORES (BID ITEM NO. 9)

- A. Payment for all work, materials and equipment will be made at the unit adjustment price for **each successful coring event**. This unit item includes obtaining cores that meet the required lengths. This unit adjustment item also includes providing boxes for proper storage and delivery to the proper regulatory authority. This item includes shipping samples, selected by the CONSULTANT, to the laboratory and for laboratory testing as specified. Up to 3 core samples per core will be selected for analysis.

1.20 PACKER TESTING (BID ITEM NO. 10)

- A. Payment for all work, materials and equipment will be made at the unit adjustment price for **each packer test**. This unit adjustment item includes performing tests using either a single packer or a straddle-packer assembly (as determined by the CONSULTANT). This unit adjustment item also includes providing and installing appropriate instrumentation to measure and record water levels within and above the packer intervals during development, background, pumping and recovery periods. This unit adjustment item also includes collecting water samples and laboratory testing. This item includes shipment of water quality samples to FGS as required by permit.

1.21 PRESSURE TESTING OF 30-INCH CASING (BID ITEM NO. 11)

- A. Payment for all work, materials and equipment will be made at the **lump sum price** for successfully demonstrating mechanical integrity of the IW-2 30-inch casing. This item includes completing a successful hydrostatic pressure test. No additional payment will be made for performing multiple testing attempts to meet specification requirements. It is the CONTRACTOR's option to perform a pressure test of the 30-inch casing prior to cementing in place. No payment will be made for completing an un-cemented pressure test.

1.22 DEVELOP AND COLLECT FINAL WATER QUALITY SAMPLE (BID ITEM NO. 12)

- A. Payment for all work, materials and equipment will be made at the **lump sum price** for sampling and analysis of the injection zone. This item includes: developing/purging the zone; monitoring pump rates, water levels and field water quality during purging; collecting the water samples; perform laboratory analysis by a certified lab. This item includes shipment of water quality samples to FGS as required by permit.

1.23 SETUP AND PERFORM INJECTION TEST OF IW-2 (BID ITEM NO. 13)

- A. Payment for all work, materials and equipment will be made at the **lump sum price** for completing an injection test in IW-2. This item includes sample collection and analysis of the injection test source water; set up and preliminary testing of all piping from an onsite water source, valving, pumps, gauges, meters and instruments; providing all data as specified; maintaining stable pump rates as specified; removal of all equipment and materials upon completion of testing and monitoring.

1.24 SETUP AND PERFORM ANNULAR PRESSURE TEST OF IW-1 (BID ITEM NO. 14)

- A. Payment for all work, materials and equipment will be made at the **lump sum price** for successfully demonstrating mechanical integrity of IW-1. This item includes completing a successful annular hydrostatic pressure test. No additional payment will be made for performing multiple testing attempts to meet specification requirements.

1.25 SETUP AND PERFORM INJECTION TEST OF IW-1 (BID ITEM NO. 13)

- A. Payment for all work, materials and equipment will be made at the **lump sum price** for completing an injection test in IW-1. This item includes sample collection and analysis of the injection test source water; set up and preliminary testing of all piping from an onsite water source, valving, pumps, gauges, meters and instruments; providing all data as specified; maintaining stable pump rates as specified; removal of all equipment and materials upon completion of testing and monitoring.

1.26 FURNISH AND INSTALL INJECTION WELL IW-2 WELLHEAD AND SURFACE FACILITIES, INCLUDING CONCRETE PAD (BID ITEM NO. 16)

- A. This pay item shall include, but not be limited to, all equipment, materials, and labor to satisfactorily furnish and install the wellhead and concrete well pad. The work shall include the wellhead, piping, valves, meters, above-grade piping, floor drain assembly, fittings, coatings, and concrete work (including testing) as shown on the Contract Plans. Pay item shall include start-up, testing, commissioning, operation and maintenance manuals, record drawings, and close-out documentation. Payment of this item shall be paid as a Lump Sum price listed on the Bid Form.

1.27 FURNISH AND INSTALL BURIED PIPING, VALVES, AND FITTINGS (BID ITEM NO. 17)

- A. This pay item shall include, but not be limited to, all equipment, materials, and labor to satisfactorily furnish and install the buried piping, valves, fittings, and appurtenances. The work shall include the PVC large diameter effluent disposal piping, valves, ductile iron fittings, restraints, identification tape, tracer wire, marker balls, and appurtenances as shown on the attached drawings. Pay item shall include start-up, testing, commissioning, record drawings, backfill, compaction, and connection to existing pipe. Payment of this item shall be paid as a Lump Sum price listed on the Bid Form.

1.28 GENERAL SITEWORK INCLUDING RESTORATION (BID ITEM NO. 18)

- A. The work specified under this pay item shall include all equipment, tools, material and labor necessary to prepare the site and for completion of the site as shown on the Contract Plans and Specifications, and any restoration or repair to items damaged by construction. This item includes, but is not limited to, clearing/grubbing, site grading, excavation/backfill as necessary, the furnishing/installation/compaction of clean fill as necessary, compaction of subgrade to a depth of 24" below existing grade or greater (see geotechnical report in appendices), legal disposal of excess fill and/or cleared vegetative mass, limerock road-base, prepared subgrade, stabilized rock road, asphalt pavement, gravel, stormwater drainage piping/cleanout, sodding, landscaping, subgrade/road-base compaction, and density testing of prepared subgrade, record drawings, and all other incidentals necessary to provide a finished and restored site. The CONTRACTOR shall restore irrigation systems (piping, sprinkler heads, controls, wiring, etc.), fencing, gates, existing structures, signs,

miscellaneous wiring and any other item that was damaged or removed during construction not covered in the other Bid Items, to existing conditions or better. No more than 50% of this item shall be payable for initial site preparation, clearing, and preliminary grading work prior to final grading, sodding, subgrade/pavement installation, final site restoration, and all incidentals required to complete the site work as defined in the Contract Plans and Specifications. Payment of this item shall be paid as a Lump Sum price listed on the Bid Form.

1.29 ELECTRICAL AND INSTRUMENTATION WORK (BID ITEM NO. 19)

- A. The item includes all equipment, materials, and labor necessary to furnish and install electrical service and controls facilities to the well as appropriate, as shown on the attached drawings and specifications. This item shall include all power feeds and services, power and control panels, disconnects, wire, conduit, grounding, lightning protection, site lighting and light poles and fixtures, instrumentation/controls, SCADA, telemetry, record drawings, and appurtenances as shown in the Contract Plans and Specifications. Payment of this item shall be paid as a Lump Sum price listed on the Bid Form.

1.30 STANDBY WITH DRILLING CREW (BID ITEM NO. 20)

- A. The OWNER and/or CONSULTANT may order the CONTRACTOR to stop operations. The OWNER and CONSULTANT shall schedule the request, so it causes a minimum of disruption. The CONTRACTOR shall be reimbursed on a hourly basis to a maximum of 12 hours per day at rates listed in the bid. Standby time shall be approved in advance by the CONSULTANT. Driller and Superintendent must be present on site to meet the definition of "with crew". Standby time shall not be paid for any time awaiting FDEP approvals relating to the requirements of the FDEP UIC construction permit.

1.31 OWNER'S CONTINGENCY

- A. Included in this bid item is work associated with undefined conditions or conflicts developing from undefined conditions. All work will be authorized in writing by the OWNER prior to implementation and payment. The amount to be paid per undefined conditions or conflict shall be negotiated or agreed to by both parties. The OWNER reserves the right to award any, all, or none of the money associated with this bid item.

**PART 2 -- PRODUCTS (NOT USED)**

**PART 3 -- EXECUTION (NOT USED)**

**END OF SECTION**



## SECTION 01300 – SUBMITTALS

### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF REQUIREMENTS

- A. The type of submittals controlled by these general requirements includes shop drawings, product data, samples and miscellaneous work-related submittals. The individual submittal requirements are specified in applicable sections for each unit of work.
  - 1. Unless otherwise noted, each item of submittal shall be submitted to the CONSULTANT for review prior to construction or installation.
  - 2. CONSULTANT's review is for general conformance with the design concept and Contract Documents.
- B. The submittal will not be accepted for review unless it contains complete information, complies with the specifications, and has been certified by the CONTRACTOR. Submittals that are not accepted will be returned with attached notations of requirements necessary for acceptance. Resubmit after the material has been amended to comply with the comments.
- C. When submitting "or equal" submittals for review, one of the CONSULTANT's copies shall contain catalog sheets for the specified items marked, FOR COMPARISON ONLY, as well as sheets for the proposed substitutions, otherwise substitutions will not be considered.
- D. Prior to prosecution of the work, the CONTRACTOR shall submit to the CONSULTANT a schedule of shop drawings which shall include a list of shop drawings he anticipates submitting and the respective date for submittal.

#### 1.02 DEFINITIONS

- A. The work-related submittals of this section, in addition to the definitions of the General Conditions and elsewhere in the Contract Documents, are defined as follows:
  - 1. Shop drawings include custom-prepared data of all forms including drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements and similar information not in standard printed form applicable to other projects.
  - 2. Product data includes standard printed information on materials, products and systems not custom-prepared for this project, other than the designation of selections from available choices.
  - 3. Samples include both fabricated and unfabricated physical examples of materials, products and work, both as complete units and as smaller portions of units of work; either for limited visual inspection or (where indicated) for detailed testing and analysis.
  - 4. Mock-ups are a special form of samples which are, because of size, usually constructed on the project site.

- B. Miscellaneous submittals related directly to the work (non-administrative) include extended warranties or guarantees, maintenance agreements, project photographs and videography, survey data and reports, physical work records, statements of applicability, quality testing, calculations and certifying reports, copies of industry standards, record drawings, operating and maintenance materials, overrun stock, and similar information, devices and materials applicable to the work.

### 1.03 GENERAL SUBMITTAL REQUIREMENTS

#### A. Coordination and Sequencing

1. Coordinate the preparation and processing of submittals with the performance of the work and in accordance with the schedules prepared and referred to in the paragraph(s) on Schedules and Progress Reports of the General Conditions, so that work will not be delayed by submittals. Coordinate and sequence different categories of submittals for the same work, and for interfacing units of work, so that one will not be delayed for coordination with another. Do not proceed with purchasing, fabrication and delivery of work related to a submittal until submittal procedure has been successfully completed. No extension of time will be allowed because of failure to properly coordinate and sequence submittals.

#### B. Preparation of Submittals

1. Transmit each submittal with a CONSULTANT-accepted form. The transmittal form should use sequential transmittal numbers. Resubmittals should have the original number with an alphabetic suffix.
2. Provide permanent marking on each submittal to identify it by project; date; CONTRACTOR, subcontractor, or supplier; submittal name; pertinent Drawing sheet or detail number(s); and specification Section number. Submittals which are received directly from sources other than through the CONTRACTOR's office will be returned without review.
3. Where manufacturer's data sheets, catalog pages or drawings have several items shown or a selection of characteristics are shown in chart and graphs, clearly mark the information indicating exactly what will be supplied.
4. Apply CONTRACTOR's stamp, signed or initialed, certifying that the review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

- C. Number of Copies Required for Each Submittal: See Paragraph 1.05 D. of this section for the number of copies required for each submittal.

- D. Submittal Log: The CONTRACTOR is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting with the OWNER and/or CONSULTANT. This log should include the following items:

1. Submittal description and number assigned
2. Date to CONSULTANT

3. Date returned to CONTRACTOR (from CONSULTANT)
4. Status of submittal (Approved/Resubmit/Rejected)
5. Date of resubmittal and return (as applicable)
6. Date material released (for fabrication)
7. Projected date of fabrication
8. Projected date of delivery to site
9. Status of O&M submittal

#### 1.04 SPECIFIC CATEGORY REQUIREMENTS

- A. General: Except as otherwise indicated in individual work sections, comply with the general requirements specified for each indicated category of submittal. Provide and process intermediate submittals (where required between initial and final) similar to initial submittals.
- B. Construction Progress Schedules
  1. Submit initial progress schedule in duplicate within 15 days after date of OWNER/CONTRACTOR Agreement for CONSULTANT review.
  2. Revise and resubmit as required.
  3. Submit revised schedules with each Application for Payment, identifying changes since previous version.
  4. Submit a horizontal bar chart with separate line for each major section of the Work or operation, identifying first workday of each week.
  5. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.
  6. Indicate estimated percentage of completion for each item of Work at each submission.
- C. Shop Drawings
  1. Provide newly-prepared information; show dimensions and note which are based on field measure, identify materials and products in the work shown, indicate compliance with standards, and special coordination requirements. Do not allow shop drawing copies without appropriate final review markings by the CONSULTANT to be used in connection with the work.
- D. Product Data
  1. Collect the required data into one submittal for each material, product or system; and mark each copy to show which choices and options are applicable to the project. Include manufacturer's standard printed recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements which have been checked, and special coordination requirements. Maintain one set of product data (for each submittal) at the project site, available for reference by the CONSULTANT or others.

2. Installer's Copy: Do not proceed with the installation of materials, products or systems until a copy of the applicable product data is in the possession of the installer.

E. Samples

1. Provide units identical to the final condition of the proposed materials or products for the work. Include "range" samples (not less than three units) where variations occur and identify each unit of each set. Provide full set of optional samples where CONSULTANT's selection is required. Prepare samples to match CONSULTANT's sample where so indicated. Include information with each sample to show generic description, source or product name and manufacturer, limitations, and compliance with standards.
2. Samples as submitted for review and confirmation of color, pattern, texture and "kind" by the CONSULTANT, who will not "test" them (except as otherwise indicated) for other requirements, which are therefore the exclusive responsibility of the CONTRACTOR.
  - a. Submittal: At his option, the CONTRACTOR may provide a preliminary submittal of a single set of samples for the CONSULTANT's review and "Action". Otherwise, the initial submittal is the final submittal unless it is returned with "Action" which requires an additional submittal.
    - 1) Submit three sets of samples in the final submittal; two sets will be returned.
    - 2) Quality Control Set: Maintain one of the returned final sets of samples at the project site, in suitable condition and available for quality control comparisons by the CONSULTANT and by others.
  - b. Reusable Samples: Samples which are intended or permitted to be returned and actually incorporated in the work are so indicated in the individual work sections, but must be in undamaged condition at the time of use.

F. Inspection and Test Reports

1. Submittal is classified either as "shop drawings" or "product data", depending upon whether the report is uniquely prepared for the project or a standard publication of regular product or workmanship control testing at the point of production (respectively).

G. Guarantees, Operating and Maintenance Instructions

1. Refer to individual sections for specific general requirements on the submittal of warranties, guarantees, product/workmanship bonds, and maintenance agreements which are uniquely prepared and executed for the project. Furnish two executed copies, except furnish five additional (conformed) copies where required, for maintenance manual.
2. The CONTRACTOR shall furnish to the OWNER five sets of brochures containing spare parts data and operating and maintenance instructions on all major equipment

furnished for the project, and copies of all manufacturer's guarantees and warranties. This material shall be furnished before the completion of the project and before final payment is made to the CONTRACTOR.

- H. Trench Safety Act Compliance Certification: The CONTRACTOR shall complete the Trench Safety Act Certification and submit it in triplicate with appropriate signature and corporate seal.

#### 1.05 CONSULTANT'S ACTION

- A. The CONSULTANT will review each required submittal and return it with the action required marked on it.
- B. The mark will be a self-explanatory action stamp, marked and executed to indicate whether required submittal is accepted, returned for resubmittal, or rejected.
- C. Where marked RESUBMIT, do not proceed with work covered by submittal (purchasing, fabrication, delivery or other activity); revise submittal or prepare a new submittal and resubmit without delay, in accordance with CONSULTANT's notations stating reasons for returning submittal; repeat if necessary to obtain a different action marking.
- D. Submit the number of prints of shop drawings or copies of manufacturer's product data required by the CONTRACTOR plus three (3) copies; two (2) copies will be retained by the CONSULTANT, one (1) will be sent to the OWNER and the remainder will be returned, one of which is to be marked up and maintained by the CONTRACTOR as "Record Document". A maximum of seven (7) copies will be reviewed for each submittal unless specifically requested by the CONTRACTOR.

#### 1.06 CLOSEOUT SUBMITTALS

- A. Refer to Section 01700 for specific general requirements on the submittal of closeout information, materials, tools, and similar items.
  - 1. Record Document Copies: Furnish one set of electronic drawings, one set of reproducible drawings and two sets of plain paper drawings unless noted otherwise in the individual sections of these specifications.
  - 2. Maintenance/Operating Manuals: Furnish five bound copies unless noted otherwise in the individual sections of these specifications. Provide one electronic copy of entire approved O&M upon acceptance of the document. Document (including all back-up) will be scanned and copied to CD for submission to the OWNER.
  - 3. Materials and Tools: Refer to individual work sections for required quantities of spare parts, extra and overrun stock, maintenance tools and devices, keys and similar physical units to be submitted.

#### 1.07 OPERATIONS AND MAINTENANCE MANUAL

- A. The CONTRACTOR shall submit complete technical operation and maintenance information for each item of mechanical, electrical and instrumentation equipment in an organized manner. The information from each manufacturer shall be gathered and submitted in the form of a single Technical Manual (multiple volumes if required). It shall be written so that it can be used and understood by the OWNER's operation and maintenance

staff. Information, as it pertains to preventative maintenance, shall be submitted with the shop drawings.

- B. The Technical Manuals submitted by the CONTRACTOR for inclusion in the O&M manual shall be prepared in accordance with applicable specifications.

#### 1.08 SPARE PARTS LIST

- A. The CONTRACTOR shall furnish as a part of Shop Drawing submittals to the CONSULTANT 5 identical sets of spare parts and special tools information for all mechanical, electrical, and instrumentation equipment. The spare parts list shall include the current list price of each spare part and special tool. The spare parts and special tools list shall be limited to those spare parts and spare tools which each manufacturer recommends be maintained by the OWNER in inventory at the plant site. Each manufacturer or supplier shall indicate the name, address, and telephone number of its nearest outlet of spare parts and special tools to facilitate the OWNER in ordering. The CONTRACTOR shall cross-reference all spare parts and spare tools lists to the equipment numbers designated in the Contract Documents. The spare parts and spare tools list shall be bound in a standard size, 3-ring, loose-leaf, vinyl plastic hard cover binder suitable for bookshelf storage. Binder ring size shall not exceed 2.5 inches.
- B. The CONTRACTOR shall furnish to the OWNER all spare parts and spare tools stated on the spare parts and spare tools list and which each manufacturer recommends be maintained by the OWNER in inventory at the plant site. The spare parts and spare tools for all mechanical, electrical and instrumentation equipment shall be furnished by the CONTRACTOR to the OWNER at no additional cost and prior to the OWNER's acceptance of the work.

#### **PART 2 – PRODUCTS (NOT USED)**

#### **PART 3 – EXECUTION (NOT USED)**

**END OF SECTION**

## SECTION 01310 – PROGRESS SCHEDULES

### PART 1 - GENERAL

#### 1.01 SUBMITTALS

- A. Submit with Each Progress Schedule Submission:
  - 1. CONTRACTOR's certification that progress schedule submission is the actual schedule being utilized for execution of the Work and certification by all Subcontractors with 10 percent or more of Work that they concur with CONTRACTOR's progress schedule submission.
- B. Preliminary Progress Schedule: Submit no later than preconstruction conference.
- C. Progress Schedule: Submit adjusted schedule or confirm validity of current schedule with each monthly Application for Payment, and at such other times as necessary to reflect: (i) progress of Work to within 5 working days prior to submission; (ii) changes in Work scope and activities modified since submission; (iii) delays in Submittals or resubmittals, deliveries, or Work; (iv) adjusted or modified sequences of Work; (v) other identifiable changes; and (vi) revised projections of progress and completion.
- D. Narrative Progress Report: Submit with each monthly submission of progress schedule.
- E. Precedent to final payment, provide four copies of any Critical Path Method (CPM) type schedule utilized with certification that said schedule represents correctly the way the Work was performed.
- F. Progress quantity chart(s).

#### 1.02 PROGRESS OF THE WORK

- A. If CONTRACTOR fails to complete activity by its latest scheduled completion date and his failure may 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 the acceptable current progress schedule. Actions by CONTRACTOR to complete Work within Contract Times (or Milestones) will not be justification for adjustment to Contract Price or Contract Times.
- B. OWNER may order CONTRACTOR to increase plant, equipment, labor force or working hours if CONTRACTOR fails to: (i) complete a critical scheduled activity by its latest Milestone completion date, or (ii) satisfactorily execute Work as necessary to prevent delay to the overall completion of the Project.

#### 1.03 PRELIMINARY PROGRESS SCHEDULE

- A. As a minimum, submit two bar charts or preliminary network analysis diagrams as follows:

1. 90-Day Plan: Show major initial activities including, but not limited to, mobilization, permits, submittals for early product procurement and long lead time items, initial site work, and other activities anticipated in the first 90-day period of the Contract Time.
  2. Project Overview Plan: Show major components of the Work and the sequence relations between major components and subdivisions of major components. The chart shall indicate the relationship and time frames in which the various facilities will be made substantially complete and placed into service in accordance with the Project Milestones. Sufficient detail shall be included for the identification of subdivisions of major components into such activities as:
    - a. Mobilization and setup.
    - b. Well drilling.
    - c. Well completion.
    - d. Completion of all structural concrete.
    - e. Major mechanical Work (including yard piping).
    - f. Major electrical Work.
    - g. Instrumentation and control Work.
    - h. Other important work for each major facility within the overall Work scope.
- B. Planned durations and start dates shall be indicated for each Work item subdivision. Each major component and subdivision component shall be accurately plotted on time scale sheets not to exceed 11 inches by 17 inches in size. Not more than four sheets shall be employed to represent this overview information.
- C. The preliminary progress schedule, when accepted by the CONSULTANT, will be the initially acceptable schedule.

#### 1.04 PROGRESS SCHEDULE

##### A. General:

1. Schedule(s) shall reflect Work logic sequences, restraints, delivery windows, review times, Contract Times, and Milestones set forth in the Agreement and Section 01040, SITE CONDITIONS, and shall begin with the date of Notice to Proceed and conclude with the date of Final Completion.
2. The schedule requirement herein is the minimum required. CONTRACTOR may prepare a more sophisticated schedule if such will aid CONTRACTOR in execution and timely completion of Work.
3. Base schedule on a 7-day Work week.
4. Adjust or confirm schedules on a monthly basis.
5. Float time is a Project resource available to both parties to meet contract Milestones and Contract Times
6. Use of float suppression techniques such as preferential sequencing or logic, special lead/lag logic restraints, and extended activity times are prohibited, and use

of float time disclosed or implied by use of alternate float-suppression techniques shall be shared to proportionate benefit of OWNER and CONTRACTOR.

7. Pursuant to above float-sharing requirement, no time extensions will be granted nor delay damages paid until a delay occurs which (i) impacts Project's critical path, (ii) consumes available float or contingency time, and (iii) extends Work beyond contract completion date.
8. If CONTRACTOR provides an accepted schedule with an early completion date, OWNER reserves the right to reduce Contract Times to match the early completion date by issuing a deductive Change Order at no change in Contract Price.

#### 1.05 CLAIMS FOR ADJUSTMENT OF CONTRACT TIMES

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the CONTRACTOR to the CONSULTANT and the OWNER.
- B. Where CONSULTANT 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 that amount of time adjustment in progress schedule as CONSULTANT may accept as appropriate for the interim. It is understood and agreed that such interim acceptance by CONSULTANT will not be binding and will be made only for purpose of continuing to schedule Work, until such time as formal decision as to an adjustment, if any, of the Contract Times acceptable to the CONSULTANT has been rendered. CONTRACTOR shall revise progress schedule prepared thereafter in accordance with CONSULTANT's formal decision.

#### **PART 2 - PRODUCTS (NOT USED)**

#### **PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

## SECTION 01360 – PRE-CONSTRUCTION AUDIO-VIDEO DOCUMENTATION

### PART 1 - GENERAL

#### 1.01 PERFORMANCE

- A. Section generally defines CONTRACTOR's responsibilities, unless otherwise rated, for the following:
1. Audio-Video Documentation.
  2. Equipment.
  3. Submittals.
  4. Technique.
  5. Quality Assurance.

#### 1.02 QUALITY ASSURANCE

- A. Documentation shall be performed by a responsible commercial firm known to be skilled and regularly engaged in the preparation of pre-construction color audio-video documentation. **Any Preconstruction video produced by the CONTRACTOR will be immediately rejected.** All preconstruction videos are to be completed by a firm with extensive amount of previous experience in producing preconstruction documentation.
- B. Completed documentation shall reproduce bright, sharp pictures with accurate colors and shall be free from distortion, tearing, rolling, or any other significant picture imperfection. The audio portion of the recording shall reproduce the commentary of the camera operator with proper volume, clarity, and be free of distortion.
- C. Construction shall not proceed until the OWNER and CONSULTANT have reviewed the documentation and notified the CONTRACTOR of its acceptability.

#### 1.03 MEASUREMENT AND PAYMENT

- A. No separate payment item is provided for this work. The cost of performing this work shall be incorporated into the bid items or lump sum amount identified on the bid form.

### PART 2 - PRODUCTS

#### 2.01 RECORDING EQUIPMENT

- A. Utilize color video camera having:
1. Horizontal Resolution of 350 lines at center.
  2. 8:1 Zoom, minimum.
- B. Utilize digital format recorder having:
1. Minimum horizontal resolution of 540 lines, 60 fields.

## 2.02 RECORDING MEDIA

- A. Utilize new, Digital Video Disc (DVD) having:
  - 1. DVD shall be DVD-R. DVD-RAM shall not be accepted.
  - 2. 4¾ inch diameter discs.
  - 3. High resolution.
  - 4. 4.7 gigabyte storage per layer with two (2) layers, minimum.

## PART 3 - EXECUTION

### 3.01 COVERAGE

- A. Record coverage of all surface features located in the construction's zone of influence (including the proposed storage area(s)) including, but not limited to:
  - 1. Roadways, driveways, sidewalks, fences, gates
  - 2. Treatment facilities, buildings, surrounding structures, sanitary facilities.
  - 3. Drainage structures, above grade utilities, surface features, drainage swales, canals.
  - 4. Landscaping, trees, shrubbery, fences, irrigation heads, meters.
- B. Record the individual features of each item with particular attention being focused upon the existence of any faults, fractures, or defects.
- C. Control pan rate, rate of travel, camera height and zoom rate to maintain a steady clear view at all times.
- D. Limit recorded coverage to one (1) side of any street at any one time.
- E. Create a single, continuous, unedited recording that begins and ends within each portion of a particular construction area. The recording shall proceed in the direction of ascending baseline stationing.

### 3.02 AUDIO CONTENT

- A. Simultaneously record audio content during videotaping.
- B. Audio recording shall assist in viewer orientation and in any needed identification, clarification, or description of features being recorded.
- C. Audio recording will only consist of camera operator commentary.

### 3.03 INDEXING

- A. Permanently label each DVD with a sequential DVD number and the project name.
- B. Index each DVD with a digital record of the time and date of the recording that is continuously displayed as the DVD is played.
- C. Prepare a written log which describes the contents of each DVD including:
  - 1. Structure/location names.

2. Coverage begin/end, station and location.
3. Recording date.

3.04 CONDITIONS

- A. Record coverage during dry, clear weather and during daylight hours only.
- B. Record coverage when the area to be covered is free of debris or obstructions.
- C. Record coverage no more than fifteen (15) days prior to the start of construction.

**END OF SECTION**

## SECTION 01400 – GENERAL QUALITY CONTROL

### PART 1 - GENERAL

#### 1.1 DESCRIPTION OF REQUIREMENTS

- A. Definitions: Specific quality control requirements for the work are indicated throughout the contract documents and are not repeated herein. The requirements for this section are primarily to performances of the work beyond furnishing of manufactured products. The term "Quality Control" includes, but is not necessarily limited to, inspection and testing and associated requirements. This section does not specify or modify CONSULTANT's duties relating to quality control and Contract enforcement.

#### 1.2 RESPONSIBILITY FOR INSPECTIONS AND TESTS

- A. Unless otherwise noted, all testing and inspections required by these specifications shall be performed by a properly certified entity. All costs associated with the testing and inspections shall be the CONTRACTORs responsibility. The CONTRACTOR shall also be responsible for all tests or inspections required by any entity having jurisdictional control over the work.
- B. The costs for those required services by independent testing laboratories are recognized to be included in the contract sum.
- C. No failure of test agencies, whether engaged by OWNER or CONTRACTOR, to perform adequate inspections or tests or to properly analyze or report results, shall relieve the CONTRACTOR of responsibility for fulfillment of the requirements of the contract documents.

#### 1.3 QUALITY ASSURANCE

- A. General Workmanship Standards: Except as more definitively specified, the CONTRACTOR shall comply with recognized workmanship quality standards within the industry as applicable to each unit of work, including ANSI standards where applicable. It is a requirement that each category of tradesperson or installer performing the work be prequalified, to the extent of being familiar with applicable and recognized quality standards for that category of work, and of being capable of workmanship complying with those standards.

#### 1.4 PRODUCT DELIVERY-STORAGE-HANDLING

- A. General: Handle, store and protect materials and products, including fabricated components, by methods and means which will prevent damages, deterioration and losses including theft (and resulting delays), thereby insuring highest quality results as the performance of the work progresses. Control delivery schedules so as to minimize unnecessary long-term storage at the project site prior to installation. CONTRACTOR shall provide covered, inside storage for all new equipment on the site which is not intended for outside installation. Electrical, hydraulic and pneumatic connections on all equipment shall be protected from the elements. CONTRACTOR shall store all material

on the project site unless specifically authorized otherwise by the OWNER.

1.5 WATER TIGHTNESS: All tanks, containment pads and other equipment containing liquids that are not subject to specific leakage testing, as may be specified elsewhere, shall be free of all leakage when filled to the maximum pressure or static head that could be applied. The duration of all leakage testing shall be 24 hours. Any damp areas resulting from the tests shall be considered leaks and shall be repaired.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.1 PREPARATION FOR INSTALLATION**

- A. Installer's Inspection of Conditions: The CONTRACTOR shall require the fabricator and installer of each major unit of work to inspect substrate to receive the work, and conditions under which the work will be performed, and to report (in writing to the CONTRACTOR and the CONSULTANT) unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the fabricator and installer.

### **3.2 INSTALLATION QUALITY CONTROL**

- A. Manufacturer's Instructions: Where installations include manufactured products, comply with manufacturer's applicable instructions and recommendations for installation, to whatever extent these are more explicit or more stringent than applicable requirements indicated in the contract documents.
- B. The CONTRACTOR shall inspect each item of materials or equipment immediately prior to installation, and reject damaged and defective items. Provide attachment and connection devices and methods for securing work as it is installed; true to line and level, and within recognized industry tolerances if not otherwise indicated.
- C. The CONTRACTOR shall recheck measurements and dimensions of the work, as an integral step of starting each installation.
- D. Install work during conditions of temperature, humidity, exposure, forecasted weather, and status of project completion which will ensure best possible results for each unit of work, in coordination with entire work. Isolate each unit of work from noncompatible work, as required to prevent deterioration.
- E. Mounting Heights: Except as otherwise noted, mount individual units of work at industry-recognized standard mounting heights, for applications indicated. Refer questionable mounting height choices to the CONSULTANT for final decision.
- F. Adjust, clean, lubricate, restore marred finishes, and protect newly installed work, to ensure that it will remain without damage or deterioration during the remainder of the construction period.

**END OF SECTION**

## SECTION 01720 – RECORD DOCUMENTS

### PART 1 - GENERAL

#### 1.01 PERFORMANCE

- A. Section generally defines CONTRACTOR's responsibilities, unless otherwise indicated, for the following:
  - 1. On-site maintenance of Record Documents.
  - 2. Required record information.

#### 1.02 MAINTENANCE

- A. Maintain on site, one (1) set of the following Record Documents and permits; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
  - 5. Shop Drawings, product data, and samples.
  - 6. City of Port St. Lucie Building Permits.
  - 7. Other Permits as necessary.
- B. Store Record Documents separate from documents used for construction.
- C. Record information concurrent with construction progress.
- D. In the interest of timely detection of non-conforming Work, all Record Drawing information for the partially completed work must be furnished to the CONSULTANT prior to submitting for periodic progress payments on the partially completed Work.
- E. Under no circumstances will pavement restoration Work be allowed to start until the CONSULTANT has reviewed the Record Drawing information for Work constructed within the area that pavement will be restored.
- F. All Record Drawing information must be obtained by a Professional Land Surveyor, who is licensed in the State of Florida. Information must be signed and sealed.
- G. Record Documents must be available to CONSULTANT for examination at any time during the progress of the Work.
- H. Submit completed Record Documents upon completion of the Work, at each partial pay request, and prior to application for final payment.
- I. The Surveyor to be utilized shall have successfully completed three (3) Record Drawing projects within the last two (2) years within the City of Port St. Lucie Utility Systems

Department (PSLUSD) Service area (i.e. has completed three sets of Record Drawings that have been reviewed by PSLUSD Staff and is familiar with the requirements of PSLUSD.)

### 1.03 REQUIRED RECORD DRAWING INFORMATION

#### A. General

1. Label drawings "Record Drawings" with date.
2. Complete title block with current file name.
3. Location sketch.
4. Two (1) signed and sealed sets of Record Drawings.
5. Two (2) digital copies of Record Drawings in AutoCAD 2017 format or later and one (1) copy, in PDF format, on CD.
6. Additional copies as required for permitting closeout as requested by the CONSULTANT.
7. All plan sheets issued in the construction set shall be included in the record drawings set.
8. Record drawings will be modified to show accurate location of installed infrastructure.

#### B. Pipe

1. As-built entire facility from existing tie-in to existing tie-in as determined by the OWNER. Extensions of an imaginary line will not be acceptable as reference points.
2. Stationing or Northing/Easting of each valve, fitting, air release valve, service line, well head, etc. and radial dimensions from a nearby permanent object where possible.
3. Type of materials installed - pipe and appurtenances. Indicate all locations of change of material including joint type (M.J., slip, restrained).
4. Valve type (plug, butterfly, gate, air release, etc.) and size.
5. As-built elevations at tie-in locations and any major changes in direction and/or elevation. Elevations shown at these intervals and changes must show top of pipe elevation and finished grade elevation at that location.
6. As-built elevations and latitude/longitude of well head and dimensions to major components.

#### C. Well Head

1. Include Northing/Easting of the well head, top of pipe elevation of the pipe, corners of the concrete slab, and slab elevation.

#### D. Electrical

1. Include location of electrical and instrument panels, rocks, pull boxes, transformers, equipment panels, grounding grid, grounding test wells, and conduit.

#### E. Site

1. Include well slab corners, elevations at driveway design elevation points, junction with other pavement locations and roadways, swales (top of berm, toe of slope), modified site grading (10'x10' grid), and slab elevations

## **PART 2 – PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.01 SURVEYOR RESPONSIBILITIES**

- A. Signed and sealed prints are to be submitted for each pay requisition and appropriate stages of construction as designated by the CONSULTANT.
- B. Mark information on the Drawing in a manner that indicates which elevations and dimensions have been checked. This is to be done by crossing through the design elevation or dimension and placing the Record information next to it. If an elevation or dimension has not changed, the same procedure should be followed to confirm that it has been checked. Add new information in a manner to indicate that it is Record information and not design information.
- C. Information drawn to scale shall be re-drawn to reflect the installed dimension and location. Changes in information not drawn to scale shall be corrected by crossing through the design elevation/dimension and placing the Record information next to it as explained above.
- D. Design and Record information shall be recorded on separate layers.
- E. Each Record Drawing sheet must include the surveyor's name, company, address, and registration number.
- F. Prior to the conclusion of the Project, CONTRACTOR shall submit the required number of signed and sealed copies of the Record Drawings to the CONSULTANT for the purpose of closing all of the outstanding permits.
- G. At the conclusion of the Project, submit digital copies of the Record Drawings in AutoCAD 2020 format or later. In addition, the CONTRACTOR shall provide the required number of hard copies to the CONSULTANT to assist in the closing out of all necessary permits.

**END OF SECTION**

## SECTION 01730 – OPERATION & MAINTENANCE MANUALS

### PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

- A. Detailed information for the preparation, submission, and CONSULTANT's review of Operation and Maintenance (O&M) Data, as required by individual specification sections. The O&M information shall be prepared specifically for this project, and shall include all sections and organization as specified herein.
- B. The CONTRACTOR shall include all items installed as part of this project (wellhead, pump, motor, appurtenances, piping, fittings, valves, electrical components, etc.) within the same O&M Manual.

#### 1.02 DEFINITIONS

- A. Preliminary Data: Initial and subsequent submissions for CONSULTANT's review.
- B. Final Data: CONSULTANT-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 CONSULTANT and OWNER.
    - b. Submit prior to shipment date.
  - 2. Materials and Finished Data
    - a. Preliminary Data: Submit at least 15 days prior to request for start-up.
    - b. Final Data: Submit within 10 days after final inspection.

#### 1.04 DATA FORMAT

- A. Prepare preliminary data in the form of an instructional manual. Prepare final data in data compilation format in electronic media with bookmarks for each section.
- B. Instructional Manual Format:
  - 1. Cover: Identify manual with typed or printed title "OPERATION AND MAINTENANCE MANUAL" and list:

- a. Project title.
- b. Designate Applicable system, equipment, material, or finish.
- c. Identity of separate structure as applicable.
- d. Identity of general subject matter covered in the manual.

2. 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.

3. 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 set forth in the Contract Documents.

4. Text: manufacturer's printed data, or neatly typewritten.

5. Material shall be suitable for reproduction, with quality equal to original.

C. Data Compilation Format:

1. Compile all CONSULTANT-accepted preliminary O&M data. Draft and Final O&M Manuals shall be submitted as complete documents incorporating all preliminary O&M data. Piecemeal submissions of O&M Manuals will not be accepted.

2. Each set shall consist of the following:

- a. Cover: Identify each volume with typed or printed title "OPERATION AND MAINTENANCE MANUAL, VOLUME NO. \_\_\_\_ OF \_\_\_\_", and list:
  - i. Project title
  - ii. CONTRACTOR's name, address, and telephone number.
  - iii. If entire volume covers equipment or system provided by one supplier include the following:
    - a) Identity of general subject matter covered in the manual.
    - b) Identity of equipment number and specification section.
- b. Provide each volume with title page and typed table of contents with consecutive page numbers.
- c. Table of contents neatly typewritten, arranged in systematic order:

- i. Include list of each product, indexed to content of each volume.
- ii. Designate system or equipment for which it is intended.
- iii. Identify each product by product name and other identifying numbers or symbols set forth in the Contract Documents.

d. Section Dividers:

i. Fly-leaf:

- a) For each separate product, or each piece of operating equipment, with typed description of product and major component parts of equipment.
- b) List with each product:
  - 1) Name address, and telephone of subcontractor, suppliers, installer and maintenance CONTRACTOR as applicable.
  - 2) Identity area of responsibility of each.
  - 3) Provide local source of supply for parts and replacement.

iii. Identity of separate structure as applicable.

D. Electronic Media Format:

1. Portable Document Format (PDF):

- a. After all preliminary data has been found to be acceptable to the CONSULTANT, submit O&M data in PDF format on CD.
- b. Files to be exact duplicates of CONSULTANT-accepted preliminary data. Arrange by specification number and name.
- c. Files to be fully functional and viewable in the most recent version of Adobe Acrobat.
- d. The table of contents shall include hot links to the individual sections.

1.05 SUBMITTALS

A. Informational

1. Data outline: submit a detailed outline of the proposed organization and content of the Final Manuals prior to preparation of the preliminary manuals.
2. Preliminary Data:
  - a. Submit accordance with the CONSULTANT's comments.
3. Final Data: Submit in format specified herein.

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 part list, illustrations, detailed assembly drawings showing each part with part numbers and sequentially numbered part list, and diagrams required for maintenance.
  - g. Spare parts ordering instructions.
  - h. Where applicable, identify installed spares and other provisions for future work (e.g. reserved panel space, unused components, wiring, and 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. Relations of component parts of equipment and systems.
  - b. Control and flow diagrams.
  - c. 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 OWNER's personnel, including:
      - a) Proper procedures in the event of failure.
      - b) 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 operating 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 reassembly.
- 6. Start-up information and test reports.
  - 7. Guarantee, bond, and service agreement: in accordance with **Section 01780** – Contract Closeout.

B. Content for each 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 panelboard:
  - a. Electrical service.
  - b. Controls.
  - c. Communication.
- 3. List of electrical relay settings, and control and alarm contact settings.
- 4. Electrical interconnection wiring diagram, including control and lighting systems.
- 5. As-installed control diagrams by control manufacturer.
- 6. Operating procedures:
  - a. Routine and normal operating instructions.
  - b. Sequences required.
  - c. Safety precautions.
  - d. Special operating instructions.
- 7. Maintenance procedures:
  - a. Routine maintenance.
  - b. Guide to troubleshooting.
  - c. Adjustment and checking.
  - d. List of relay settings, control, and alarm contact settings.
- 8. Manufacturer's printed operating and maintenance instructions
- 9. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
- 10. Start-up information and test reports.

C. Maintenance summary

1. Compile individual maintenance summary for each applicable equipment item, respective unit or system, and for components of subunits.
2. Include detailed lubrication instructions and diagrams showing points to be greased or oiled; recommended type, grade, and temperature range of lubricants and frequency of lubrication.
3. Recommended spare parts:
  - a. Data to be consistent with manufacturer's bill of materials / parts list furnished in the 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.

#### 1.07 DATA FOR MATERIALS AND FINISHES

##### A. Content for architectural products, applied materials and finishes:

1. Manufacturer's data, giving full information on products:
  - a. Catalog number, size, and composition.
  - b. Color and texture designations.
  - c. Information required for reordering special manufactured products
2. Instructions for care and maintenance
  - a. Manufacturer's recommendation for types of cleaning agents and methods.
  - b. Cautions against cleaning agents and methods that are detrimental to product.
  - c. Recommended schedule for cleaning and maintenance.

##### B. Content for moisture protection and weather exposed products.

1. Manufacturer's data, giving full information on products:
  - a. Applicable standards.
  - b. Chemical composition.
  - c. Details of installation.
2. Instructions for inspection, maintenance and repair.

#### 1.08 ADDITIONAL ITEMS FOR THE O&M MANUAL

- A. Record drawings provided by the CONTRACTOR.
- B. Hydrogeologic report provided by the OWNER.

#### 1.09 SUPPLEMENTS

- A. The supplement listed below, following "END OF SECTION," are part of this specification.
  1. Form: Maintenance Summary Form.

**PART 2 – PRODUCTS (NOT USED)**

**PART 3 – EXECUTION (NOTUSED)**

**END OF SECTION**

**MAINTENANCE SUMMARY FORM**

PROJECT: \_\_\_\_\_ CONTRACT NO.: \_\_\_\_\_

1. EQUIPMENT ITEM \_\_\_\_\_

2. MANUFACTURER \_\_\_\_\_

3. EQUIPMENT/TAG NUMBER \_\_\_\_\_

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 01810 – EQUIPMENT TESTING AND FACILITY STARTUP

### PART 1- GENERAL

#### 1.01 DEFINITIONS

- A. Facility: Entire project, or an agreed-upon portion of the project, including all of its unit processes.
- B. Functional Test: Test or tests in presence of the CONSULTANT and the OWNER to demonstrate that installed equipment meets manufacturer's installation, calibration, and adjustment requirements and other requirements as specified.
- C. Performance Test: Test or tests performed after any required functional tests and in the presence of the CONSULTANT and the OWNER to demonstrate and confirm individual equipment meets performance requirements specified in the individual specification sections.
- D. Unit Process: as used in this section, a unit process is a portion of the facility that performs a specific process function, such as pumping or treatment.
- E. Facility Performance Demonstration:
  - 1. A demonstration, conducted by the CONTRACTOR, with assistance of the OWNER, to demonstrate and document the performance of the entire operating facility, both manually automatically, if required, based on criteria developed in conjunction with the OWNER and as accepted by the CONSULTANT.
  - 2. Such a demonstration is for the purposes of (i) verifying to the OWNER the entire facility performs as a whole, and (ii) documenting performance characteristics of complete facility for OWNER's records. Neither the demonstration nor the evaluation is intended in any way to make performance of a unit process or entire facility the responsibility of the CONTRACTOR, unless such performance is otherwise specified.

#### 1.02 SUBMITTALS

- A. Information Submittals:
  - 1. Facility startup and performance demonstration plan.
  - 2. Functional and performance test results.
  - 3. Completed unit process startup form for each unit process.
  - 4. Completed facility performance demonstration/certification form.

#### 1.03 FACILITY STARTUP AND PERFORMANCE DEMONSTRATION PLAN

- A. Develop a written plan, in conjunction with the OWNER's operating personnel, to include the following:
  - 1. Step-by-step instructions for startup of each unit process and the complete facility.

2. Unit Process Startup Form (sample attached), to minimally include the following:
  - a. Description of the unit process, including equipment numbers/nomenclature of each item of equipment and all included devices.
  - b. Detailed procedure for startup of the unit process, including valves to be opened/closed, order of equipment startup, etc.
  - c. Startup requirements for each unit process, including water, power, chemicals, etc.
  - d. Space for evaluation comments.
3. Facility Performance Demonstration/Certification Form (sample attached), to minimally include the following:
  - a. Description of unit processes included in the facility startup.
  - b. Sequence of unit process startup to achieve facility startup.
  - c. Description of computerized operations, if any, included in the facility.
  - d. CONTRACTOR certification that the facility is capable of performing its intended function(s), including fully automatic operations.
  - e. Signature spaces for the CONTRACTOR and the CONSULTANT.

## **PART 2 – PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### 3.01 GENERAL

- A. Facility Startup Meetings: Schedule, in accordance with the requirements of **Section 01039** - Coordination and Meetings, to discuss test schedules, test methods, materials, chemicals and liquids required, facilities operations interface, and OWNER involvement.
- B. CONTRACTOR's Testing and Startup Representative:
  1. Designate and furnish one or more personnel to coordinate and expedite testing and facility startup.
  2. Representative(s) shall be present during startup meetings and shall be available at all times during testing and startup.
- C. Provide temporary valves, gauges, piping, test equipment and other materials and equipment required for testing and startup.
- D. Provide adequate subcontract and equipment manufacturer's staff to prevent delays. Schedule ongoing work so as not to interfere with or delay testing and startup.
- E. OWNER will:
  1. Provide water, power, chemicals, and other items as required for startup, unless otherwise indicated
  2. Operate process units and facility with support of CONTRACTOR.
  3. Provide labor and materials as required for laboratory analyses.

### 3.02 EQUIPMENT TESTING

#### A. Preparation:

1. Complete installation before testing.
2. Furnish qualified manufacturer's representatives, when required by individual specification sections.
3. Obtain and submit from equipment manufacturer's representative Manufacturer's Certification of Proper Installation Form.
4. Equipment Test Report Form: Provide written test report for each item of equipment to be tested, to include the minimum information:
  - a. OWNER/Project name
  - b. Equipment or item tested.
  - c. Date and time of test.
  - d. Type of test performed (functional or performance)
  - e. Test method.
  - f. Test conditions.
  - g. Test results.
  - h. Signature spaces for CONTRACTOR and CONSULTANT as witness.
5. Cleaning and Checking: Prior to beginning functional testing:
  - a. Calibrate testing equipment in accordance with manufacturer's instructions.
  - b. Inspect and clean equipment, devices, connected piping, and structures to ensure they are free of foreign material.
  - c. Lubricate equipment in accordance with manufacturer's instructions.
  - d. Turn rotating equipment by hand when possible to confirm that equipment is not bound.
  - e. Open and close valves by hand and operate other devices to check for binding, interference, or improper functioning.
  - f. Check power supply to electric-powered equipment for correct voltage.
  - g. Adjust clearances and torque.
  - h. Test piping for leaks.
6. Ready-to-test determination will be by CONSULTANT based at least on the following:
  - a. Acceptable Operation and Maintenance Data.
  - b. Notification by CONTRACTOR of equipment readiness for testing.
  - c. Receipt of Manufacturer's Certificate or Proper Installation.
  - d. Adequate completion of work adjacent to, or interfacing with, equipment to be tested, including items to be furnished by the OWNER, if any.
  - e. Availability and acceptability of manufacturer's representative, when specified, to assist in testing of respective equipment.
  - f. Satisfactory fulfillment of other specified manufacturer's responsibilities.
  - g. Equipment and electrical tagging complete.
  - h. Delivery of all spare parts and special tools.

B. Functional Testing:

1. Conduct as specified in individual Specification sections.
2. Notify OWNER and CONSULTANT in writing at least 10 days prior to scheduled date of testing.
3. Prepare Equipment Test Report summarizing test method and results.
4. When, in CONSULTANT's opinion, equipment meets functional requirements specified, such equipment will be accepted for purposes of advancing to performance testing phase, if so required by individual Specification sections. Such acceptance will be evidenced by CONSULTANT/OWNER's signature as witness on Equipment Test Report.

C. Performance Testing:

1. Conduct as specified in individual Specification sections.
2. Notify CONSULTANT and OWNER in writing at least 10 days prior to scheduled test date.
3. Performance testing shall not commence until equipment has been accepted by CONSULTANT as having satisfied functional test requirements specified.
4. Type of fluid, gas, or solid for testing shall be as specified.
5. Unless otherwise indicated, furnish labor, materials, and supplies for conducting the test and taking samples and performance measurements.
6. Prepare Equipment Test Report summarizing test method and results.
7. When, in CONSULTANT's opinion, equipment meets performance requirements specified, such equipment will be accepted as to conforming to Contract requirements. Such acceptance will be evidenced by CONSULTANT's signature on Equipment Test Report.

3.03 STARTUP OF UNIT PROCESSES

- A. Prior to unit process startup, equipment within unit processes shall be accepted by CONSULTANT as having met functional and performance testing requirements specified.
- B. Startup sequencing of unit processes shall be as chosen by the CONTRACTOR to meet schedule requirements.
- C. Make adjustments, repairs, and corrections necessary to complete unit process startup.
- D. Startup shall be considered complete when, in the opinion of the CONSULTANT, the unit process has operated in the manner intended for five continuous days without significant interruption. This period is in addition to functional or performance test periods specified elsewhere.
- E. Significant Interruption: May include any of the following events:
  1. Failure of CONTRACTOR to provide and maintain qualified onsite startup personnel as scheduled.
  2. Failure to meet specified functional operation for five consecutive days.
  3. Failure of any critical equipment or unit process that is not satisfactorily corrected within five hours after failure.

4. Failure of any noncritical equipment or unit process that is not satisfactorily corrected within eight hours after failure.
5. As determined by the CONSULTANT.

F. A significant interruption will require startup then in progress to be stopped. After corrections are made, startup test period to start from the beginning again.

### 3.04 FACILITY PERFORMANCE DEMONSTRATION

- A. When, in the opinion of the CONSULTANT, startup of all unit processes has been achieved, sequence each unit process to the point that the facility is operational.
- B. Demonstrate proper operation of required interfaces within and between individual unit processes.
- C. After facility is in operation, complete performance testing of equipment and system not previously tested.
- D. Document, as defined in the Facility Startup and Performance Demonstration plan, the performance of the facility, until all unit processes are operable and under control of the computer system.
- E. Certify on the Facility Performance Demonstration/Certification Form, that facility is capable of performing its intended function(s), including fully automatic and computerized operation as specified.

### 3.05 SUPPLEMENTS

- A. Supplements listed below are part of this specification:
  1. Unit Process Startup Form
  2. Facility Performance Demonstration/Certification Form.

**END OF SECTION**

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**UNIT PROCESS STARTUP FORM**

**OWNER:** \_\_\_\_\_

**PROJECT:** \_\_\_\_\_

**Unit Process Description (Include description and equipment number of all equipment and devices):**

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**Startup Procedure (Describe procedure for sequential startup and evaluation, including valves to be opened/closed, order of equipment startup, etc.):**

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**Startup Requirements (water, power, chemicals, etc.):**

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**Evaluation Comments:**

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**FACILITY PERFORMANCE DEMONSTRATION/CERTIFICATION FORM**

**OWNER:** \_\_\_\_\_

**PROJECT:** \_\_\_\_\_

**Unit Process Description (List unit processes involved in facility startup):**

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**Unit Processes Startup Sequence (Describe sequence for startup, including computerized operations, if any):**

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**CONTRACTOR Certification that Facility is capable of performing its intended function(s), including fully automatic operations:**

**CONTRACTOR:** \_\_\_\_\_

**(Authorized Signature)**

**Date:** \_\_\_\_\_, 20\_\_

**CONSULTANT:** \_\_\_\_\_

**(Authorized Signature)**

**Date:** \_\_\_\_\_, 20\_\_

## SECTION 02000 – UTILITY CONSTRUCTION

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

- A. This specification governs the construction of all Port St. Lucie Utility Systems Department (PSLUSD) water treatment plant effluent mains, water mains, water services, injection wells all appurtenant devices associated therewith.

#### 1.02 PSLUSD UTILITY STANDARDS MANUAL

- A. Construction of the facilities identified herein shall be in accordance with Chapter II and other applicable sections of the "Port St. Lucie Utility Systems Department Utility Standards Manual" (PSLUSD USM). The PSLUSD USM may be obtained from the Department or on the World Wide Web at [www.cityofpsl.com](http://www.cityofpsl.com). Refer to Appendix A for additional information.
- B. Construction of the facilities identified herein will also be in accordance with the applicable portions of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, Latest Edition, all referenced specifications, and the CONSULTANT's project manual.
- C. In the event of a conflict between any governing specifications, the more stringent requirement shall govern construction of this project.

#### 1.03 RESTORATION

- A. Full and complete restoration of all existing facilities will be accomplished to the sole satisfaction of the OWNER without additional compensation to the CONTRACTOR. The cost of all restoration will be included in the lump sum or unit bid price and no separate payment item for restoration will be established in the schedule of values developed subsequent to bidding.

### PART 2 - MATERIALS

#### 2.01 GENERAL

- A. All construction materials shall comply with the requirements of the PSLUSD USM as outlined therein. All parts of the PSLUSD USM that are applicable shall govern unless a more stringent standard is listed in the Contract Documents or required by other permitting agencies.

### PART 3 - EXECUTION

#### 3.01 CONSTRUCTION

- A. All phases of construction, including but not limited to, trenching, pipe laying, backfilling, pipeline flushing, and surface restoration shall comply with the requirements of Part 1.02 as noted in this Section.

- B. Pipeline backfill not beneath paved surfaces shall be compacted to a minimum density of 98 percent of AASHTO T-180 or as required by governmental agencies having jurisdiction over the Work.

### 3.02 TESTING

- A. All testing, including but not limited to, trench earthwork density testing, and pipeline pressure testing shall comply with the requirements of this specification, the PSLUSD USM, "Florida Department of Transportation Standard Specifications for Road and Bridge Construction", Latest Edition, and the St. Lucie County Health Department.
- B. Backfill density test locations will be examined in accordance with the requirements listed on the trenching details shown on the engineering drawings.
- C. The OWNER must approve the CONTRACTOR's testing laboratory at least 60 days prior to the start of any testing.
- D. CONTRACTOR will pay for all testing and any retesting made necessary by failure to perform in accordance with the project specifications.
- E. Retesting locations around all failing tests will be located at the original test location.
- F. Retest only after re-compaction of a failing test area.

### 3.03 WARRANTY/PROJECT DOCUMENTATION

- A. All warranties and project documentation, including but not limited to record drawings and payment applications, shall comply with the requirements of this specification, the PSLUSD USM.

### 3.04 COORDINATION

- A. All coordination of construction shall primarily occur between the CONTRACTOR and the CONSULTANT. The Engineer of Record for design of this construction project is Holtz Consulting Engineers, Inc. The CONSULTANT will aid the OWNER in evaluation of technical questions, coordination of the work, resolution of technical and payment disputes, and regulatory certification of the project.
- B. The Utilities to coordinate with are, at a minimum:
  - 1. Florida Power and Light.
  - 2. AT&T.
  - 3. Comcast Cable.
  - 4. Teco/Peoples Gas.
  - 5. Other applicable utilities.

### 3.05 PERMITS

- A. The OWNER and CONSULTANT will obtain construction permits from the Florida Department of Environmental Protection, where applicable. If applicable, license

agreements and easements for construction on public and private property will also be obtained by the OWNER and CONSULTANT.

- B. The CONTRACTOR will obtain and pay for any dewatering, building or other permits necessary to perform the Work, except as identified above, including, but not limited to a City of Port St. Lucie Building Permit.

**END OF SECTION**

## **SECTION 02110 – CLEARING AND GRUBBING**

### **PART 1 - GENERAL**

1.01 DESCRIPTION: Work under this section of the specifications consists of clearing and grubbing, and the disposal of materials and debris resulting from the clearing and grubbing operations. The construction site shall be cleared and grubbed to the limits shown on the plans to accommodate this construction and as further indicated, excluding any trees indicated to remain outside of the clearing limits.

### **PART 2 - PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION**

3.01 SITE PROTECTION DEVICES: Prior to the start of any work, the CONTRACTOR will be required to install silt fencing around the perimeter of the clearing and/or grading limits. The Type III silt fence shall be in accordance with the details shown on the plans. The CONTRACTOR will also be required to protect any adjacent canals/ditches with silt fencing and turbidity barriers as required and otherwise comply with permit requirements.

3.02 CLEARING, GRUBBING AND STRIPPING: On areas required to be cleared, grubbed, and stripped of all trees, stumps, down timber, brush, vegetation and other objects standing on or protruding from the ground shall be removed. All roots shall be grubbed (root rake) and removed a minimum of 18 inches below the surface of the ground. Holes caused by grubbing operations shall be filled to the level of adjacent ground. Stripping of all vegetation and topsoil shall be completed by the CONTRACTOR. The CONTRACTOR shall visit the site prior to submitting a bid to confirm the required amount of clearing/grubbing and the material type within the project area.

3.03 DISPOSAL: All material and debris resulting from clearing, or clearing and grubbing operations shall be removed from the site for disposal at a suitable location.

3.04 CLEANUP: In accordance with the GENERAL CONDITIONS.

**END OF SECTION**

## SECTION 02210 – GRADING

### PART 1 - GENERAL

#### 1.01 PERFORMANCE

- A. Section generally defines CONTRACTOR's responsibilities unless otherwise indicated, for the following:
  - 1. Finish grading of subsoil.
  - 2. Placing, leveling and compacting topsoil.

#### 1.02 RELATED SECTIONS

- A. All of Division 1.
- B. **Section 02936** – Sodding.

#### 1.03 PROTECTION

- A. Protect landscaping and other features remaining as final work.
- B. Protect existing structures, utility poles, fences, roads, paving, curbs, sidewalks, etc.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

- A. Reused top soil or subsoil organically enhanced with appropriate compost material shall be used to perform all final grading operations in preparation for establishment of a live and healthy grass cover.

### PART 3 - EXECUTION

#### 3.01 INSPECTION

- A. Verify site conditions and note irregularities affecting work of this Section.

#### 3.02 SUBSOIL PREPARATION AND COMPACTION

- A. Eliminate uneven areas and low spots.
- B. Remove debris, roots, branches, stones, in excess of ½-inch in size and dispose of at an approved site.
- C. Place and compact needed fill in lifts having a maximum unconsolidated thickness of twelve (12) inches.
- D. Compact fill to 98% of maximum density as determined by AASHTO Method T-180 using

mechanical tamping equipment. Use a minimum amount of water to adjust fill moisture content if necessary.

- E. Restore the surface to the original grade wherever settlement occurs.

### 3.03 PLACING TOPSOIL

- A. Place topsoil in areas where seeding, sodding, planting is scheduled.
- B. Use topsoil in relatively dry state. Place during dry weather.
- C. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles, and contours of subgrade.
- D. Remove stone, roots, grass, weeds, debris, and foreign material while spreading.
- E. Manually spread topsoil around trees and plants to prevent damage.
- F. Lightly compact roll placed topsoil.
- G. Remove surplus subsoil and topsoil from site.
- H. Leave stockpile area and site clean and ready to receive landscaping.
- I. Top soil to match existing depth, or two inches, whichever is greater.

### 3.04 TOLERANCES

- A. Top of topsoil: Plus or minus ½-inch.

### 3.05 SCHEDULE OF LOCATION

- A. The following identifies compacted topsoil thicknesses for various locations.
  - 1. Sod: 2 inches

**END OF SECTION**

## SECTION 02220 – EXCAVATION AND FILL

### PART 1 - GENERAL

- 1.01 DESCRIPTION OF WORK: The extent of excavation and fill is shown on the drawings and otherwise defined by the proposed structures.
- 1.02 QUALITY ASSURANCE:
- A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction, including the Florida Trench Safety Act.
  - B. Testing, Inspection and Geotechnical Service: The CONTRACTOR shall engage a soil testing inspection and geotechnical service, to include testing soil materials proposed for use in the work and field testing facilities for quality control testing during excavation and fill operations. The firm shall also have the capability of performing Standard Penetration Tests (SPT). The firm shall also have the experience of providing a professional opinion on excavation stability matters. The testing laboratory shall be approved by the CONSULTANT prior to commencing earthwork.
- 1.03 SUBMITTALS:
- A. Submit experience/qualification record and written description of testing laboratory and geotechnical service personnel and testing facilities for approval.
  - B. Submit copies of all field reports, laboratory test reports (passing and failing), recommendations, etc., to the CONSULTANT for approval.
  - C. Submit selected procedure and design for stabilizing excavated areas where potential undermining of existing piping, concrete duct banks, or structure foundations may occur.
  - D. All submittals shall be in accordance with the format established in Section 01300.
- 1.04 JOB CONDITIONS:
- A. Existing Utilities:
    - 1. Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protecting during excavation operations.
    - 2. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the utility OWNER immediately for directions. Cooperate with the OWNER, and public and private utility companies in keeping their respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility OWNER.
    - 3. Do not interrupt existing utilities serving facilities occupied and used by the OWNER or others, except when permitted in writing by the CONSULTANT and then only after acceptable temporary utility services have been provided.
  - B. Use of Explosives: The use of explosives is not permitted.
  - C. Protection of Persons and Property:
    - 1. Barricade open excavations occurring as part of this work and post with warning lights. Supply and operate warning lights on all excavations.

2. Protect structures, utilities, and other facilities from damages caused by settlement, lateral movement, undermining, washout and other hazards created by excavation operations.

## **PART 2 - PRODUCTS**

### **2.01 SOIL MATERIALS:**

#### **A. Backfill and Fill Materials:**

1. Satisfactory soil materials for backfill and fill shall be, free of rock or gravel larger than ½ in. in any dimension, debris, waste, vegetable and other deleterious matter.
2. Suitable material shall be clean, granular, free draining, fine to medium sandy materials classified as SW or SP according to the Unified Soil Classification System, with no more than 12 percent by weight finer than a No. 200 sieve when tested in accordance with ASTM D-2487.

#### **B. Unsuitable Materials:**

1. Unsuitable materials, such as calcium carbonate or aluminum hydroxide sludge, peat, muck, roots, logs, debris, brush sod, CL, ML, CH, MH, OL, OH according to the Unified Soil Classification System or other similar materials, shall not be used.

## **PART 3 - EXECUTION**

### **3.01 INSPECTION**

- A. Examine the areas and conditions under which excavation and fill is to be performed and notify the CONSULTANT in writing of conditions detrimental to the proper timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

### **3.02 EXCAVATION:**

- A. Excavation consists of the removal and disposal of materials encountered when establishing the required grade elevations.
- B. Earth excavation includes the removal and disposal of obstructions visible on the ground surface, underground structures and utilities indicated to be demolished and removed, material of any classification indicated.
- C. Unauthorized excavation consists of removal of materials beyond indicated elevations or site dimensions without the specific direction of the CONSULTANT. Unauthorized excavation, as well as remedial work directed by the CONSULTANT, shall be at the CONTRACTOR's expense.
- D. Stability of Excavations:
  1. Slope the sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible either because of space restrictions or stability of material excavated.
  2. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

E. Shoring and Bracing:

1. Provide shoring and bracing to comply with local codes and authorities having jurisdiction.
2. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.
3. Maintain shoring and bracing in excavations regardless of the time period excavations will be open. Carry down shoring and bracing as the excavation progresses.

F. Material Disposal:

1. Roots and clearing and grubbing waste shall be disposed of in a manner approved by the CONSULTANT. The CONTRACTOR shall be responsible for securing appropriate permits and complying with same.
2. Locate and retain fill materials away from edges of excavations.
3. Disposal of unsuitable material shall be provided by the CONTRACTOR off of the project site.

3.03 BACKFILL AND FILL:

A. General:

1. In all excavations, use approved fill material that has been sampled, tested and approved by the soil testing laboratory as conforming to the requirements of this specification.

B. Prior to Backfill Placement:

1. Backfill excavations as promptly as the work permits, but not until completion of the following:
  - a. Completion of construction below finish grade.
  - b. Inspection, testing, approval, and recording locations of underground utilities.
  - c. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.
  - d. Remove trash and debris.
  - e. Permanent or temporary horizontal bracing which is in place on horizontally supported walls.

C. Ground Surface Preparation:

1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

- D. Leveling and Backfill for, and Adjacent to, all structures, slabs, walkways, etc:
1. After stripping unsuitable materials, densify the in-situ soils to a depth of 24-inches and each lift of backfill with a compactor of suitable size and capacity for the densification to satisfy the specified criteria. All fill shall be placed in layers which do not exceed 12-inches loose. Densification of the sub-grade and each lift of fill shall continue until no additional settlement can be discerned and the density testing requirements are satisfied. In no case shall any section of the work pad, including sub-grade, receive less than 10 passes of the compactor. The compaction zone shall include, at a minimum, the structure footprint plus a 5 foot wide perimeter zone extending beyond the structure. The CONTRACTOR shall monitor proof compaction operations to detect signs of pumping, weaving and other forms of instability indicative of buried deposits of weak and compressible soils. Weak soils (if any) detected during the densification shall be excavated over the full vertical extent and removed. Removal shall extend to a minimum horizontal margin of 10-feet beyond the edge of the structure. Clean fill satisfying this specification shall be used to replace all such excavations.
  2. Backfill adjacent to structural elements shall be placed, as far practicable, as the adjacent structural elements have been completed and accepted. Backfilling against concrete shall be done only when approved.
- E. Fill for Non-Structural Areas: This applies to berms and the general site where no structures, roadways or pipe lines are proposed or exposed below grade.
1. Suitable backfill shall be dozed into place and compacted using routing of equipment and tracking with dozer equipment. Backfill in all areas, shall be placed and compacted in 12-inch (loose) lifts, or less.
  2. The surface of the layer shall be finished by blading or rolling with a smooth roller, or a combination thereof, and shall be smooth and free from waves and inequalities.
- F. Compaction (In-Place Density): This applies to all areas.
1. Maximum Laboratory Density shall be the Modified Proctor Maximum Dry Density as determined in accordance with ASTM D1557, Method B or D, unless otherwise indicated.
  2. Subgrade beneath and 10-feet beyond all structures, walkways, slabs, etc. shall be compacted to 98% ASTM D1557 maximum laboratory density. Subgrade soils to a depth of 24-inches shall be densified to an equivalent relative compaction.
  3. Fill and/or backfill beneath and 10 feet beyond all structures, walkways, slabs on grade, pipelines routes, shall be compacted to not less than 98% ASTM D1557 maximum laboratory density.
  4. Fill for non-structural areas shall be compacted to a minimum 95% ASTM D1557 maximum laboratory density.
  5. All fill shall be placed with a moisture content within 2% of the optimum.
  6. Fill and/or backfill beneath shellrock access driveways, roads and parking areas and subgrade shall be compacted to a minimum density of 98% ASTM D 557 maximum, laboratory density.

G. Grading:

1. Perform all grading in the areas so indicated and as required.
2. Fill shall be brought to finished grades indicated within a tolerance of .05 of a foot and shall be graded to drain water away from structures, and as otherwise indicated on the plan.
3. Existing grades which are to remain and which are disturbed by the CONTRACTOR's operations shall be graded to provide surfaces suitable for the proper use of mowing machines.

3.04 FIELD QUALITY CONTROL:

- A. Quality Control Testing During Construction: The testing laboratory and CONSULTANT shall inspect and approve subgrades and fill layers before subsequent layer or further construction work is performed.
- B. In structural areas, including walkways, slabs, trenches, and other structures, one density test shall be made for every 100 sq.ft., or portion thereof, of surface area of compacted material per compacted layer, starting with the sub-grade prior to placement of the initial lift. Specific locations for all tests shall be field established by the CONSULTANT.
- C. The CONTRACTOR shall perform sieve analyses on all backfill supplied. A sieve analysis shall be performed on each source and whenever the color, texture or general make-up of the backfill has changed as determined by the CONSULTANT. The CONTRACTOR shall supply load tickets on every truck of fill which identify and confirm the source.

**END OF SECTION**

## SECTION 02225 – TRENCHING, BEDDING AND BACKFILL FOR PIPE

### PART 1 - GENERAL

#### 1.01 PERFORMANCE

- A. Section generally defines CONTRACTOR's responsibilities unless otherwise indicated, for the following:
  - 1. Trench excavation.
  - 2. Pipe bedding.
  - 3. Trench Backfill.
  - 4. Backfill testing.
  - 5. Measurement and Payment.
  - 6. Reference standards.

#### 1.02 RELATED WORK

- A. All of Division 1.
- B. **Section 02660:** Pipe and Fittings-General.
- C. Appendices, as necessary.

#### 1.03 MEASUREMENT AND PAYMENT

- A. No separate bid item for measurement and payment.
- B. Include trenching, bedding, backfilling, all necessary restoration, pressure, bacteriological and density testing costs under pipe installation unit costs.

#### 1.04 REFERENCE STANDARDS

- A. Conform to the requirements of the Standards published by the following organizations. The version of each Standard in effect as of the date of the bid opening shall govern unless otherwise noted.
  - 1. American Water Works Association (AWWA).
  - 2. American Association of State Highway and Transportation Officials (AASHTO).
  - 3. American Institute of Steel Construction (AISC).
  - 4. American National Standards Institute, Inc. (ANSI).
  - 5. American Concrete Institute (ACI).
  - 6. American Welding Society (AWS).
  - 7. Port St. Lucie Utility Systems Department Utility Standard Manual in effect at the time the bid is submitted.
- B. Where no standards are specified, utilize good quality material and perform workmanship in accordance with the best trade practices.

## **PART 2 - PRODUCTS**

### **2.01 TRENCH BACKFILL**

- A. Use excavated or borrowed soil materials that are free of rock or gravel larger than two (2) inches in diameter and free of twigs, roots, or other vegetation/foreign matter.
- B. Use backfill soil that is also non-organic in nature (i.e. peat, muck are unsatisfactory) and is no more than 20 percent by weight finer than No. 200 mesh sieve.

### **2.02 ROCK BEDDING**

- A. Use 3/8-inch to 3/4-inches washed and graded gravel having 99% passing a 3/4-inch sieve and 80 percent retained on a No. 8 sieve.

## **PART 3 - EXECUTION**

### **3.01 CLEARING**

- A. Clear pipe corridor of shrubs, trees and other foreign material prior to beginning excavation.
- B. Dispose of clearing debris at a properly permitted landfill.
- C. If a nutrient-rich topsoil layer exists, strip the topsoil and store in piles for reuse.

### **3.02 TRENCHING**

- A. Locate all existing utilities before trenching.
- B. Install suitable barriers between the work area and vehicle/pedestrian travel lanes before trenching. Barriers must control vehicular/pedestrian work area access.
- C. Excavate trenches as specified on the engineering drawings.
- D. Completely remove all muck, peat or other incompressible/organic soils (unsuitable soils) that occur along the pipeline route.
  - 1. Minimum unsuitable soil removal limits are:
    - a. Vertical - from existing ground to surface of acceptable soil layer.
    - b. Horizontal - from both sides of the pipe centerline to a distance equal to the vertical removal depth plus the pipe diameter plus one foot.
    - c. The CONTRACTOR shall determine if the minimum removal limits noted herein are sufficient to properly construct the Work.
  - 2. Backfill areas where unsuitable soil has been removed with acceptable soil or rock bedding to the design pipe invert elevation.
    - a. Compact suitable soil backfill to 98 percent of maximum density as determined by AASHTO method T-180.
    - b. Place and compact unsuitable soil backfill in lifts having a maximum unconsolidated thickness of 12 inches.
    - c. Obtain a backfill testing schedule from the CONSULTANT prior to beginning

backfill. This schedule will only apply to backfill placed below the pipe invert due to removal of unsuitable soil.

- E. Excavate rock to four (4) inches below the design pipe invert.
  - 1. No additional payment will be made for rock excavation unless the total quantity of rock excavation exceeds 50 cubic yards and the rock is present in a large continuous unfractured mass.
  - 2. Concrete, asphalt and other demolition of man-made materials is not classified as rock excavation.
  - 3. Backfill after rock removal.

### 3.03 BEDDING

- A. Bed pipe as specified on the engineering drawings. Excavate for pipe bells as noted. Pipe shall be uniformly supported by the trench bottom prior to backfill.
- B. All pipe bedding shall be performed in a dry trench unless the bedding is part of a subaqueous installation.
- C. Trenching shall not exceed pipe installation by more than 200 linear feet.

### 3.04 BACKFILL

#### A. General

- 1. Backfill trench immediately after the pipe is laid unless other protection for the pipeline is provided.
- 2. Backfill material shall be solidly tamped around the pipes in layers not to exceed six (6) inches to a level at least one (1) foot above the top of the pipe.
- 3. Test backfill compaction at each full 12 inches of compacted backfill over the pipe.
- 4. Test backfill at each station. Two (2) tests are required at each station. The CONSULTANT reserves the right to change the testing interval but not the total number of tests. Retesting because of failed tests is not limited.

#### B. Unpaved Areas

- 1. Place and compact backfill in lifts having a maximum unconsolidated thickness of 12 inches.
- 2. Compact backfill to 98 percent of maximum density as determined by AASHTO Method T-180 using mechanical tamping equipment. Use a minimum amount of water to adjust backfill moisture content if necessary.
- 3. Restore the surface to the original grade wherever settlement occurs.

#### C. Paved Area (Including Driveways)

- 1. Place and compact backfill in lifts having a maximum unconsolidated thickness of eight (8) inches.
- 2. Compact backfill to 98 percent of maximum density as determined by AASHTO Method T-180 using hand or mechanical tampers.
- 3. The top 12 inches of backfill (subgrade) shall be stabilized to LBR 40 and then

compacted per 3.04.C.2.

4. When backfilling is completed, tested and approved, the roadway base for pavement replacement may be placed immediately.
5. Restore the surface to the original grade wherever settlement occurs.

### 3.05 TESTING

- A. Testing shall be performed by a certified testing laboratory (at the CONTRACTOR's expense) approved by the OWNER.
- B. Pay for all backfill testing and any required backfill retesting.
- C. Retesting locations around all failing tests will be located fifty (50) feet on both sides of each failing test and at the original failing test location.
- D. Retest only after recompaction of a failing test area.

**END OF SECTION**

## **SECTION 02260 – FINISH GRADING**

### **PART 1 - GENERAL**

1.01 DESCRIPTION: To bring to finished elevations all earth materials as called for in the drawings. This general work includes the completion of finish grading so that surfaces of compacted material are correctly oriented with the requirements of the slab or other components which will rest on the grade at that point.

### **PART 2 - PRODUCTS**

2.01 MATERIALS: All fill shall be clean sand, free from debris, vegetable matter and other deleterious substances. Refer to Section 02220 for further requirements.

### **PART 3 - EXECUTION**

3.01 GRADING: Fill, backfill and rough grade as necessary to bring entire site level with elevations of undersides of concrete slabs, walks, paving and finished landscaping as indicated on drawings or in specifications.

#### **3.02 FINISH GRADING**

- A. Where elevations are indicated on plans, obtain such finish elevations, and establish uniform slopes of finish grades between indicated elevations.
- B. Where elevations are not indicated, establish and obtain uniform slope from finished spot elevations at the exterior face of the building out to the nearest indicated elevations for finished grades, as shown on plans.
- C. Finish grade all areas for positive drainage. Leave no high/low areas to accumulate surface water.
- D. Achieve final grades as specified on the drawings, inclusive of the required top soil. In some areas, this will require removal of existing materials.
- E. Areas to be grassed shall be box bladed for leveling prior to grassing.

**END OF SECTION**

## **SECTION 02270 – EROSION, SEDIMENTATION AND DUST CONTROL**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF WORK**

- A. Work consists of control measures as required during the life of the Contract to control erosion, sedimentation and dust.
- B. The CONTRACTOR shall establish, construct and maintain erosion and sediment control measures. The erosion control programs shall be maintained during the entire period of construction, including any extensions in Contract time.
- C. Temporary erosion and pollution control shall include construction work off-site where such work is necessary as a result of borrow pit operations, haul roads or equipment storage sites, etc.
- D. Preparation of the Stormwater Pollution Prevention Plan (SWPPP), including modifications and updates.
- E. Obtain and comply with all provisions of the State of Florida, Department of Environmental Protection, Permit for Stormwater Discharge from Large and Small Construction Activities (NPDES Construction Site Permit Program).

#### **1.02 REFERENCES**

- A. Rule 62-40.432, F.A.C.
- B. Erosion and Sediment Control Designer and Review Manual, prepared for FDOT and FDEP, July 2013 or latest update.
- C. 40 CFR Part 122.
- D. Chapter 403.0885, F.S.
- E. State of Florida Department of Environmental Protection Generic permit for Stormwater Discharge from Large and Small Construction Activities – Notice of Intent and Notice of Termination of Generic Permit

### **PART 2 – PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION**

#### **3.01 PREVENTION, CONTROL AND ABATEMENT OF EROSION AND WATER POLLUTION**

- A. All work shall be in accordance with the requirements of the State of Florida Department of Environmental Protection under Chapter 62-621, F.A.C. or Chapter 62-620, F.A.C.
- B. The CONTRACTOR shall provide for and be responsible for the prevention, control and abatement of erosion and water pollution until completion and acceptance of the Project. The

CONTRACTOR shall provide all temporary erosion control features necessary to prevent, control and abate erosion and water pollution, and shall prepare and submit as the operator and permittee, along with the applicable application fee, the "Notice of Intent to Use Generic Permit for Stormwater Discharge from Large and Small Construction Activities" (NOI) prior to commencing construction and the "Notice of Termination" (NOT) upon final completion of construction. The CONTRACTOR, as required by the NPDES permit program, shall prepare a stormwater pollution prevention plan (SWPPP). This SWPPP shall be modified and updated by the CONTRACTOR as necessary, to meet the requirements of the NPDES permit issued, at no additional cost to the OWNER. The CONTRACTOR shall also comply with the inspections, maintenance, reporting and all other provisions of the NPDES permitting program, and the cost for compliance with this program is to be included in the CONTRACTOR bid price for the work. CONTRACTOR shall provide copies of NOI and NOT to CONSULTANT and OWNER.

- C. During the construction of the Project, the CONTRACTOR shall comply with the Water Quality Standards of the EPA and the State of Florida.
- D. The CONTRACTOR shall meet and be responsible for the requirements of all applicable governing agencies regarding prevention, control and abatement of erosion and water pollution.

### 3.02 DAMAGE TO WATER DETENTION AND DRAINAGE AREAS

- A. The CONTRACTOR shall be responsible for the prevention of damage to detention ponds, holding areas, drainage canals or natural waterways, and wetlands (both on and off site).
- B. The CONTRACTOR shall act as directed to correct said damage as quickly as possible and take necessary steps to prevent future damage. The CONTRACTOR shall notify the CONSULTANT of said damage.
- C. The cost of correction of damage shall be at no cost to the OWNER or his agents.

### 3.03 DUST CONTROL

- A. The CONTRACTOR shall exercise precautionary measures to minimize dust emissions as necessary, which may include, but shall not be limited to, periodic sprinkling or wetting of the site, and shall modify measures to be implemented, as necessary, to satisfy jurisdictional agency requirements including but not limited to City of Port St. Lucie and St. Lucie County Health Department (Air Pollution Division) at no additional expense to the OWNER.

**END OF SECTION**

## **SECTION 02401 – DEWATERING**

### **PART 1 - GENERAL**

- 1.01 DESCRIPTION: The Work to be performed under this section shall include furnishing all equipment and labor necessary to remove storm or subsurface waters from excavation areas in accordance with the requirements set forth and as shown on the drawings.
- 1.02 APPLICABLE CODES, STANDARDS AND SPECIFICATIONS: The dewatering of any excavation areas and the disposal of the water shall be in strict accordance with the latest revision of all local and state government rules and regulations. The CONTRACTOR shall be responsible for securing all required permits and shall provide copies of permit(s) to the CONSULTANT prior to commencing any dewatering operations.

### **PART 2 - PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION**

- 3.01 DEWATERING: The CONTRACTOR shall provide adequate equipment for the removal of storm or subsurface waters which may accumulate in the excavation. At a minimum, the groundwater shall be lowered to at least two (2) feet below the lowest point of the excavation bottom. When subsurface water is encountered, the CONTRACTOR shall utilize suitable equipment to adequately dewater the excavation so that it will be dry for work and pipe laying. A wellpoint system or other CONSULTANT approved dewatering method shall be utilized as necessary to maintain the excavation in a dry condition. Dewatering by trench pumping will not be permitted if migration of fine grained natural material from bottom, side walls or bedding material will occur. No facilities shall be constructed under wet conditions. Dewatering shall cease in a manner to allow the subsurface water to slowly return to normal levels. Any voids left after the removal of the dewatering system shall be fully grouted.
- 3.02 DISPOSAL: Water pumped from the trench or other excavation shall be disposed of in storm sewers having adequate capacity, canals or suitable disposal pits. CONTRACTOR is responsible for acquiring all permits required to discharge the water and shall protect waterways from turbidity during the dewatering operation. In areas where adequate disposal sites are not available, partially backfilled trenches may be used for water disposal only when the CONTRACTOR's plan for trench disposal is approved in writing by the CONSULTANT. The CONTRACTOR's plan shall include temporary culverts, barricades and other protective measures to prevent damage to property or injury to any person or persons. No flooding of streets, roadways, driveways or private property will be permitted. Engines driving dewatering pumps shall be equipped with critical grade mufflers.

**END OF SECTION**

## SECTION 02660 – PIPE AND FITTINGS - GENERAL

### PART 1 - GENERAL

#### 1.01 PERFORMANCE

- A. Section generally defines CONTRACTOR's responsibilities, unless otherwise indicated, for the following:
  - 1. Submittals.
  - 2. Record drawings.
  - 3. Product delivery, storage and handling.
  - 4. Product installation.
  - 5. Field quality control.

#### 1.02 RELATED SECTIONS

- A. All of Division 1.
- B. **Section 02000** – Utility Construction.
- C. **Section 02225** - Trenching, Bedding and Backfill for Pipe.
- D. **Section 02668** - Fittings, Valves, Stainless Steel Piping, and Appurtenances.
- E. Appendices.

#### 1.03 SUBMITTALS

- A. Submit manufacturer's data for pipes, fittings and appurtenances.
- B. Submit shop drawing of air release valve installation if installation deviates from the engineering drawings.
- C. Submit certified affidavit of compliance with material specifications for all pipe, fittings, and appurtenances.
- D. Submit hydrostatic proof, sustained pressure and burst strength reports for tests performed by the manufacturer prior to shipping.

#### 1.04 RECORD DRAWINGS

- A. Submit record drawings prepared by a professional land surveyor that accurately record actual installed horizontal and vertical location of pipe, fittings, valves and other appurtenances in accordance with Port St. Lucie Utility Systems Department (PSLUSD) specifications.
- B. Submit written summary of pipe stations where statutory separation between pipes has not been maintained.

- C. Accurately record all deviations from engineering drawings on the record drawing submittal.
- D. Refer to **Section 01720** – Record Documents for additional requirements.

#### 1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Handle and store products in strict accordance with manufacturer's recommendations.
- B. Handling must not damage or mar products.
- C. Store products to minimize exposure to weather, vandalism and theft.

### **PART 2 – PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION**

#### 3.01 INSTALLATION

- A. Perform earthwork operations in accordance with **Section 02225** – Trenching, Bedding, and Backfill for Pipe, where applicable.
- B. All laying, testing for defects and pressure testing shall be performed in the presence of the CONSULTANT's and/or OWNER's representative.
- C. All defective material shall be promptly removed from the Work.
- D. Conform to the manufacturer's installation recommendations.
- E. In case of conflict between various requirements the more stringent requirement shall apply.
- F. Lay pipe with the bell end pointing in the direction of laying.
- G. Temporarily close all open pipe ends at the end of each day's work with water-tight plugs.
- H. Pipe shall be uniformly supported by the trench bottom prior to backfill.
- I. Install thrust blocking or restraint at all valves and fittings in accordance with manufacturer's recommendations, the engineering drawings, or PSL specifications, whichever is more stringent.
- J. Blocking or wedging between bells and spigots will not be permitted.
- K. Joint deflections shall not exceed 50 percent of the manufacturer's maximum allowable deflection.
- L. Cut pipe with saws or power driven abrasive cutters which will produce a square cut. Wedge type roller cutters will not be permitted. After cutting, bevel cut ends with beveling tool or abrasive disc and repair any damage to the interior pipe lining with a NSF 61 approved coating.

- M. Keep pipe free of earth and debris during installation.
- N. Flush each completed pipe sections with water obtained from an approved source if needed due to dirt and debris enters the proposed pipe during installation. If the proposed pipe is kept clean during construction, flushing will not be required. The flushing volume shall be sufficient to twice exchange the volume of water in the pipe section being flushed. The flushing flow rate shall be sufficient to create a minimum water velocity of two and one half (2½) feet per second in the pipe section being flushed.
- O. Trench is to be kept clean and dry at all times.

### 3.02 FIELD TESTING

- A. Perform earthwork density testing in accordance with Section 02225 – Trenching, Bedding, and Backfill for Pipe.
- B. Hydrostatic Testing - See Section 02000 – Utility Construction, Section 3.02.

**END OF SECTION**

## SECTION 02662 – POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

### PART 1 GENERAL

#### 1.01 REQUIREMENTS INCLUDED

- A. Furnish all labor, materials, equipment and incidentals required to install and test polyvinyl chloride (PVC) pipe, and fittings, complete as shown on the Drawings and as specified herein.
- B. Pipe or piping refers to all pipe, fittings, material and appurtenances required to construct PVC reuse, water and force main sewer pipe complete, in place.

#### 1.02 RELATED REQUIREMENTS

- A. Section 02225 - Trenching, Bedding and Backfill for Pipe.
- B. Section 02660 - Pipe and Fittings – General.
- C. Section 02668 - Fittings, Valves, Stainless Steel Piping, and Appurtenances.
- D. Appendices.

#### 1.03 SUBMITTALS

- A. Within 30 days of the Effective Date of the Notice to Proceed, submit the name of the pipe and fitting manufacturers and a list of materials to be furnished by each manufacturer. Also, include information on local representative of each manufacturer, if product is sold through a distributor.
- B. Shop Drawings including piping layouts and schedules shall include dimensioning, fittings, types and locations of valves and appurtenances, joint details, methods and location of supports, anchorage, gasket material, grade of material and all other pertinent technical information for all items to be furnished.
- C. Prior to each shipment of pipe, certified test reports that the pipe for this Contract was manufactured and tested in accordance with the ASTM and AWWA Standards specified herein shall be submitted.

#### 1.04 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
  - 1. ASTM D1784 – Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
  - 2. ASTM F477 – Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
  - 3. ASTM D3139 – Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.

4. ASTM D3034 – Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
5. ASTM D2241 – Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)

B. American Water Works Association (AWWA):

1. AWWA C110 – Ductile-Iron and Gray-Iron Fittings, 3-in Through 48-in for Water and Other Liquids.
2. AWWA C111 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
3. AWWA C600 – Standard Installation of Ductile-Iron Water Mains and their Appurtenances.
4. AWWA C651 – Disinfecting Water Mains.
5. AWWA C900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fittings, 4-in Through 36-in for Water Distribution.

C. National Sanitation Foundation (NSF):

1. Standard No. 14 – Plastic Piping Components and Related Materials.
2. Standard No. 61 – Drinking Water System Components – Health Effects.

D. 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. All PVC pipe shall be from a single manufacturer. The supplier shall be responsible for the provisions of all test requirements specified in ASTM D3034 and NSF Standard No. 14 as applicable. In addition, all PVC pipe to be installed under this Contract may be inspected at the plant for compliance with these specifications by an independent testing laboratory provided by the OWNER. The CONTRACTOR shall require the manufacturer's cooperation in these inspections. The cost of plant inspection of all pipe approved for this Contract, plus the cost of inspection of a reasonable amount of disapproved pipe, will be borne by the OWNER.
- B. Inspections of the pipe may also be made by the CONSULTANT or other representatives of the OWNER after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the Specification requirements, even though sample pipes may be have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be removed from the job at once.

#### 1.06 SYSTEM DESCRIPTION

- A. The equipment and materials specified herein are intended to be of standard types for use in transporting water and sewage.
- B. Note information in pipe schedule on Drawings, if any and in this Section, especially concerning pressures, minimum thickness, etc. In case of a conflict, information given in the pipe schedule shall govern.

- C. CONTRACTOR is responsible for compatibility between pipe materials, fittings and appurtenances.

1.07 DELIVERY, STORAGE AND HANDLING

- A. All items shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the CONSULTANT.
- B. PVC items deteriorate in sunlight and are slightly brittle, especially at lower temperatures, so care shall be taken in loading, transporting and unloading items to prevent injury to the items. All items shall be examined before installation and no piece shall be installed which is found to be defective. Handling and installation of pipe and fittings shall be in accordance with the manufacturer's instructions, referenced standards and as specified herein.
- C. Any pipe or fitting showing a crack or which has received a blow that may have caused an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work.
- D. While stored, pipe shall be adequately supported from below at not more than 3-ft intervals to prevent deformation. The pipe shall be stored in stacks no higher than that given in the following table:

<u>Pipe Diameter (inches)</u>	<u>Max. No. of Rows Stacked</u>
8 or less	5
12 to 21	4
24 to 30	3
33 to 48	2
54 and larger	1

- E. Pipe and fittings shall be stored in a manner which will keep them at ambient outdoor temperatures and out of the sunlight or delivered to the site so that no pipe is exposed to sunlight for more than 60 days. Temporary shading as required to meet this requirement shall be provided. Simple covering of the pipe and fittings which allows temperature buildup or direct or indirect sunlight will not be permitted.
- F. If any defective item is discovered after it has been installed, it shall be removed and replaced with an exact replacement item in a satisfactory manner by the CONTRACTOR, at the CONTRACTOR's own expense. All pipe and fittings shall be thoroughly cleaned before installation and the interior shall be kept clean until testing.
- G. In handling the items, use special devices and methods as required to achieve the results specified herein. No un-cushioned devices shall be used in handling the item.

**PART 2 - PRODUCTS**

2.01 PRESSURE POLYVINYL CHLORIDE (PVC) PIPE

- A. PVC pressure pipe sized 4-in through 36-in shall conform to the requirements of AWWA C900. All pipe shall be Class 235 with a Dimension Ratio (DR) of 18. Higher pressure

class will be furnished if indicated on the drawings. The pipe shall be PVC 1120 made from PVC compounds Class 12454-A or 12454-B as defined in ASTM D1784. Each pipe length shall be marked with the manufacturer's name or trademark, size, material code, pressure class, AWWA designation number and seal of test agency that verified pipe material for potable-water service.

- B. PVC pipe shall have bell and spigot push-on joints. The bell shall consist of an integral wall section with a solid cross-section elastomeric gasket securely locked in place to prevent displacement during assembly. Installation of elastomeric gasketed joints and performance of the joint shall conform to ASTM F477, ASTM D3139.
- C. Type of piping service shall be identified by color in accordance with the following:
  - 1. Blue – Potable
  - 2. Green – Sanitary
  - 3. Purple – Reclaimed Water
- D. Where restrained joints are shown on the drawings or as required, restraining glands shall be installed. Restraint for PVC pipe at the bell shall consist of the following: The restraint shall be manufactured of ductile iron conforming to ASTM A536. A backup ring shall be used behind the PVC bell. A restraint ring, incorporating a plurality of individually-actuating gripping surfaces, shall be used to grip the pipe, and a sufficient number of bolts shall be used to connect the bell ring and the gripping ring. All wedge assemblies and related parts shall be epoxy coated with a minimum of two coats with heat cure to follow each coat. The coating on the casting bodies shall be a polyester based powder electrostatically applied and heat cured. The restraint shall be the Series 2800, as manufactured by EBAA Iron, Inc. or approved equal.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION OF PVC PIPE**

- A. No single piece of pipe shall be laid unless it is straight. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16-in per foot of length. If a piece of pipe fails to meet this requirement check for straightness, it shall be rejected and removed from the site. Laying instructions of the manufacturer shall be explicitly followed.
- B. If any defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional cost to the OWNER. All pipe and fittings shall be thoroughly cleaned before installation, shall be kept clean until they are used in the work and when laid, shall conform to the lines and grades required. PVC pipe shall be installed in accordance with requirements of the manufacturer and AWWA C605 or as otherwise provided herein.
- C. As soon as the excavation is complete to normal grade of the bottom of the trench, bedding shall be placed, compacted and graded to provide firm, uniform and continuous support for the pipe. Bell holes shall be excavated so that only the barrel of the pipe bears upon the bedding. The pipe shall be laid accurately to the lines and grades indicated on the Drawings. Blocking under the pipe will not be permitted. Bedding shall be placed evenly

on each side of the pipe to mid-diameter and hand tools shall be used to force the bedding under the haunches of the pipe to give continuous support for the pipe. Bedding shall then be placed to 12-in above the top of the pipe. The initial 3-ft of backfill above the bedding shall be placed in 1-ft layers and carefully compacted. Generally the compaction shall be done evenly on each side of the pipe and compaction equipment shall not be operated directly over the pipe until sufficient backfill has been placed to ensure that such compaction equipment will not have a damaging effect on the pipe. Equipment used in compacting the initial 3-ft of backfill shall be approved by the pipe manufacturer's representative prior to use.

- D. All pipes shall be sound and clean before installation. When installation is not in progress, including lunchtime, the open ends of the pipe shall be closed by watertight plug or other approved means. Good alignment shall be preserved during installation. The deflection at joints shall not exceed that recommended by manufacturer. Fittings, in addition to those shown on the Drawings, shall be provided, if required, in crossing utilities which may be encountered upon opening the trench.
- E. When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be used with a bell shall be beveled to conform to the manufactured spigot end.
- F. The CONSULTANT may examine each bell and spigot end to determine whether any preformed joint has been damaged prior to installation. Any pipe having defective joint surfaces shall be rejected, marked as such and immediately removed from the job site.
- G. Each length of the pipe shall have the assembly mark aligned with the pipe previously laid and held securely until enough backfill has been placed to hold the pipe in place. Joints shall not be "pulled" or "cramped".
- H. Before any joint is made, the pipe shall be checked to assure that a close joint with the next adjoining pipe has been maintained and that the inverts are matched and conform to the required grade. The pipe shall not be driven down to grade by striking it.
- I. Precautions shall be taken to prevent flotation of the pipe in the trench.
- J. When moveable trench bracing such as trench boxes, moveable sheeting, shoring or plates are used to support the sides of the trench, care shall be taken in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the backfill. Trench boxes, movable sheeting, shoring or plates shall not be allowed to extend below top of the pipe. As trench boxes, moveable sheeting, shoring or plates are moved, pipe bedding shall be placed to fill any voids created and the backfill shall be recompacted to provide uniform side support for the pipe.
- K. Concrete thrust blocks shall only be installed at all fittings and other locations as directed by the CONSULTANT. Minimum bearing area shall be as shown on the Drawings. Concrete shall be placed against undisturbed material and shall not cover joints, bolts, or nuts, or interfere with the removal of any joint. Wooden side forms shall be provided for thrust blocks.
- L. Restrained joints shall be installed where shown on the Drawings.

- M. A single, continuous #12 AWG reinforced tracer wire with blue insulation as manufactured by Copperhead, Industries shall be installed on top of the PVC pipe installed via open cut methods. No in-line connectors shall be allowed.

### 3.02 JOINTING PVC PIPE (Push-on type)

- A. Joints shall be made in strict accordance with the manufacturer's instructions. Pipe shall be laid with bell ends looking ahead. A rubber gasket shall be inserted in the groove of the bell end of the pipe and the joint surfaces cleaned and lubricated. The plain end of the pipe to be entered shall then be inserted in alignment with the bell of the pipe to which it is to be joined and pushed home with a come-along or by other means. Check that the reference mark on the spigot end is flush with the end of the bell.

### 3.03 TESTING (PRESSURE PIPELINE)

- A. Furnish all necessary equipment and labor for carrying out a pressure test and leakage test on the pipelines. The procedures and method for carrying out the pressure and leakage tests shall be approved by the CONSULTANT.
- B. Make any taps and furnish all necessary caps, plugs, etc, as required in conjunction with testing a portion of the pipe between valves. Furnish a test pump, gages and any other equipment required in conjunction with carrying out the hydrostatic tests.
- C. All pipelines shall be subjected to a hydrostatic pressure of 150 percent of the design operation pressure or 150 psi whichever is greater, except that in no case shall test pressure exceed the design pressure rating of the pipe, fittings and thrust restraints and this pressure maintained for at least 2 hours. The leakage test shall be conducted at the maximum operating pressure as determined by the CONSULTANT and this pressure shall be maintained for at least 2 hours during the tests. Hydrant branch gate valves shall remain open during this test. The amount of leakage which will be permitted shall be in accordance with the requirements of the OWNER's standards.

**END OF SECTION**

## SECTION 02666 – DUCTILE IRON PIPE

### PART 1 - GENERAL

#### 1.01 PERFORMANCE

- A. Section generally defines the CONTRACTOR's responsibilities unless otherwise indicated, for the following:

- 1. Ductile Iron Pipe (DIP).

#### 1.02 RELATED SECTIONS

- A. All of Division 1.
- B. **Section 02660** - Pipe and Fittings - General.
- E. **Section 02668** - Fittings, Valves, Stainless Steel Piping, and Appurtenances.
- F. Appendices.

#### 1.03 REFERENCES

- A. ANSI/AWWA C104/A21.4, Latest Revision - Cement mortar lining for DIP and fittings for water.
- B. ANSI/AWWA C111/A21.11, Latest Revision - Rubber gasket joints for DIP and grey iron pressure pipe and fittings.
- C. ANSI/AWWA C115/A21.15, Latest Revision - Flanged DIP and grey iron pipe with threaded flanges.
- D. ANSI/AWWA C151/A21.51, Latest Revision - DIP centrifugally cast in metal molds or sand lined molds for water and other liquids.
- E. ANSI/AWWA C600, Latest Revision - Installation of DIP water mains and appurtenances.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

##### A. PIPE:

- 1. DIP shall be designed in accordance with the requirements of ANSI/AWWA A21.50/C150, Latest Version as applicable, and the supplemental requirements of this section.
- 2. Below-grade DIP shall be Pressure Class 350 for pipes up to twenty inches (20") in diameter and Pressure Class 250 for pipes larger than twenty inches (20"). Above-grade DIP shall be Class 53 and shall conform to ANSI A21.51 and AWWA C-151.

3. Pipe interior and fittings shall have a Protecto 401 lining.
4. DIP shall be of the diameter shown on the plans.
5. DIP shall be furnished complete with rubber gaskets or restraint gaskets where applicable.
6. DIP shall be supplied in lengths not less than eighteen feet (18'), having rubber ring type push-on joints, standard mechanical joints, restrained joints, threaded flanges, or ball joints as shown on the contract documents.

**B. COATING AND LININGS:**

1. Exterior of buried pipe shall have factory applied bituminous coating, coal tar varnish or asphalt base paint, minimum one (1) mil thick.
2. Exterior of above-grade piping shall be coated in accordance with **Section 09900 – Painting for ferrous metals.**

**C. JOINTS:**

1. Joints in straight "Runs" of buried pipe shall be push-on with mechanical joints at fittings unless indicated otherwise on the Contract Documents.

**D. FLANGED PIPE:**

1. Flanged pipe shall have threaded flanges with bolts and gaskets appropriate to the service use and maximum working pressure of the pipe.
2. All flanges shall be ductile iron.

**PART 3 – EXECUTION (NOT USED)**

**END OF SECTION**

## SECTION 02668 – FITTINGS, VALVES, STAINLESS STEEL PIPING, AND APPURTENANCES

### PART 1 - GENERAL

#### 1.01 PERFORMANCE

- A. This Section generally defines CONTRACTOR's responsibilities unless otherwise indicated, for the following:
1. Buried Fittings.
  2. Stainless Steel Piping.
  3. Valve Boxes.
  4. Above-Grade Combination Air Relief Valves.
  5. Resilient Seat Gate Valves
  6. OS&Y Gate Valves.
  7. Butterfly Valves.
  8. Restrained Mechanical Joints.
  9. Floor Drain.
  10. Pressure Gauges.
  11. Pipe Supports.
  12. Diaphragm Seals.
- B. All new materials shall adhere to the 2014 Environmental Protection Agency (EPA) standards for lead free brass.

#### 1.02 RELATED SECTIONS

- A. All of Division 1.
- B. **Section 02000** – Utility Construction.
- C. **Section 02225** - Trenching, Bedding and Backfill for Pipe.
- D. **Section 02660** - Pipe and Fittings - General.
- E. Appendices.

#### 1.03 REFERENCES

- A. ANSI/AWWA C104/A21.4, Latest Revision - Cement mortar lining for ductile iron pipe and fittings for water.
- B. ANSI/AWWA C110/A21.10, Latest Revision - Ductile Iron and grey iron fittings three (3) inch through 48 inch for water and other liquids.
- C. ANSI/AWWA C111/A21.11, Latest Revision - Rubber gasket joints for ductile iron and grey iron pressure pipe and fittings.
- D. ANSI/AWWA C600, Latest Revision - Installation of Ductile Iron water mains and appurtenances.

- E. ANSI/AWWA C153/A21.53, Latest Revision – Ductile Iron Compact Fittings for Water Service.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS**

#### **A. Buried Fittings (4 inches and larger)**

1. Mechanical joint fittings to be Compact Ductile Iron (AWWA C-153 only). Buried flange fittings shall have the same interior and exterior coatings as buried mechanical joint fittings.
2. Exterior of below grade fittings shall have factory applied bituminous coating, coal tar varnish or asphalt base paint, minimum one-mil thick.
3. Interior of fittings shall be lined with Protecto-401, Induron Ceramapure PL-90 Ceramic Epoxy Lining (40 mils DFT, minimum), or an equal lining system compatible with RO concentrate water quality.
4. CONTRACTOR shall submit a Certificate of Quality Assurance Form from the pipe supplier who applied the coating system that notes, at a minimum, the surface preparation, the DFT in mils of the first and second coat, the final DFT in mils, and proof of holiday testing at 2,000 Volts minimum.

#### **B. Stainless Steel Piping (ANSI / ASTM A312, Schedule 10A, 10, 40)**

1. Stainless steel pipe shall be 316 stainless steel and shall be pickled and passivated on both the exterior and interior of the piping.
2. Stainless steel pipe shall conform to ASTM A 312, Austenitic steel pipe, welded, seamless, grade TP 316L.
3. Size shall be nominal pipe size (NPS) designation as shown with schedule 40-wall thickness as indicated on the drawings, or specified herein.
4. Pipe flanges and fittings to meet ASME B16.5-1996.
5. Flanges to be Class 150, raised face, serrated finish, forged A182 Grade F316L, slip on type. Dimensions shall meet ANSI/ASME B16.5-1996.
6. Flange bolts and nuts shall be ASTM A193 and ASTM A194, Type 316, respectively. Never seize, NSF 61 anti-galling compound, shall be used on all stainless steel threaded fasteners. Flange gaskets shall be full faced, elastomeric type rubber (EPDM), and meet the requirements of ANSI / AWWA C207.
7. Stainless steel tubing for sizes 1-inch and smaller shall be seamless austenitic stainless, grade TP 316L conforming to ASTM MA-632. The interior and exterior shall be pickled and passivated. Furnish Swagelok 316 Stainless compression fittings, or equal.
8. After all fabrication is completed, all pipe spools shall be pickled and passivated by complete immersion in a solution containing 3-percent hydrofluoric and 6-percent to 10-percent nitric acid with the balance of water and then followed by a fresh water rinse bath. All pipe spools shall be free of surface iron and have a uniform 2D finish throughout upon completion of this process. All openings shall be capped after the pickling / passivating process to protect the inside of the spools from debris and dirt.
9. Welding in the field is not allowed.
10. Pipe and fittings shall be as manufactured by Aerex Industries, Fort Pierce, Florida; Douglas Brothers, Savannah, Georgia; or Felker Brothers, Marshfield, Wisconsin; or approved equal.

### C. Valve Boxes

1. All buried valves shall have cast iron two (2) piece valve boxes with cast iron covers.
2. Valve boxes shall be provided with suitable heavy bonnets and will extend to an elevation at or slightly above the finished grade surface as directed by the CONSULTANT.
3. The barrel shall be two (2) or three (3) piece, screw type, having a 5¼ inch shaft diameter.
4. Covers shall have "Water" or "Sewer", as appropriate, cast into the top.
5. All valves shall have actuating nuts extended to within twenty-four inches of the top of valve box cover.

### D. Above-Grade Air/Vacuum Valves

1. The combination air relief valves shall be installed as shown on the drawings and shall be the automatic type.
2. The air release combination valves shall have all 316L construction with a high density polyethylene float. The O-rings shall be Buna-N.
3. Combination air relief valves shall have flanged inlet/outlet and shall meet requirements of AWWA C512.
4. Combination air valves shall be automatic float operated valves designed to exhaust large quantities of air during the filling of a piping system and close upon liquid entry. The valves shall open during draining or if a negative pressure occurs. The valve shall also release accumulated air from a piping system while the system is in operation and under pressure. The valve shall perform the functions of both air release and air/vacuum valves and furnished in a single body.
5. A regulated exhaust device shall be provided on combination air valves to reduce pressure surges.
6. Air release valves and combination valves shall be manufactured by Vent-Tech SWG-C, or approved equal.

### E. Resilient Seat Gate Valves

1. Gate valves, unless otherwise specified or approved, shall be ductile iron body, resilient seat gate valves with mechanical joints conforming to the AWWA standard specifications for gate valves for ordinary wastewater works service, designation C509, in so far as applicable. Wedge material to be EPDM. EPDM to be clearly stamped on wedge.
2. Gate valves smaller than 3-inches in diameter shall be 316 stainless steel and suitable for the service required.
3. Gate valves shall be non-rising stem type with 316 SS stem.
4. Face to face dimension shall conform to ANSI standard face-to-face and end-to-end dimensions of ferrous valves, (ANSI B16.10).
5. Hand wheels or chain wheels shall be turned counterclockwise to open the valves. Hand wheels shall be of ample size and shall have an arrow and the word "open" cast thereon to indicate the direction of opening.
6. All internal/external bolting material/hardware shall be 316 Stainless Steel.
7. Gaskets shall be O-ring seals and have a permanently lubricated thrust collar sealed with an O-ring above and below.
8. Valves shall be suitable for abovegrade service and be designed for 150 psi working pressure.

9. Valves shall be manufactured by AVK, Mueller Model 2360, American Flow Control 2500-1, Davis Valve, Williams Valve Corp., or approved equal.

#### F. OS&Y Gate Valves

1. The OS&Y gate valve shall be bi-directional, Class 150 rated for intended service, with rising stem.
2. Gate valves, unless otherwise specified or approved, shall be ductile iron body, resilient seat gate valves with flange joints conforming to the AWWA standard specifications for gate valves for ordinary wastewater works service, designation C509, in so far as applicable. Wedge material to be EPDM. EPDM to be clearly stamped on wedge.
3. Stem and all hardware shall be 316 SS.
4. Valves shall have all internal and external ferrous surfaces coated with a fusion bonded thermosetting powder epoxy coating of 10 mils nominal thickness. The coating shall conform to AWWA C550.
5. Hand wheels or chain wheels shall be turned counterclockwise to open the valves. Hand wheels shall be of ample size and shall have an arrow and the word "open" cast thereon to indicate the direction of opening.
6. The OS&Y gate valves shall be manufactured by AVK, Mueller Model 2360, American Flow Control 2500-1, Davis Valve, Williams Valve Corp., or approved equal.

#### G. Butterfly Valves

1. Butterfly valve shall be flanged AWWA butterfly valves. All valves shall be suitable for use with ANSI class 125 or 150 flanges. Valve shall provide bi-directional drip-tight shut-off at 200 psi with 316 SS disc and shaft.
2. Body shall be ductile iron.
3. Discs shall be offset to provide an uninterrupted 360-degree seating edge and shall be 316 SS. The disc and shaft connection shall be splined.
4. EPDM seats shall fully line the valve body and be permanently bonded. Seats shall have integral flange seals so flange gaskets are not required.
5. Shafts shall be one (1) piece 316 Stainless Steel. Shaft diameters shall meet the AWWA C504, class 75B standard. Multiple shaft seals shall be provided to prevent leakage.
6. Three (3) shaft bearings made of heavy-duty aluminum bronze shall be provided to ensure smooth, reliable valve operation.
7. A hand-wheel actuator shall be provided and shall have adjustable open and closed position stops. Operating shaft to be supported axially and radially at the input end by permanently lubricated thrust and bearing sleeves.
8. A two (2) year warranty shall be provided for all valves and actuators.
9. All hardware shall be 316 SS.
10. Butterfly valves shall be as manufactured by Pratt, Bray, Jamesbury, Keystone Valves, or approved equal.

#### H. Restrained Mechanical Joint Devices

1. Restrained mechanical joint devices for nominal pipe sizes 3 inch through 48 inch shall consist of multiple gripping wedges incorporated into a follower gland meeting the applicable requirements of ANSI/AWWA C110/A21.10. Restraint devices shall be Listed by Underwriters Laboratories (3 inch through 24 inch size) and Approved by Factory Mutual (3 inch through 12 inch size).

2. Restraints shall be made of ASTM A536 ductile iron. Fasteners shall be Cor-Ten steel painted in accordance the Authority's specifications. Fasteners at the wellhead shall be 316 stainless steel.
3. Restrained mechanical joint glands shall be Megalugs as manufactured by EBAA Iron or One Loks as manufactured by Sigma.

I. Floor Drains

1. Floor drain shall be cast iron, two-piece body with double drainage flange and ½" primer tap, invertible flashing collar, weepholes, bottom outlet connection and adjustable strainer.
2. Floor drains shall be as manufactured by JOSAM Series 30000-A or approved equal.

J. Ball Valves

1. The ball valves shall be threaded with female NPT inlet/outlet connections and constructed of 316 stainless steel, including the handle, stem, stem nuts, washers, stop plate, body, and ball. The nuts and bolts shall also be 316 stainless steel. The lever and grip shall be 316 stainless steel with a vinyl cover.
2. Ball valves shall be full-port and designed for a pressure not less than 150 psi.
3. Ball valves shall be Apollo 96-100 series, FNW 200A series, or OWNER approved equal.

K. Pressure Gauges

1. The pressure gauge shall be constructed of 316 stainless steel with a solid front conforming to ASME B 40.1, Grade 1A. The gauge shall be glycerin filled with a min. four-inch (4") face and ¼-inch bottom port.
2. The pressure gauge shall be 0 – 150 psi manufactured by Ashcroft, Model 1109, or approved equal.

L. Pipe Supports

1. Floor supported pipe three inches (3") and larger in diameter shall be supported by adjustable saddle supports as directed by the CONSULTANT.
2. Each adjustable pipe saddle support shall be screwed on welded to the corresponding size 150-pound companion flange or slip-on welding flanges, respectively. Supporting pipe shall be of Schedule 40 steel pipe construction.
3. Each flange shall be secured to the concrete floor by a minimum of four (4) expansion bolts per flange. Adjustable saddle supports shall be equal to Grinnell Fig. No. 264. Where used under base fittings, a suitable flange shall be substituted for the saddle.

M. Diaphragm Seals

1. Units shall be Ashcroft or OWNER approved equal.
2. Units shall be 316 stainless steel silicone factory filled and connected to instrumentation for all non-clean wastewater applications.

**PART 3 – EXECUTION (NOT USED)**

**END OF SECTION**

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## SECTION 02700 - WELL CONSTRUCTION SEQUENCE

### PART 1 – GENERAL

#### 1.1 SCOPE OF WORK

- A. This section describes the sequence of work to complete the construction and testing of one Class I injection well (IW-2) and four (4) Surficial aquifer water table monitor wells. It also includes annular pressure testing and injection testing of existing Class I injection well IW-1. The work sequence of all civil, mechanical, electrical and instrumentation is covered in other sections and in the Contract Drawings. Detailed descriptions of work items that are listed in this section are provided in other sections. All work shall be performed by the CONTRACTOR unless otherwise specified.

#### 1.2 SUBMITTALS

- A. Provide detailed construction schedule prior to the commencement of any site work.
- B. Provide preconstruction video of site prior to mobilization and any site activity.
- C. Provide proposed daily log form.
- D. Provide completed daily log forms daily and scanned and compiled daily logs weekly.

### PART 2 – PRODUCTS (NOT USED)

### PART 3 – EXECUTION

#### 3.1 GENERAL SEQUENCE

- A. Provide all necessary submittals that are required prior to drilling startup; including submittals noted in the Contract and submittals required by permit.
- B. Prepare site and mobilize equipment.
- C. Install all necessary equipment and provisions to mitigate noise, lighting and vibration.
- D. Install and sample water table pad monitor wells.
- E. Set pit pipe (CONTRACTOR's Option).
- F. Provide elevations of IW-2 temporary containment pad (at the location of IW-2) and top of casings of pad wells (NAVD 1988).
- G. Construct and test IW-2. Refer to Part 3.2 in this section for a detailed work sequence.
- H. Perform annular pressure testing of IW-1.
- I. Perform short term injection test of IW-2 and IW-1.
- J. Complete IW-2 wellhead, permanent concrete pad, piping, valves, electrical, instrumentation

and all other appurtenances necessary to complete IW-2.

- K. Provide all post construction submittals including as-built drawings.
- L. Demobilize equipment and restore site.
- N. The CONTRACTOR is advised that this is a test-injection well program and that the depths specified are approximate. Also, the sequence of testing such as coring, geophysical logging, and injection testing described in this outline may be changed in order of occurrence, or deleted, and additional testing may be required.

### 3.2 INJECTION WELL IW-2 CONSTRUCTION SEQUENCE

- A. CONTRACTOR's Option: Install pit casing. Casing must be of sufficient diameter to accommodate a drill bit and assembly able to drill a nominal 64-diameter borehole. Collect drill cuttings every 10 feet.
- B. Drill nominal 64-inch diameter borehole to approximately 195 feet below pad level (bpl). Collect drill cuttings every 10 feet. Conduct inclination surveys at intervals no greater than 90 feet. Perform caliper and gamma-ray logging upon completion.
- C. Set and cement 58-inch outside diameter (O.D.) steel conductor casing to approximately 190 feet bpl. Perform cement-top temperature logging after each stage of cement (until cement is observed at pad level).
- D. Drill nominal 58-inch diameter borehole from the base of the conductor casing to approximately 665 feet bpl. Collect drill cuttings every 10 feet. Conduct inclination surveys at intervals no greater than 90 feet. Perform caliper, gamma-ray and dual induction logging upon completion.
- E. Set and cement 48-inch O.D. steel surface casing to approximately 660 feet bpl. Perform cement-top temperature logging after each stage of cement (until cement is observed at pad level).
- F. Switch from mud-rotary to reverse-air, closed-circulation drilling method.
- G. Drill nominal 12-inch diameter pilot hole from the base of the surface casing to approximately 1,700 feet bpl. Collect drill cuttings every 10 feet. Collect water-quality samples at intervals no greater than 90 feet. Conduct inclination surveys at intervals no greater than 90 feet.
- H. Perform suite of geophysical logs under static and dynamic conditions from base of surface casing to total depth.
- I. Perform up to three (3) packer-pumping tests as directed by the CONSULTANT.
- J. Cement back the pilot hole to within 150 feet or less of the base of the surface casing.
- K. Ream nominal 48-inch diameter borehole from the base of the surface casing to approximately 1,605 feet bpl. Conduct inclination surveys at intervals no greater than 90 feet. Perform caliper logging upon completion.

- L. Set and cement 40-inch O.D. steel intermediate casing to approximately 1,600 feet bpl. Perform cement-top temperature logging after each stage of cement (until cement is observed at pad level).
- M. Drill nominal 12-inch diameter pilot hole from the base of the intermediate casing to approximately 3,500 feet bpl. Collect drill cuttings every 10 feet. Collect water-quality samples at intervals no greater than 90 feet to a depth not less than 2,700 feet bpl. Collect up to eight (8) rock cores during drilling. Conduct inclination surveys at intervals no greater than 90 feet to a depth not less than 2,700 feet bpl.
- N. Perform geophysical logging under static and dynamic conditions from the base of the intermediate casing to total depth.
- O. Perform up to eight (8) packer-pumping tests as directed by the CONSULTANT.
- P. Install a cement bridge plug near the top of the injection zone (approximately 2,600 feet bpl).
- Q. Cement back the pilot hole from the bridge plug to within 150 feet or less from the base of the intermediate casing.
- R. Ream nominal 40-inch diameter borehole from the base of the intermediate casing to approximately 2,605 feet bpl. Conduct inclination surveys at intervals no greater than 90 feet. Perform caliper logging upon completion.
- S. Set 30-inch O.D. steel final casing to approximately 2,600 feet bpl. Cement in place from the base of the final casing to approximately 500 feet bpl. Perform cement-top temperature logging after each stage of cement.
- T. Perform hydrostatic pressure test of final casing. CONTRACTOR may elect to perform hydrostatic pressure testing after completion of reaming the 30-inch diameter borehole to approximately 3,500 feet bpl (step U., below).
- U. Ream nominal 30-inch diameter borehole from the base of the final casing to approximately 3,500 feet bpl. Perform caliper logging upon completion.
- V. Perform a cement bond log in the final casing. Cement bond tool shall have receivers that are spaced 5 feet and 7 feet from the transmitter unless approved otherwise by the CONSULTANT. Perform downhole video survey from pad level to total depth.
- W. Cement remaining 500 feet of the final casing. Perform cement-top temperature logging after each stage of cement (until cement is observed at pad level).
- X. Develop the injection well and zone and collect final background water sample.
- Y. Conduct background temperature and gamma-ray logging and then conduct radioactive tracer survey (RTS).

### 3.3 INJECTION WELL IW-1 TESTING

- A. Perform annular pressure testing of IW-1.

- B. Perform short-term injection testing of IW-1.

### 3.4 FDEP APPROVALS DURING CONSTRUCTION

- A. During the construction and testing of IW-2, FDEP approval is required prior to proceeding with stages of the Work as follows:
  - 1. Prior to cementing back the pilot hole drilled to near the surface casing (step 3.2.J.), FDEP's approval of the intermediate casing setting depth is required.
  - 2. Prior to cementing back the pilot hole from the cement bridge plug to near the base of the intermediate casing (step 3.2.Q.), FDEP's approval of the final casing setting depth is required.
  - 3. FDEP's approval is required prior to injection testing (after mechanical integrity testing is performed). FDEP shall be provided adequate notification to witness mechanical integrity testing (i.e. pressure testing and RTS testing).
  - 4. FDEP's approval is required prior to plugging and abandoning the water-table pad monitor wells.
- B. No standby time shall be paid for any time awaiting FDEP approvals relating to the requirements of the FDEP UIC construction permit.

### 3.5 DAILY LOGS

- A. The CONTRACTOR shall maintain a detailed daily log of the drilling and testing operations (those both on and off the rig) during the construction of the injection well and monitor well.
- B. The daily log forms shall be approved by the CONSULTANT prior to commencing work activities. A form shall be provided for each work shift.
- C. A copy of each daily log shall be submitted to the CONSULTANT (or CONSULTANT's representative) on a daily basis. If requested by the CONSULTANT, a scanned copy of the combined logs for each week shall be emailed to the CONSULTANT each Monday by 12:00 (noon). The scanned copy shall be legible as determined by the CONSULTANT. The scanned copy shall include all logs (for all work shifts) for the previous week. For purposes of the daily logs, a work week begins on Monday at 7 a.m.
- D. The daily logs shall provide a brief description of all formations encountered, footage and size of holes drilled, depths and sizes of all casings installed in the wells, fluid losses, material quantities used (including salt onsite and salt used in wells), complete record of drilling fluids and drilling fluid additives, water-level changes, cementing operations, repair time, names of work crew and other pertinent data as may be required by the CONSULTANT.
- E. The CONTRACTOR must maintain an accurate tally of all material that is inserted in the well. This includes, but not limited to, drill bits and bottom-hole assemblies, drill pipe, cement pipe, airline tubing, work pipe, pipe for packer testing, and casings. The tallies shall include the length and diameters (inside and outside) and other dimensions of each section

inserted and a cumulative length of the “string”. The tally shall include the date the tally was generated. The CONTRACTOR shall provide a copy of each tally and any associated sketches or drawings to the onsite CONSULTANT prior to installation of each “string”.

END OF SECTION

## SECTION 02740 – DRILLING AND CORING

### PART 1 – GENERAL

#### 1.1 SCOPE OF WORK

- A. This section covers the work, materials, and equipment necessary for drilling and testing Injection Well IW-2 at the Port St. Lucie Glades Wastewater Treatment Facility (WWTF).

#### 1.2 SUBMITTALS

- A. Submit list of all drilling additives intended for use on this project.
- B. Submit site plan that includes location of drill rigs, cementer, cement silo, construction trailers, generators, MCC, electric sub-station (for electric rig), storage tanks, mud system, work crew parking, fencing, laydown area for casing and drill pipe, location of pad monitor wells, and ingress and egress. Site plan must be approved prior to mobilization.
- C. Provide confirmatory written documentation from American Petroleum Institute (API) of proposed drill rig hook load capacity if requested by CONSULTANT.
- D. Submit details of circulation plan for closed-circulation system.
- E. Submit details of certified temporary containment pad.
- F. Submit proposed disposal site for cuttings and fluids. CONTRACTOR is responsible for obtaining approval from appropriate regulatory authorities.
- G. Provide drilling data (geolograph data) upon completion of each borehole.
- H. Submit details of inclination survey tool.
- I. Provide sure-shot discs or equal of every inclination survey performed. CONTRACTOR shall include the well identification, depth, date and time for each survey.
- J. Provide proposed certified laboratory for analyzing water quality samples.
- K. Provide proposed certified laboratory for analyzing core samples.
- L. Submit detailed plans to mitigate the construction noise impacts and comply with the noise criteria specified herein, including the method of construction, and the equipment to be used.
- M. Submit vibration and sound compliance plan for approval prior to drilling activities.
- N. Provide well completion report for IW-2.
- O. Provide proof that survey of IW-2 has been recorded at the St. Lucie County courthouse.

### 1.3 LOCAL GEOLOGIC CONDITIONS

- A. It is anticipated that the boreholes will intersect beds of unconsolidated sand and shell and little limestone to a depth of approximately 190 feet below drilling pad level (bpl). Below this depth, clay and marl with varying amounts of sand, limestone and shell may be present to a depth of approximately 660 feet bpl. Below 660 feet bpl, permeable zones containing brackish water under artesian pressure and flowing conditions may be present. It is intended that the surface casings will case off the portion of the Hawthorn Group where squeezing clays are present. Interbedded layers of limestone and dolomite also are present and cavities may be encountered, with the possibility of associated lost-circulation and formation-caving problems.
- B. Information regarding subsurface conditions is intended to assist the CONTRACTOR in preparing his proposal. The OWNER or CONSULTANT does not guarantee its accuracy or that it is necessarily indicative of conditions to be encountered in drilling the well.
- C. It is the CONTRACTOR's responsibility to satisfy himself regarding all local conditions affecting his work by personal investigation and neither the information on local geology, nor that derived from maps or plans, nor from the OWNER or his agents or employees shall act to relieve the CONTRACTOR of any responsibility hereunder or from fulfilling any and all terms and requirements of the Contract and Technical Specifications.

### 1.4 DEPTH REFERENCES

- A. All depth references for the drilling and logging operations shall be made to the drilling pad level. The drilling pad level shall be surveyed referenced to North American Vertical Datum (NAVD) adjustment of 1988. The drilling pad and all other surveyed measurement points for the proposed wells shall be professionally surveyed and certified, by a Florida-licensed Land Surveyor, prior to the onset of drilling activities.
- B. A permanent concrete pad shall be constructed at the injection well upon completion of IW-2. The permanent concrete pad shall be constructed according to the attached plans and specifications. Upon completion of the pad, the well location and elevation shall be surveyed and a benchmark shall be installed on the finished, reinforced concrete pad.
- C. The CONTRACTOR shall provide an as-built survey of the injection well system upon completion of construction and testing of IW-2. The CONTRACTOR shall provide proof that the existence of IW-2 has been recorded on the surveyor's plan at the County courthouse.

## **PART 2 – PRODUCTS**

### 2.1 DRILLING EQUIPMENT

- A. All equipment shall be in good working condition and suitable for the proposed work. Prior to mobilization, a list of drilling equipment to be used on the project is to be submitted to the CONSULTANT. The CONTRACTOR shall provide assurances that he has the proper equipment to adequately complete the project and overcome possible complications.
- B. No unnecessary delays or work stoppages will be tolerated because of equipment

failure. Equipment failure shall not be considered a valid reason for extending the length of the Contract. The CONTRACTOR shall be held responsible and payment may be withheld for damages to the well due to any cause of negligence, faulty operation, or equipment failure.

- C. The CONTRACTOR shall provide and operate a drilling rig capable of handling 1.5 times the maximum static hook load capacity, as defined by the American Petroleum Institute (API), that will be placed upon the rig's drilling and supporting equipment. Confirmatory written documentation shall be provided by API upon request. If conditions develop in the field that prove the rig and supporting equipment that had been supplied by the CONTRACTOR are, in the opinion of the CONSULTANT, incapable of completing a well as specified, the CONTRACTOR shall be required to provide a more suitable rig with the necessary capacity at his own cost.
- D. The OWNER shall reserve the right to inspect the equipment of each CONTRACTOR submitting a bid as a part of the evaluation of bids.
- E. The CONTRACTOR shall provide all tools, bits, and all other necessary equipment for drilling. A portion of the drilling scope shall be performed under artesian aquifer conditions and the water level is above land surface. A rotating head assembly, that makes a watertight connection between the drill string and the construction wellhead shall be used at all times during drilling in the Floridan Aquifer.
- F. Geolograph: The drilling rig(s) shall be equipped with a geolograph or an approved equal recording system capable of recording drilling time, depth and weight of the tool string. This information shall be recorded continuously by the CONTRACTOR and records or copies furnished to the CONSULTANT upon completion of each borehole. The geolograph (or approved equal system) shall be fully functional before well drilling commences and shall continue to operate and record during all drilling, reaming, cementing, and runs into the well with drill bits or casing.
- G. Drilling equipment shall be capable of performing mud rotary and reverse air drilling methods, in accordance with API Bulletin D-10, within the established time of construction.
- H. All equipment shall be in accordance with local noise ordinances and OWNERS requirements for the applicable working hours. The CONTRACTOR shall be required to keep within noise requirements during all phases of the work. This shall include use of hospital-grade mufflers on equipment (as appropriate) to comply. Noise abatement shall require an acoustical sound barrier wall, electric drilling rigs, enclosures and other means to minimize noise. Noise control and compliance are the sole responsibility of the CONTRACTOR.
- I. The CONTRACTOR shall plan and execute construction activities by methods to control vibration to prevent damage to surrounding foundations, structures, and buildings.

## 2.2 CONTAINMENT AND CIRCULATION SYSTEM

- A. The CONTRACTOR shall provide a temporary containment pad installed for IW-2 in accordance with FDEP requirements. The CONTRACTOR shall construct a minimum two-foot-high wall or curb to contain spills of water and drilling fluid (including a method

to return them to the closed-circulation system). The CONTRACTOR shall submit complete construction details and design calculations including load requirements certified by a professional engineer licensed in the state of Florida and receive acceptance by the Engineer and FDEP, before beginning construction.

- B. Drilling shall be accomplished using a close-circulation system designed and constructed so that under no conditions shall there be an overflow. The CONTRACTOR shall be required to take all necessary steps to prevent accidental spillages from occurring. Tanks for the circulation system shall be leak-proof. The CONTRACTOR shall submit plans for the circulation system to the CONSULTANT for approval. In no case shall a system capable of storing less than approximately 9,360 cubic feet (70,000 gallons) of fluids and cuttings be considered. Written approval from the CONSULTANT shall be required before the CONTRACTOR is allowed to commence drilling.

### **PART 3 – EXECUTION**

#### **3.1 DRILLING**

- A. The conventional mud-rotary method shall be employed for all drilling through the setting of the surface casing for IW-2.
- B. The CONTRACTOR shall provide high-yield, fine-grained sodium bentonite (manufactured by Baroid Industrial Drilling Products or approved equivalent) during mud rotary drilling operations meeting API Spec 13A. The CONTRACTOR shall provide all drilling fluid additives and lost circulation material, as required. Review drilling fluids and potential additives, itemize all products, and include the appropriate material safety data sheet (MSDS) to be used during the course of drilling operations. The CONTRACTOR shall submit these items to the CONSULTANT before drilling operations commence.
- C. The CONTRACTOR shall maintain complete control over drilling fluid characteristics during the entire operation of well construction. If proper control of the drilling fluid is not maintained, the CONTRACTOR may be required, at the CONTRACTOR's expense, to retain or employ an experienced, qualified mud CONSULTANT on the job during all operations to supervise and maintain drilling fluid characteristics.
- D. A good drilling mud-management program is essential to the proposed drilling program. Mechanical removal of solids from the drilling mud is necessary to reduce the build-up of a thick mud (over-balanced) and formation damage due to high mud invasion. As part of the solids control program, a mud cleaner (e.g., "shale shaker"), and de-silting/de-sanding cones shall be employed. Selection of appropriate screen cloth for the shale shaker shall be in accordance with API RP 13E.
- E. Mud weights (lbs/gal) shall be maintained during mud rotary drilling with mud viscosity determined using a Marsh funnel. Field testing of water based drilling fluids shall conform to API RP 13B-1. Mud weight and viscosity shall be determined manually a minimum of 3 times daily and shall be recorded as part of the driller's daily log.
- F. All additives shall be approved prior to use by the CONSULTANT. The following additives have been approved for similar injection well system construction projects.
  - 1. Max Gel – a viscosifier of bentonite and extenders to increase the yield of bentonite

2. M-I Gel – a viscosifier of bentonite and extenders to increase the yield of bentonite
3. M-I Gel Supreme - a viscosifier of bentonite and extenders to increase the yield of bentonite
4. M-I Wate – a barite material used to increase the density of drilling mud
5. Penetrol Dry – a surfactant used to counteract the sticking tendencies of clay
6. Platinum D-D – a blend of surface-active agents used to counteract the sticking tendencies of clay
7. Platinum Pac UL – a water-soluble polymer designed to control fluid loss
8. Platinum Pac – a water-soluble polymer designed to control fluid loss
9. Poly-Plus LV – provides cuttings encapsulation to prevent clay cuttings from sticking together
10. Poly-Plus - provides cuttings encapsulation to prevent clay cuttings from sticking together
11. Ringfree – prevents development of drilling mud ball on the drill bit
12. Soda Ash – used to raise the pH of water prior to mixing with bentonite to improve hydration of bentonite
13. EZ-MUD GOLD: Clay and shale stabilizer, provides inhibition of clay and shale formations in water-based drilling fluids without substantially increasing viscosity.
14. QUIK-TROL® LV: modified natural cellulosic polymer, provides filtration control in most water-based drilling fluids without substantially increasing viscosity. QUIK-TROL LV, when added to a QUIK-GEL® or BORE-GEL® slurry, yields a drilling mud system suitable for drilling in sandy formation.
15. QUIK-GEL®: High-yielding Wyoming sodium bentonite. QUIK-GEL imparts viscosity, fluid loss control and gelling characteristics to freshwater-based drilling fluids.
16. SODIUM BICARBONATE: Used to raise the pH of water prior to mixing with bentonite to improve hydration of bentonite.
17. SODA ASH: Sodium carbonate primarily used to condition and soften make-up water and to raise pH.
18. SUPER GEL-X® (High Yield Bentonite): High viscosity freshwater drilling fluid produced from the highest grade Wyoming sodium bentonite that helps prevent loss circulation, removes cuttings, and stabilizes boreholes.
19. PENETROL®: Wetting agent that is a water miscible, non-ionic surfactant designed

to counteract the sticking tendencies of clay.

20. PENETROL® DRY: Surfactant that is used to assist in counteracting the sticking tendencies of encountered clay or shale during drilling operations.
  21. INSTA-VIS™ PLUS: Multi-functional liquid polymer designed to improve drilling efficiency in both horizontal and vertical drilled holes through its rapid field mixing, viscosity development, and clay and shale inhibition.
  22. AQUA-CLEAR® PFD: Concentrated liquid polymer dispersant provides mud and sediment removal from the producing formation and gravel pack. This product also serves as a highly effective mud thinner.
  23. SENTRY® POLY-D PLUS: Low molecular weight polymer that contributes to shale inhibition, slurry viscosification, and friction reduction through its highly water-soluble profile.
  24. SENTRY ® PAC Polymer: Minimizes clay hydration mechanisms on all active clay sites by adsorbing to the formation. Once deposited onto the borehole interface, a filter cake minimizes further entry of water into the clay matrix and minimizes cuttings dispersion.
  25. SENTRY ® DRILLING DETERGENT: Surfactant blend formulated for use in water base muds as a lubricant and rheology stabilizer.
  26. Premium Pine Shavings: Used during lost-circulation drilling conditions.
- G. All drilling below the base of the surface casing (approximately 660 feet) shall be done by the reverse-air, closed-circulation method.
- H. All discharge of drilling fluids and/or formation fluids shall be contained.
- I. When pilot hole drilling is initiated within a casing or borehole of a larger diameter than the pilot hole drilling bit, the bit shall be centered in the casing or borehole using the reamed hole bottom hole assembly. The bottom hole assembly outer diameter shall be approximately equal to the existing casing or borehole. The centered lead hole shall have a minimum length of 5 feet.
- J. During reaming operations inside any portion of a pilot hole not cemented, the CONTRACTOR must either incorporate the use of a lead bit or stinger and staged drilling assembly to facilitate the tracking of the uncemented pilot-hole interval or install a stabilizer assembly with fluted sides having the same nominal diameter as the reaming bit.
- K. A closed-circulation system shall be used for the drilling fluids, employing suitable devices such as screens, shale shakers, and settling tanks to remove cuttings. There are no means of handling or disposing of drilling fluids on the site.
- L. Anticipated borehole depths and diameters for the wells are depicted on the project drawings. Borehole diameters are considered nominal dimensions. The CONTRACTOR shall recommend the appropriate bit size for drilling the correct borehole

diameter. Borehole depths provided in the specifications are estimates, only; actual depths may vary and shall be determined by the CONSULTANT.

- M. The CONTRACTOR shall anticipate that casing setting depths may be shallower than the total depth of the previously drilled pilot hole.
- N. Boreholes shall be drilled and conditioned to permit geophysical logging and casing installation. The borehole shall be cleared of cuttings and stable to permit subsequent tasks to be completed without impairment. No additional payment will be made for re-drilling boreholes due to collapse or dredging of formation materials.
- O. All drilling fluid storage tanks shall be above ground. Dug mud pits shall not be permitted. Tanks shall be of sufficient length and construction to allow settling or removal of cuttings and prevent their reintroduction to the borehole.

### 3.2 ALIGNMENT REQUIREMENTS

- A. A priority requirement of these Specifications is the drilling of straight holes. The CONTRACTOR shall be required to perform the schedule of surveys as specified in this section. To ensure that the casing can be set to the required depths and properly cemented, all the holes shall be drilled so that they are straight. Hole straightness, which will permit setting of the casing to the required depths and providing sufficient annular space for proper cementing, and providing positive documentable assurance that the pilot hole has been wiped out by the reaming operations, shall not be sacrificed for drilling speed or any other reason.
- B. During all drilling of IW-2 the CONTRACTOR shall perform inclination surveys at intervals no greater than 90 feet as the drilling and reaming progresses. These surveys shall be performed using a wire-line instrument equipped with an inclination unit having a range between 0 and 3.5 degrees of inclination from the vertical and the survey record shall be capable of being read to the nearest one tenth of one degree.
- C. All holes for IW-2 shall be round, straight, and true to line. No dog-legs or departures from a straight line shall be permitted which will interfere or prevent casings from being set to their required depths.
- D. The maximum allowable inclination from the vertical at any portion of a hole or survey point shall be one (1) degree; the maximum allowable difference between any two successive survey points shall be 0.5 degree. Any deviation greater than one (1) degree, or difference greater than 0.5 degree (30 minutes) between two surveys, shall be corrected by the CONTRACTOR at his own expense.
- E. Should the inclination surveys or the results of the drilling of any of the pilot and/or reamed holes indicate that conditions have been or are being created that would prevent the casings from being set to their prescribed depths and properly cemented or prevent the well from being properly and successfully completed, the CONTRACTOR shall take steps to straighten the hole or correct the drift or deviation at his own expense so that casing can be installed to the prescribed depths and allow for proper cementing.
- F. The equipment shall be kept on the job at all times. The costs for surveys described in this section include those required to diagnose a problem and demonstrate the

effectiveness of any remedial work or demonstrate that no problem has occurred.

- G. Inclination surveys shall be performed at intervals no greater than 90 feet during all drilling events (including pilot-hole, reamed-hole and borehole drilling) above 2,700 feet bpl. Each survey shall be performed after the hole intercepts the survey depth with the least amount of over-drill as possible. Holes shall not be drilled more than 45 feet beyond each survey depth prior to performing the survey, unless otherwise approved by the CONSULTANT.
- H. During the drilling operations, the CONTRACTOR shall review the results of each survey and then submit the survey to the CONSULTANT (or CONSULTANT's Representative) on the site. The CONTRACTOR shall have a qualified crew member, proficient in the interpretation of the raw data, to review the results. In the event the survey data indicates hole drift or departure in excess of the specified limits, the CONTRACTOR shall take the following steps:
  - 1. Run additional surveys to demonstrate that the hole is within the specified limits.
  - 2. If the instrument is indicating that the hole is not meeting the specified limits, then the CONTRACTOR shall re-ream the hole and repeat the survey. This process shall be repeated or other actions taken by the CONTRACTOR to meet the specified limits at the CONTRACTOR's expense.
- I. If the CONTRACTOR feels that the instrument is in error, it shall be his responsibility to obtain a new instrument to confirm the survey data. If a new instrument requires 24 hours or less to be shipped to the site, the CONTRACTOR may, with the CONSULTANT's approval, continue the drilling operation. However, this does not relieve the CONTRACTOR of his responsibility of maintaining the hole within the specified limits. The CONTRACTOR shall bear all costs of repeated surveys, re-reaming the hole, or other steps required to meet the specified limits. No standby time will be paid for time spent during these procedures.
- J. At any time during construction, the CONSULTANT may require the CONTRACTOR to demonstrate the accuracy of the survey tool. This may include placing the tool at a specified and measured angle from vertical (between 1 and 1.5 degrees), and then "shooting" a survey.

### 3.3 FORMATION SAMPLES

- A. One (1) set of representative formation samples shall be collected by the CONTRACTOR from surface to the total depth of the well. Samples shall be taken every 10 feet and each change in formation or material type. The method must yield samples that are representative of the actual depth to which drilling has progressed.
- B. Each sample shall be approximately 8 ounces and be placed in a cotton, soil sample bag, Hubco or equivalent, or as approved by the CONSULTANT. Each sample shall be labeled with the date, well identification, and depth from which the sample was taken clearly marked on the container in indelible ink. The CONTRACTOR shall store and protect the samples from damage or disturbance until they have been released to and accepted by the CONSULTANT.

- C. Upon completion of drilling and upon authorization by the CONSULTANT, the CONTRACTOR shall forward one set of samples to the Florida Bureau of Geology in Tallahassee, Florida (3915 Commonwealth Boulevard, Tallahassee, FL 32399) along with any appropriate well completion reports. Prior to forwarding, the CONTRACTOR shall confirm with the Florida Bureau of Geology of the proper forms to be provided with the samples. If sample storage becomes a problem on the site, samples may be forwarded to the Florida Bureau of Geology as the work progresses with the approval of the CONSULTANT. CONTRACTOR shall provide documentation to the CONSULTANT that the samples have been received and accepted by the Florida Bureau of Geology.

### 3.4 REVERSE-AIR DISCHARGE WATER SAMPLES

- A. The CONTRACTOR shall supply new 500 ml HDPE sample bottles and appropriate laboratory sample containers for water sampling. The CONTRACTOR shall collect water samples at intervals no greater than 90 feet to the top of the injection zone unless directed otherwise by the CONSULTANT.
- B. The sample containers shall be plainly marked with the well identification and shall show the depth, date, time and sample temperature (when the sample was taken) from which (and when) they were taken.
- C. The CONTRACTOR shall collect reverse-air circulation water samples and perform field water-quality analysis of temperature and conductivity. CONTRACTOR also shall collect reverse-air circulation water samples for laboratory analysis of conductivity, chloride, TKN and ammonia.
- D. Appropriate sample containers shall be used, and the samples shall be immediately refrigerated or placed on ice until received by the laboratory.
- E. The CONTRACTOR shall refer to Section 2700 and 02785 for additional requirements for sampling, handling and analyzing samples.

### 3.5 CORE COLLECTION AND TESTING

- A. Cores shall be taken during the drilling of the 12-inch diameter pilot hole at discrete depths. Four-inch diameter cores, at least 10 feet long, shall be collected at depths designated by the CONSULTANT.
- B. The approximate number of cores estimated for this project is provided in Section 2700.
- C. A minimum 10-foot-long barrel is to be used as manufactured by the Christensen Diamond Products Company or approved equal.
- D. Cores must be a minimum of 36 inches in length with one piece at least 6 inches in length and full diameter to be considered an acceptable core. Cores that do not meet these criteria will not be accepted and the CONTRACTOR will not be paid for such core.
- E. The collecting of cores shall be observed by technicians from the manufacturer of the coring tool unless the CONTRACTOR can demonstrate previous successful experience.
- F. Coring points shall be determined from information derived during drilling operations and

as directed by the CONSULTANT. All cores shall be stored in wooden or high-strength plastic boxes with lids, marked with the appropriate well designation, and the depth from which they are taken. Tops and bottoms of the cores are to be marked as directed by the CONSULTANT.

- G. After collection, boxing, and labeling, each core shall be furnished to the CONSULTANT. The CONTRACTOR shall anticipate that the CONSULTANT will select up to three representative sections of each core on which the CONTRACTOR shall have laboratory analyses performed in order to determine vertical and horizontal hydraulic conductivity, porosity and specific gravity.
- H. The CONTRACTOR shall submit the name of the laboratory for approval to the CONSULTANT before analyses. After the core-sample analytical results are received, the remaining cores shall be shipped to Florida Geological Survey.

### 3.6 ABANDONMENT OF WELL BY CONTRACTOR

- A. Any hole in which the CONTRACTOR voluntarily stops work, and/or fails to complete in a satisfactory manner, in accordance with the regulations and/or Specifications and approved changes, shall be considered as abandoned by him.
- B. If the OWNER declares the hole abandoned by the CONTRACTOR, then no payment will be made for the abandoned hole. All abandoned holes shall be properly plugged and sealed by the CONTRACTOR at his own cost in accordance with Federal, State, and local regulations.
- C. All salvageable material furnished by the CONTRACTOR may be removed and remain his property. Casings may be removed only with the permission and approval of the CONSULTANT.
- D. The CONTRACTOR shall submit a written plan of action for plugging and abandonment to the OWNER and the CONSULTANT. Written approval from the OWNER shall be required before the CONTRACTOR is allowed to proceed.

**END OF SECTION**

## **SECTION 02745 – WELL CASING**

### **PART 1 – GENERAL**

#### **1.1 SCOPE OF WORK**

This section covers the work, materials, and equipment necessary for furnishing and installing casing in Injection Well IW-2 at the Glades Wastewater Treatment Facility (WWTF).

#### **1.2 SUBMITTALS**

- A. Provide casing mill certificates for all steel casing.
- B. Provide manufacturer's specification and product data for centralizers.
- C. Provide inventory of all casing and tubing stored onsite and any approved storage area. Provide separate tallies for each casing to be installed in the wells.
- D. Provide list of welders the CONTRACTOR proposes to use during drilling construction and the type of welding for which each has been qualified, along with current certification documents for each welder listed.
- E. Provide proposed design of "dummy" tool to verify roundness of 30-inch diameter final casing.

### **PART 2 – PRODUCTS**

#### **2.1 GENERAL REQUIREMENTS**

- A. All casings shall be new, unused and in good physical condition. Warped or damaged casing shall be rejected. The casing shall be clean and free of paint, oil, rust, scale, slag, and other material detrimental to welds and cement bonds. Casing that will not yield an acceptable cement bond as determined by the CONSULTANT shall be sandblasted (SSPC – SP-7 Finish) at the CONTRACTOR's expense.
- B. The CONTRACTOR may propose to the CONSULTANT the use of thicker-walled and/or well casing of a higher grade. The CONTRACTOR may also propose the use of larger diameter casing strings. Approval of such strings by the CONSULTANT is contingent upon approval by FDEP.
- C. The Contract provides an estimate of the amount of casing. The OWNER or the CONSULTANT shall determine actual lengths based on drilling results.
- D. Casing mill certificates shall be submitted to the CONSULTANT by the CONTRACTOR prior to delivery of the casing to the site for approval. Casing will not be approved for installation without mill certification submittal and approval by the CONSULTANT. Heat numbers on casing joints shall be readily visible and legible or the casing will not be accepted by the CONSULTANT.
- E. All steel casing sections shall be welded by certified welders. The CONTRACTOR shall

provide proof of welder's certifications to the CONSULTANT a minimum of 72 hours before any welding operations commence. The standards of the American Welding Society, Structural Welding Code (AWS D1.1) shall apply for all welded joint casing and accessories. All welds shall conform to the latest revision of ANSI B31.1.

- F. The CONTRACTOR shall provide the CONSULTANT with an inventory of all casing delivered to the site and maintain a tally during installation. The tally shall include the length of each section, weight of each joint, cumulative string weight, order of installation of casing sections, and locations of centralizers.
- G. Throughout each casing installation, the CONTRACTOR shall provide to the CONSULTANT the suspended casing string weight using the drill rig weight indicator.

## 2.2 IW-2 CASING

- A. Pit Casing: The CONTRACTOR may install a pit casing with an inside diameter sufficient to accommodate a nominal 64-inch diameter borehole. The material, length and method of installation shall be at the CONTRACTOR's option subject to approval by the CONSULTANT. The CONTRACTOR shall notify CONSULTANT a minimum of 36 hours prior to installation.
- B. Conductor Casing: The conductor casing shall be 58-inch outside diameter, minimum of 0.375-inch wall thickness, beveled end and shall conform to either API 5L-B, ASTM A53-B, Spiral Weld A139 Grade B, AWWA C200, or ASTM A2552 Grade 3 standards.
- C. Surface Casing: The surface casing shall be 48-inch outside diameter, minimum of 0.375-inch wall thickness, beveled end and shall conform to either API 5L Grade B, ASTM A53 Grade B, Spiral Weld A139 Grade B, AWWA C200, or ASTM A2552 Grade 3 standards.
- D. Intermediate Casing: The intermediate casing shall be 40-inch outside diameter, minimum of 0.375-inch wall thickness, beveled end and shall conform to either API 5L Grade B, ASTM A53 Grade B, Spiral Weld A139 Grade B, or AWWA C200 standards.
- E. Final Casing: The final casing shall be 30-inch outside diameter, 0.500-inch wall thickness, beveled end and shall conform to either API 5L Grade B or ASTM A53 Grade B standards.
  - 1. Each final casing section shall either be seamless or joined with a single continuous longitudinal welded seam. The casing section shall **not** be joined with a spiral weld.

## 2.3 CENTERING GUIDES

- A. All steel casings shall be fitted with centralizers as approved by the CONSULTANT.
- B. Centralizer material shall be steel when attached to carbon steel. The centralizers shall have a minimum thickness that equals the casing being centralized. Centralizers shall be welded.
- C. Centralizers shall have a minimum width of 2 inches and extend outward from the casing a minimum of 3 inches.
- D. Centralizers shall be placed at 0, 90, 180, and 270 degrees around the casing at each

position. The centralizers shall be located as follows:

1. One set within 20 feet above the bottom end of the casing.
2. Three sets spaced at 40-foot intervals above the bottom centralizer, and additional sets located at approximate intervals of 200 feet thereafter;
3. The top most centralizer set at a depth of 20 feet below pad level.
4. All centralizers shall be in precise vertical alignment, one above the other, to allow for the installation of tremie pipe in the annulus.

## **PART 3 – EXECUTION**

### **3.1 GENERAL**

- A. Casings shall be installed as described in the specifications and drawings. Actual casing depths shall be determined by the CONSULTANT.
- B. Casing failure by any means, including but not limited to: any collapse, breakage, separation, dents, tears or rips during construction that in any way impairs the use or construction of the well in the opinion of the CONSULTANT, shall be repaired or replaced at the CONTRACTOR's sole expense.
- C. Casing connections shall meet manufacture specifications for water tightness. Connections shall have equal strength to the casing itself.
- D. All steel casings shall have machine cut beveled ends. Beveled ends for butt welding shall conform to ASME B16.25.
- E. Surfaces shall be clean and free of paint, oil, rust, scale, slag, or other deleterious material detrimental to welding.
- F. Casing strings shall be straight and true of alignment to the satisfaction of the CONSULTANT. The casing shall be suspended in tension from the surface. The casings shall be lowered into the borehole open-ended and the weight of the casing shall be supported by the drilling rig.

### **3.2 WELDING**

- A. The standards of the American Welding Society, Structural Welding Code (AWS D1.1) shall apply for all welded joint casing and accessories. All welds shall conform to the latest revision of ANSI B31.1. All field joints shall be welded during installation by qualified welders in accordance with the requirements of AWWA C206.
- B. All welders and welding operators shall be qualified by a qualified testing laboratory before performing any welding under this section. Qualification tests shall be in accordance with Section IX, Article III of the ASME Boiler and Pressure Vessel Code. Welders and operators shall be qualified for making groove welds in carbon steel pipe in position 6G for each welding process to be used.

- C. All welded casing joints shall be made by Florida certified welders. Proof of welder's certification shall be provided prior to any welding performed.
- D. Surface Preparation: Any surface defects that shall affect the weld shall be chipped or ground out.
- E. There shall be a minimum of three (3) weld passes for each casing section. A power-driven wire brush shall be used to thoroughly clean each layer of weld, including the final pass.
- F. Cooling Time: Welded joints shall be allowed to cool for 30 minutes before the weld is placed in contact with water or until the welded joint reaches a temperature equal to or less than 400 degrees Fahrenheit.

END OF SECTION

## **SECTION 02750 – BOREHOLE AND ANNULAR GROUTING**

### **PART 1 – GENERAL**

#### **1.1 SCOPE OF WORK**

This section covers the work, materials, and equipment necessary for furnishing and installing grout for Injection Well IW-2 at the Port St. Lucie Glades Wastewater Treatment Facility (WWTF).

#### **1.2 SUBMITTALS**

- A. Provide data on all proposed additives and manufacturer's specifications.
- B. Provide bulk cement units weight tickets for verification of cement quantities pumped.
- C. During cementing, provide cement slurry weight, amount pumped and rate of pumping. Provide samples from each cement stage. The cement samples shall be submitted to the CONSULTANT as soon as they are available.
- D. Provide details of bridge plug to cement back the pilot hole in IW-2.

### **PART 2 – PRODUCTS**

#### **2.1 GENERAL REQUIREMENTS**

- A. The CONTRACTOR shall furnish and install all grout and additives as specified.
- B. Cement and dry additives shall be delivered to the site in their dry state and mixed with water on site. "Ready-mix", cement mixed with water prior to delivery to the site shall not be accepted for annular grouting.

#### **2.2 PORTLAND CEMENT**

Cement grout shall be API class B Portland cement and conform to ASTM C150, Type II standards.

#### **2.3 BENTONITE**

- A. Bentonite furnished for cementing shall be raw bentonite and thoroughly mixed at the ratio specified. Bentonite-cement mix ratio shall not exceed applicable regulations for cement grout.

### **PART 3 – EXECUTION**

#### **3.1 GENERAL**

- A. The CONTRACTOR is solely responsible for the successful execution of grouting. Annular grout shall be in conformance with the specifications and all applicable local and state regulations.

- B. The CONTRACTOR is solely responsible for defects in the grout or grouted interval. The CONTRACTOR shall take all precautions to protect the casing from collapse or damage during grouting. Any defects in the grout job or casing damage resulting from grouting shall be corrected by the CONTRACTOR at his own expense.
- C. The CONTRACTOR shall provide appropriate notice, as determined by the CONSULTANT, prior to each stage of cementing of the well to enable the CONSULTANT to observe all cementing operations.
- D. All cement blends shall be approved by the CONSULTANT in advance of placement, and the CONTRACTOR shall make provisions to pump more or less cement during specific stages as directed by the CONSULTANT.
- E. Neat cement only shall be used to cement the bottom 100 feet of the all casing strings (in a ratio of approximately 6 gallons of water per 94-pound sack).
- F. For all other cement stages when cementing casing strings, bentonite may be used as an additive up to 6 percent by weight.
- G. In lost circulation zones, Flocele and/or gilsonite may be used as necessary and as approved by the CONSULTANT. The CONSULTANT will consider the use of gravel in discreet intervals if repeated cement stages resulted in no cement lift. Gravel material shall be 1/4 to 3/8-inch in diameter, well sorted, and free of deleterious material.
- H. Cement with 12-percent bentonite by weight may be used for cementing pilot holes.
- I. The CONTRACTOR shall provide a pressurized mud scale for manual measurements.
- J. All cement and cement additives shall be approved prior to use by the CONSULTANT. The following cement and additives have been approved for similar injection well system construction projects.
  - 1. Portland Neat Cement (no additives): This shall be used when cementing in the bottom 100 linear feet of all casings.
  - 2. ASTM Type I/II Portland Cement with 6 percent Bentonite Gel Additive: This will be used to cement casing (except the bottom 100 feet).
  - 3. ASTM Type I/II Portland Cement with 12 percent Bentonite Gel Additive: This may be used to cement in a pilot hole.
  - 4. Calcium Chloride - used to accelerate the setting time of cement
  - 5. Sodium Gluconate – a cement additive that acts as a retardant, reducing the chance of getting a cement tremie stuck in the well

### 3.2 GROUTING

- A. Cementing shall be performed in stages. During all stages of cementing, the CONTRACTOR shall pump a pre-flush or spacer. Cement shall be placed in such a manner that no voids shall exist between the outer well casing and formation.

- B. It is the CONTRACTOR's responsibility to ensure that these operations are conducted in such a manner that the casing collapse and burst strengths (with safety factor) are not exceeded and the casings are not caused to fail. Cement shall be pumped or emplaced so that excessive pressures shall not result and affect the bond between casing and cement.
- C. During cementing the final casing, when performing cement stages by the AWWA Positive Placement-Exterior Method, the interior of the final casing shall not be pressurized.
- D. Cementing procedures shall be continuous for each stage after cementing begins. If loss of circulation or no return of cement is encountered, the CONSULTANT shall be notified immediately of what remedial measures are underway to re-establish the circulation and complete the cementing program according to well design and specifications.
- E. The CONTRACTOR shall submit cement-mix designs to the CONSULTANT for approval, including technical specifications for the pre-flush and the cementing procedures with calculations, at least 6 hours prior to the commencement of cementing operations for each stage of each casing string. All cement blends shall be approved by the CONSULTANT in advance of placement, and the CONTRACTOR shall, upon request by the CONSULTANT, make provisions to pump more or less cement during specific stages as directed by the CONSULTANT. The CONTRACTOR also shall submit to the CONSULTANT cement records (a mill test report) for each type of cement mixture to be emplaced; the mill test report shall contain the cement slurry density, the results of chemical analysis of the cement sample and results of compressive strength tests and shall be submitted to the CONSULTANT at least 72 hours before the beginning of cementing operations.
- F. During cementing the CONTRACTOR shall provide cement slurry weight data for each grouting stage. A fixed, safe, accessible location to collect samples must be provided to the satisfaction of the CONSULTANT. Samples of the cement slurry shall be collected, weighed and recorded. The correct mix ratios shall be maintained. If performed in batches, provide slurry weight and collect sample for each batch mixed. If performed in continuous mixing, provide slurry weights and collect samples at the beginning, middle, and end of pumping for each grouting stage. Cement samples shall include at least three, 2-inch cubes of each blend from each cement stage. The cement samples shall be submitted to the CONSULTANT as soon as they are available.
- G. During cementing the CONTRACTOR shall provide and utilize a calibrated barrel counter to measure cement volumes installed.
- H. After each stage of cementing (except when returns are observed at pad level), and before the next stage, the CONTRACTOR shall conduct a temperature log, and then shall tag the top of the cement with a collarless tremie pipe. The log shall be run at the appropriate time interval after completion of pumping, as per cementing company (industry standard) recommendations. The temperature log shall be performed between eight (8) hours and twelve (12) hours after the cement stage is complete.
- I. For the casing cementing operations, the first stage of cementing on each casing shall be performed in a manner consistent with the American Water Works Association

(AWWA) Standard for Water Wells (AWWA A100), Section B.4 (or the most recent revision) by the Interior Method - Without Plug.

- J. The CONTRACTOR shall wait for cement to cure for a minimum of 12 hours after the completion of each pressure-grout cementing operation before conducting a second cementing event on the same casing unless approved otherwise by CONSULTANT.
- K. The CONTRACTOR shall perform cement-top temperature logs during cementing operations as required in Sections 02700 and 02755.
- L. After the initial pressure-grout stage, the annular space outside of well casings shall be cemented in a manner consistent with the AWWA Standard for Water Wells (AWWA A100), Section B.3 (or the most recent revision) by the Positive Placement-Exterior Method.
- M. After cementing casings except the final casing string, a minimum period of 12 hours shall elapse before drilling or any other work in the well resumes. After cementing the final casing string, a minimum period of 24 hours shall elapse before drilling or any other work in the well resumes. No standby time shall accumulate during this time period.
- N. Conditions for gravel placement: CONTRACTOR shall provide cement plans to CONSULTANT for approval for each stage of cement. Cement plans shall include theoretical cement lifts based on XY caliper logging results. After performing a specific cement stage, cement-top temperature logging and a physical tag shall be performed, consistent with contract conditions. If the physical tag and cement-top temperature log show an actual cement lift less than 10% of the theoretical cement lift, the CONTRACTOR shall perform another cement stage. If the subsequent cement stage indicates an actual cement lift of less than 10% compared to the theoretical cement lift, the CONTRACTOR may request to install gravel. The size and material of the gravel shall be approved by the CONSULTANT prior to placement. The CONTRACTOR may install the approved gravel by the tremmie method. The amount of gravel shall be approved by the CONSULTANT, but shall not exceed a total of 20 contiguous vertical linear feet. After the approved amount of gravel is installed, measured in vertical feet, the CONTRACTOR shall resume with cement stages. The CONTRACTOR may again request the placement of additional gravel after two successive cement stages resulting in cement lifts less than 10% of theoretical.

### 3.3 PILOT HOLE BRIDGE PLUG

- A. The CONTRACTOR shall install a bridge plug in the pilot hole completed below the IW-2 40-inch O.D. intermediate casing. The CONSULTANT will provide to the CONTRACTOR the depth to set the plug. The CONTRACTOR will have an opportunity to evaluate the setting depth with the CONSULTANT prior to placement.
- B. The design and materials used for the bridge plug shall be provided for CONSULTANT's approval prior to placement. The CONTRACTOR also shall provide the proposed procedure for installing and setting. The design and setting of the plug shall allow the CONTRACTOR to cement back the pilot hole above the plug. The material of the plug shall allow the CONTRACTOR to drill out the plug during the reaming process.

**END OF SECTION**

## **SECTION 02755 – BOREHOLE GEOPHYSICAL AND VIDEO LOGGING**

### **PART 1 – GENERAL**

#### **1.1 SCOPE OF WORK**

- A. This section covers the work, materials, and equipment necessary for performing geophysical and downhole video logging in Injection Well IW-2 at the Port St. Lucie Glades Wastewater Treatment Facility (WWTF).

#### **1.2 SUBMITTALS**

- A. Provide name of survey company the CONTRACTOR proposes to use that specializes in downhole geophysical logging activities in deep well environments.
- B. If the CONTRACTOR does not propose to use a subcontractor, provide a list of loggers the CONTRACTOR proposes to use during the project and resumes detailing years of applicable logging experience and qualifications for performing logging operations.
- C. Provide all geophysical logs as follows:
  - 1. Provide Log ASCII Standard (LAS) format for each log performed immediately following logging activities and prior to commencing subsequent work activities including drilling and casing installation.
  - 2. Provide Portable Document File (PDF) format for each log performed immediately following logging activities and prior to commencing subsequent work activities including drilling and casing installation.
  - 3. Provide three (3) paper copies for each log performed immediately following logging activities and prior to commencing subsequent work activities including drilling and casing installation.
  - 4. Provide three (3) USB flash drives for each video survey performed immediately following logging activities and prior to commencing subsequent work activities including drilling and casing installation.
  - 5. Provide PDF and two (2) paper copies of merged cement-top temperature logs within 24 hours following cementing operations and prior to commencing subsequent work activities.

### **PART 2 – PRODUCTS (NOT USED)**

### **PART 3 – EXECUTION**

#### **3.1 GENERAL**

- A. The CONSULTANT shall be given 12 hours' notice of the time when the survey will be run to witness the performance of the survey.
- B. The CONTRACTOR shall employ the services of a qualified, experienced and approved

geophysical surveying company specializing in the operation of downhole geophysical equipment in deep well environments

- C. Geophysical logging shall be performed following drilling and borehole preparation. Borehole preparation shall include but not be limited to: i) continuation of drilling fluid circulation until drill cuttings have been removed from the borehole and the fluid is uniform in the borehole; or ii) reverse air pumping until the discharge water is free of cuttings and suspended sediment.
- D. The logging intervals shall be the total length of the borehole and a minimum of fifty (50) feet within casing unless otherwise directed by CONSULTANT. Each log must be run in a continuous fashion to be acceptable.
- E. The CONTRACTOR shall clean the hole and rerun logs if they fail to survey within five (5) feet of the bottom of the hole, as measured by the drill bit and pipe tally.
- F. Each log shall be recorded using a depth measurement that is accurate to within 0.1 foot. Each log shall be submitted with three scales of 1 inch representing 100 feet; 1 inch representing 50 feet; and 1 inch representing 20 feet.
- G. Each log shall include a repeat section of not less than 50 feet. The CONTRACTOR shall select the section that will best demonstrate the logging tool can repeat the log. The CONSULTANT reserves the right to require an additional repeat section of any 50-foot borehole interval.
- H. The CONSULTANT reserves the right to specify up/down hole logging speeds of surveys, but speeds shall not exceed 30 feet per minute.

### 3.2 DYNAMIC LOGGING

- A. The CONTRACTOR shall furnish and operate the pumping equipment and appurtenances necessary to perform the dynamic logs. The CONTRACTOR shall anticipate the need to install a submersible pump to achieve the minimum pumping rates.
- B. The CONTRACTOR shall perform dynamic logging at a minimum pumping rate of 350 gpm or with a minimum water level drawdown in the well of 50 feet.
- C. The CONTRACTOR shall maintain the required pumping rate for a minimum of 20 minutes prior to initiating dynamic logging. The CONTRACTOR shall maintain the pumping rate throughout the logging event.
- D. The CONTRACTOR shall ensure adequate storage space is available to contain the purge water during logging. Logging activities will not be sacrificed due to the CONTRACTOR's inability to contain the purge water.

### 3.3 CALIPER LOGGING PRIOR TO CASING INSTALLATION

- A. Caliper logging shall be performed in the reamed hole prior to installing casing. Casing installation shall be initiated with minimum delay following caliper logging and within 24 hours from completion of logging.

- B. If a caliper survey shows the hole to be less than the specified diameter at any location, the hole shall be re-reamed and re-logged at the CONTRACTOR's cost.

### 3.4 CEMENT-TOP TEMPERATURE AND CEMENT BOND LOGGING

- A. After each stage of cement where a minimum of twenty (20) barrels of cement were pumped, the CONTRACTOR shall perform a temperature log.
- B. The temperature log shall be performed between eight (8) hours and twelve (12) hours after the cement stage is complete.
- C. The logger, qualified in interpreting cement-top temperature logs, shall provide the approximate top of cement based on the logging results. The CONTRACTOR shall then physically tag the top of cement with tremie pipe and immediately report the tag depth to the CONSULTANT.
- D. If the estimated top of cement from the temperature log and the physical tag depth are significantly different, as determined by the CONSULTANT, the CONTRACTOR shall propose a plan to confirm the top of cement depth for the CONSULTANT's approval. The CONSULTANT reserves the right to require the CONTRACTOR, at his expense, to remove the tremie pipe from the casing annulus to verify that the pipe tally is accurate.
- E. Cement-top temperature logs are not required after cement stages where cement returns are observed at pad level. A temperature log is not required after the cement stage in IW-2 where the top of cement is approximately 500 feet from pad level and a cement-bond log is performed.
- F. The tool for cement bond logging in the 30-inch final casing of DIW-2 shall have receivers spaced 5 feet and 7 feet from the transmitter unless prior approval to use a tool with a different configuration is provided by the CONSULTANT.

### 3.5 VIDEO SURVEYS

- A. Downhole video surveys shall be performed as indicated in the geophysical logging schedule provided in this section.
- B. It is the CONTRACTOR's responsibility to ensure that the well column and borehole fluid is of sufficient clarity (as determined by the CONSULTANT) to allow each video survey to be conducted. The means and methods of obtaining a clear television image of the pilot-hole section are at the discretion of the CONTRACTOR, subject to good construction practices and existing regulations. The CONTRACTOR shall anticipate and allocate a sufficient period of time to achieve the water clarity necessary to obtain a video survey.
- C. Alternative methods of imaging the pilot-hole section may be proposed for CONSULTANT's approval. This may include a borehole televiewer.
- D. The video camera shall be color and capable of 360-degree movement; be controlled by the logging technician; be independent of the camera body; have side-view and focus capability.

- E. The video camera shall be centralized in the borehole. The centralizers shall self-adjust to different casing and hole sizes as necessary.
- F. The video shall continuously display the depth referenced from pad level.
- G. The video camera shall be lowered at a rate specified by the CONSULTANT. It is anticipated that a logging rate of between 20 and 25 feet per minute will meet this requirement. The CONTRACTOR shall anticipate that the CONSULTANT may require viewing multiple intervals of the borehole (or cased hole) using the side-view lens.

### 3.6 GEOPHYSICAL LOGGING SCHEDULE

- A. The following geophysical and video logs shall be performed in IW-2 (next page)

IW-2 Logging Phase	Total Logged Depth (ft bpl)	Logging Performed in IW-2
64-inch reamed hole prior to setting 58-inch conductor casing	195	XY Caliper, Gamma-ray
During cementing of 58-inch conductor casing	190	Cement-top Temperature
58-inch borehole from base of conductor casing to approximate setting depth of surface casing	665	XY Caliper, Gamma-ray, Dual Induction
During cementing of 48-inch surface casing	660	Cement-top Temperature
Pilot hole from base of surface casing to approximate 1,700 feet	1,700	<b>Static Logs:</b> XY Caliper, Gamma-ray, Dual Induction, Borehole Compensated Sonic w/ VDL, Temperature, Fluid Conductivity, Flowmeter, Borehole Televiewer, log-derived TDS
		<b>Dynamic Logs:</b> Temperature, Fluid Resistivity, Flowmeter
48-inch reamed hole prior to setting 40-inch intermediate casing	1,605	XY Caliper
During cementing of 40-inch intermediate casing	1,600	Cement-top Temperature
Pilot hole from intermediate casing through injection zone	3,500	<b>Static Logs:</b> XY Caliper, Gamma-ray, Dual Induction, Borehole Compensated Sonic w/ VDL, Temperature, Fluid Conductivity, Flowmeter, Borehole Televiewer, log-derived TDS
		<b>Dynamic Logs:</b> Temperature, Fluid Resistivity, Flowmeter
After reaming 40-inch borehole to final casing setting depth (top of injection zone)	2,605	XY Caliper
During cementing of 30-inch final casing	2,600	Cement-top Temperature
After cementing 30-inch final casing	2,600	Modified Cement-Bond
After reaming 30-inch borehole to total open hole depth	3,500	XY Caliper, Video, Pressure Test, Background Gamma-ray, Background Temperature, Radioactive Tracer Survey

**END OF SECTION**

## SECTION 02760 – INFLATABLE PACKER TESTING

### PART 1 - GENERAL

#### 1.1 SCOPE OF WORK

- A. This section covers the work, materials, and equipment necessary for performing inflatable packer testing in Injection Well IW-2 at the Port St. Lucie Glades Wastewater Treatment Facility (WWTF).

#### 1.2 SUBMITTALS

- A. Provide calibration certificates of flowmeters for use during testing. Meters shall have been calibrated within six (6) months from the time of each test. The CONTRACTOR shall assume that multiple meters will be necessary to accurately measure the rates from the different tests.
- B. Provide diagram of proposed packer assemblies for both single packer and straddle-packer testing. The diagram shall include the diameters with the assembly deflated and the maximum diameters with the assembly safely inflated. The diagram also shall include the minimum length between the centerlines of the straddle packer assembly.
- C. Provide specifications of the pressure/water-level transducers to be used for both inside and outside the drill string. The manufacturer, model number, and pressure rating of the transducers shall be included.
- D. Provide all data from transducers from each test in Excel format and provide all manual data collected by the CONTRACTOR (including packer pressures, flow rates and totalizer readings). Data shall be accepted by the CONSULTANT prior to deflating packers for each test.
- E. Provide proposed certified laboratory for analyzing packer test water quality samples.
- F. Provide laboratory reports from each packer test. CONTRACTOR shall assume that CONSULTANT will not submit casing setting requests to FDEP until all lab reports are received.

### PART 2 – PRODUCTS

#### 2.1 GENERAL

- A. Furnish and install a dual-seal, open-hole packer, as manufactured by Baker, TAM J, Baski, or approved equal, of a diameter appropriate for the size of hole drilled. Large diameter packer or packer sleeves may be necessary to test large diameter portions of the borehole.
- B. The pipe used between the inflatable packers shall consist of appropriate diameter steel pipe or tubing. The pipe/tubing shall be uniformly slotted; the slots shall be distributed near the top, middle, and bottom of the pipe/tubing with the slotted openings occupying at least 25 percent of the surface area.

- C. Provide water level or pressure transducers and data logger manufactured by Insitu™ or approved equal. The transducers shall have an appropriate range and accuracy for the well as approved by the CONSULTANT prior to testing.
- D. Pressure transducers shall be placed inside the drill pipe just above the pump and in the annulus with at least 50 feet of submergence. The recorded data-logger data must be able to be viewed during testing.
- E. The pressure transducers shall be calibrated in the well on the day that it is installed for monitoring the tests. The transducer pressure measurement shall be plotted against depth and a correction formula determined, if deemed necessary by the CONSULTANT.
- F. The CONTRACTOR shall be responsible for providing appropriate-sized submersible pumps necessary to successfully complete each packer pumping test. The pump(s) shall have the capability of pumping at constant rates from 0.5 to 100 gpm at a total head up to 200 feet.

### **PART 3 – EXECUTION**

#### **3.1 GENERAL**

- A. The CONTRACTOR shall conduct inflatable packer-type tests as described in Section 2700 and as directed by the CONSULTANT. The CONTRACTOR may be required to perform single-packer borehole pumping tests or straddle-packer pumping tests as specified in these Specifications at the discretion of the CONSULTANT. The packer tests shall be conducted such that hydrologic properties of the formation can be determined and a representative water sample can be collected for analysis.
- B. For all packer tests, the uppermost 270 feet of work pipe shall consist of drill pipe with a minimum 6-inch inside diameter to facilitate the installation of an appropriate submersible electric pump. The pump shall be set at a depth of approximately 250 feet (or greater) below pad level.
- C. The internal surfaces of the drill pipe, casings and other fittings used for the packer tests shall be free of rust, scale and other materials that could be dislodged and interfere with the results of a test. The CONTRACTOR shall ensure the stand pipe and joints do not leak during testing operations.
- D. The CONTRACTOR shall provide, install and operate pressure transducers and data loggers capable of measuring changes in water level to an agreed accuracy as required by the CONSULTANT for the intervals both below and above the upper packer. The CONTRACTOR shall provide a means to monitor the packer seal, by water-level measurements of the work (drop) pipe annulus, using an electronic probe/transducer and computerized data logger.
- E. The CONTRACTOR shall furnish and install in the pipeline within 30 feet of the well to be pumped, a flowmeter capable of recording instantaneous flow rates and totalizing flow. The flow meter shall have an accuracy of 5 percent at the tested rate. The flow meter shall be sufficiently removed from valves, elbows and reductions and obstructions in the pipeline to allow the meter to perform within specifications. The CONTRACTOR shall provide a throttling valve downstream of the flowmeter to regulate flow.

### 3.2 TESTING PROCEDURES

- A. The CONSULTANT will select the depth intervals to be tested based on the geophysical logs (including video surveys), geologic logs, core samples and other available site-specific and regional data. The CONSULTANT will discuss with the CONTRACTOR the packer testing plan for each borehole tested. The CONTRACTOR will be given the opportunity to evaluate the CONSULTANT's packer depth selection before commencing packer setting.
- B. The CONSULTANT reserves the right to change the testing plan, the sequence of tests performed, the configuration of packer assembly (single or straddle) and the spacing of the packers. The CONTRACTOR shall assume that additional tests may be required by FDEP.
- C. After successfully setting and inflating the packer, the CONTRACTOR shall develop each zone so that the discharge water is free of any drilling fluid (and produces stable water-quality results, as determined by the CONSULTANT). Unless directed otherwise by the CONSULTANT, the CONTRACTOR shall allow for a minimum of 8 hours of pre-test development (and development of a minimum of 2 drill pipe volumes) prior to each packer pumping test.
- D. The CONTRACTOR may perform multiple methods to develop the test interval. The final development shall be performed with the pump to be used for the packer test. The CONTRACTOR shall record data from pump development using the pressure transducers.
- E. After development, the CONTRACTOR shall allow water levels in the work pipe to return to static conditions to the satisfaction of the CONSULTANT. The CONTRACTOR shall continue to record transducer data during recovery following development.
- F. After post-development recovery, the CONTRACTOR shall ensure the transducers and data-loggers are collecting data at the frequency required by the CONSULTANT. The CONTRACTOR shall then turn on the pump and initiate pump testing.
- G. The CONSULTANT will determine the duration of the pump test, but the CONTRACTOR may assume a duration of eight (8) hours or until a minimum of one drill pipe volume plus three test interval volumes have been pumped from the well, whichever is longer.
- H. Just prior to the completion of each test and as directed by the CONSULTANT, the CONTRACTOR shall collect a water sample from the discharge for laboratory analysis. The CONTRACTOR shall provide appropriate sample containers obtained from the approved laboratory. The parameters noted below shall be analyzed by a state certified laboratory. The CONTRACTOR shall refrigerate or ice the samples until the laboratory has custody of the samples.

All Tests (including Confinement Tests)	Additional Parameters for Confinement Tests
total dissolved solids	magnesium*
chloride	alkalinity*
sulfate	bicarbonate*
specific conductance	sodium*
temperature	calcium*
ammonia-nitrogen	potassium*
total Kjeldahl nitrogen	*Refers to parameters to be analyzed during tests to identify confinement.
phosphorus	
pH	

- I. The CONTRACTOR shall refer to Section 02785 for additional requirements for sampling, handling and analyzing samples.
- J. If the formation does not produce enough water to purge one drill pipe volume and three test interval volumes within 8 hours, the CONTRACTOR may propose to collect the water quality sample using a thief sampler, subject to CONSULTANT's approval. If approved, the sample shall be collected after completion of post-test recovery and prior to deflating the packers. The thief sampler shall be capable of collecting a sample directly within the test interval and shall be able to collect a sufficient volume of water for proper analysis of the required parameters.
- K. After collecting the water-quality samples and upon completion of the packer test, as determined by the CONSULTANT, the CONTRACTOR shall ensure the transducers and data-loggers are collecting data at the frequency required by the CONSULTANT. The CONTRACTOR shall then turn off the pump and allow water levels to recover.
- L. The CONSULTANT will determine the duration of post-test recovery, but the CONTRACTOR shall assume a duration of eight (8) hours.
- M. Upon completion of post-test recovery, the CONTRACTOR shall provide the recorded data-logger data to the CONSULTANT in Excel format. The CONTRACTOR shall not deflate and move the packers until the CONSULTANT receives the electronic data and confirms that it is acceptable.
- N. The CONTRACTOR shall be solely responsible for the collection and downloading of test data. Throughout development, testing and recovery activities, the CONTRACTOR shall provide the CONSULTANT access to view transducer data on a real-time basis.

### 3.3 FAILURE TO COMPLETE TESTING

- A. In the event of test failure for any cause, including loss or non-recording of data, the CONTRACTOR shall repeat the test at his own cost.

- B. If accidental shutdown or a variation in the pumping rate occurs prior to the specified end of the test which invalidates the data in the CONSULTANT's opinion, the CONTRACTOR shall make any necessary repairs and re-start the test from the beginning. No payment will be made for pumping time (or anything else) prior to any accidental shutdown.

**END OF SECTION**

## SECTION 02765 – PAD MONITOR WELLS

### PART I - GENERAL

#### 1.1 SCOPE OF WORK

- A. This section covers the work, materials, and equipment necessary for installing, developing, sampling and completing Surficial aquifer water-table pad monitor wells at the Port St. Lucie Glades Wastewater Treatment Facility (WWTF).

#### 1.2 SUBMITTALS

- A. Provide proposed locations of pad wells on site plan.
- B. Provide proposed Florida-licensed water-well CONTRACTOR for installation of pad wells.
- C. Provide manufacture's specifications and technical data for completion of pad monitor wells. Submittal shall include: manufacturer, material and diameter of casing and screen; screen slot size; gravel pack material and size; cement type.
- D. Provide drilling method to install pad wells.
- E. Provide elevation of top of casings, surveyed to North American Vertical Datum 1988 (NAVD 88).
- F. Provide laboratory results of water quality samples.
- G. Provide well completion report, FDEP Form 62-532.900(2). Reports for each well shall be completed and submitted to the CONSULTANT and FDEP for both the initial construction of the pad wells and for the completion of the wells at the end of the project.

### PART 2 – PRODUCTS

#### 2.1 GENERAL

- A. The casing for pad wells shall be new and unused, 4-inch inside diameter, flush thread, Schedule 40 PVC as manufactured by Monoflex® or approved equal.
- B. The well screen shall be new and unused, 4-inch inside diameter, flush thread, Schedule 40 PVC, flush threaded, 0.020-inch slot screen as manufactured by Monoflex® or approved equal. A flush thread PVC cap shall be secured at the base of the screen.
- C. Gravel pack shall be Standard Sand and Silica Company, "Sand", 8 by 20, gravel, or equivalent. The gravel material shall be a minimum of 95% silica material.

### PART 3 – EXECUTION

#### 3.1 GENERAL

- A. The CONTRACTOR shall install four (4), 4-inch diameter monitor wells, in the vicinity of IW-2 well drilling pads at least 14 days prior to beginning the work on IW-2. The purpose of the

wells will be to monitor the water-table aquifer for spill(s) of salty water during drilling operations and, if necessary, to pump out the shallow aquifer to reduce any contaminant level to background conditions, if a spill occurs.

- B. The monitor wells shall be installed by a licensed water-well CONTRACTOR and shall be completed with 10 feet of 4-inch diameter, Schedule 40 PVC, 0.020-inch slot screen threaded to 4-inch diameter, Schedule 40 PVC casing, as directed by the CONSULTANT.
- C. The total depth of the well screen shall be located a minimum of 10 feet below the top of the water table or 20 feet below land surface, whichever is greater.
- D. The annulus adjacent to the screen interval shall be sand packed with 6/20 grade silica sand (to at least 2 feet above the top of the screen interval) and the annulus above the screen then shall be sealed with approximately 1 foot of bentonite and then grouted (with ASTM Type II neat cement) to surface. The top of well casings may be completed above grade.
- E. Prior to drilling startup, the top of casings shall be surveyed (NAVD 1988). If the wells become damaged at any time during the project, the wells shall be repaired or replaced and the top of casings shall be resurveyed. The monitor wells shall be capped with a lockable expansion plug and equipped with a lock.

### 3.2 SAMPLING

- A. Water samples from each well shall be collected each week for the entire duration of construction as directed by the CONSULTANT and in accordance with FDEP standards. For the first four (4) weeks, the CONTRACTOR shall collect samples for laboratory analysis of total dissolved solids by a state-certified laboratory as directed by the CONSULTANT. For the entirety of the project, the CONTRACTOR shall collect samples for laboratory analysis of chlorides.
- B. The CONTRACTOR shall collect and record static water levels from each well prior to purging. Purging and sampling shall meet protocols specified in FS 2200-Groundwater Sampling in the DEP-SOP-001/01 Standard Operating Procedures for Field Activities. The results of the purging techniques and field stabilization parameters shall be provided on DEP Form FD 9000-24. Field parameters on DEP Form FD 9000-24 include: pH, temperature, conductivity, dissolved oxygen, turbidity, color, and odor.
- C. If elevated conductivity and/or chloride readings are observed (as compared to background readings measured prior to drilling commencement), at a minimum, the well with the elevated readings shall be purged (and purge water contained) until readings return to background levels as determined by the CONSULTANT. Purging the wells does not relieve the CONTRACTOR from performing additional remediation measures if spillage of drilling fluids occurs.
- D. The CONTRACTOR shall refer to Section 02785 for additional requirements for sampling, handling and analyzing samples.

### 3.3 WELL COMPLETION

- A. After completion of construction and testing at IW-2, the CONSULTANT will direct the CONTRACTOR whether the water table monitor wells shall remain in place or if they shall be abandoned.
- B. If the wells are to remain in place, the wells shall be flush-mounted within a (2-foot by 2-foot) concrete well pad using an 8-inch diameter steel well vault and a steel vault cover. The monitor well casing shall be capped with a lockable expansion plug and equipped with a lock.
- C. If the pad monitor wells are to be abandoned, the CONTRACTOR shall place a tremie pipe inside each well and grout each well (with ASTM C-150 Portland Type II cement) from bottom to top. The well casing shall be cut off below grade, and the cement grout shall be flush with ground level. Plugging and abandonment documentation shall be provided with FDEP Form 62-532.900(2).

END OF SECTION

## **SECTION 2770 –INJECTION TESTING**

### **PART 1 – GENERAL**

#### **1.1 SCOPE OF WORK**

- A. This section covers the work, materials, and equipment necessary for performing a short-term injection test in Injection Wells IW-1 and IW-2 at the Port St. Lucie Glades Wastewater Treatment Facility (WWTF).

#### **1.2 SUBMITTALS**

- A. Provide injection test plans for CONSULTANT's approval. A separate plan shall be provided for each injection well. The plan shall include the number and location of injection pumps, piping layout, placement and type of valves, flowmeter placement and vortex breaker.
- B. Provide analytical report of injection test source water (no report necessary if the source is potable water).
- C. Provide analytical report of background water quality samples from the IW-2 injection zone.
- D. Provide calibration certificates of flow meter(s). Flowmeter(s) shall be equipped with a data logger.
- E. Provide calibration certificates of wellhead pressure gauges.
- F. Provide calibration certificates and specifications of proposed pressure transducers.
- G. Provide performance curves for proposed pumps.
- H. Provide all data, in Excel format, obtained from transducers and data loggers. Provide all manual data collected during testing.

### **PART 2 – PRODUCTS (NOT USED)**

### **PART 3 – EXECUTION**

#### **3.1 INJECTION TEST PREREQUISITES**

- A. The CONTRACTOR shall perform an injection test on IW-1. Prior to performing the test, the CONTRACTOR shall complete the following:
  - 1. Provide water-quality laboratory analysis of injection test water source in accordance with FDEP permit.
  - 2. Provide a plan to perform the injection test that is acceptable to the CONSULTANT and FDEP.
  - 3. Provide all required information to the CONSULTANT to secure authorization from

FDEP to perform the injection test.

- B. The CONTRACTOR shall perform an injection test on IW-2. Prior to performing the test, the CONTRACTOR shall complete the following:
  - 1. Complete the construction of IW-2.
  - 2. Collect water quality samples for laboratory analysis from the IW-2 injection zone.
  - 3. Provide water-quality laboratory analysis of injection test water source in accordance with FDEP permit.
  - 4. Complete successful cement-bond logs and hydrostatic pressure test in IW-2. Complete successful RTS in IW-2. Demonstrate IW-2 has mechanical integrity.
  - 5. Provide a plan to perform the injection test that is acceptable to the CONSULTANT and FDEP.
  - 6. Provide all required information to the CONSULTANT to secure authorization from FDEP to perform the injection test.

### 3.2 IW-1 INJECTION TEST PLAN AND SETUP

- A. An injection test shall be performed by the CONTRACTOR with a pumping/injection phase of approximately 8 hours at different rates with the maximum rate meeting or slightly exceeding 18,350 gpm (26.42 MGD) or at a maximum rate that results in a wellhead pressure of 120 psi, whichever is less.
- B. The CONTRACTOR shall provide an injection test plan for the CONSULTANT's approval. At a minimum the plan must include pump(s) curves, piping layout, valves, flowmeters, transducers, recording system and vortex breaker.
- C. The CONTRACTOR shall provide and install all temporary piping and pump(s) from the water source (on-site stormwater storage pond located approximately 600 feet from IW-1) to the injection wellhead to achieve the required flow rate into the injection well. The pipeline intake shall be equipped with a manufactured (factory) vortex breaker and shall be installed to the satisfaction of the CONSULTANT.
- D. The CONTRACTOR shall furnish and install flowmeter capable of recording instantaneous flow rates and of totalizing flow in the pipeline. The flow meter shall have an accuracy of five percent at the tested rate. Certified proof of calibration within the previous 3-month period (with the time and date of calibration) shall be submitted to the CONSULTANT prior to the injection testing procedures. The flow meter shall be sufficiently removed from obstructions in the pipeline, valves, elbows, reductions, to allow the meter to perform within specifications. Manufacturer's specifications shall be submitted to the CONSULTANT prior to installation for approval.
- E. An approved pressure transducer and recording system capable of accurately measuring and detecting pressure changes of as little as 0.01 psi, and temperature changes of as little as 0.05 degree Fahrenheit shall be used. The data recording system shall record in real time and continuous "delta" time. No interruptions of data recording

will be permitted for equipment service or any other reason. The CONTRACTOR shall submit manufacturer's product information for the electronic pressure transducers and the recording equipment.

- F. The CONTRACTOR shall furnish and install electronic pressure transducers in (or on) each monitoring zone (upper and lower zone) wellhead and at injection well IW-1 wellhead, to the satisfaction of the CONSULTANT. Pressure transducers shall be installed at both IW-1 and IW-2 for each injection test performed. The CONTRACTOR shall submit verification of pressure-gauge/transducer calibration (certified within the previous 6 months) to the CONSULTANT prior to commencement of the injection test.

### 3.3 IW-2 INJECTION TEST PLAN AND SETUP

- A. An injection test shall be performed by the CONTRACTOR with a pumping/injection phase of approximately 8 hours at different rates with the maximum rate meeting or slightly exceeding 20,575 gpm (29.63 MGD).
- B. The CONTRACTOR shall provide an injection test plan for the CONSULTANT's approval. At a minimum the plan must include pump(s) curves, piping layout, valves, flowmeters, transducers, recording system and vortex breaker.
- C. The CONTRACTOR shall provide and install all temporary piping and pump(s) from the water source to the new injection wellhead to achieve the required flow rate into the injection well. The pipeline intake shall be equipped with a manufactured (factory) vortex breaker and shall be installed to the satisfaction of the CONSULTANT.
- D. The CONTRACTOR shall furnish and install flowmeter capable of recording instantaneous flow rates and of totalizing flow in the pipeline. The flow meter shall have an accuracy of five percent at the tested rate. Certified proof of calibration within the previous 3-month period (with the time and date of calibration) shall be submitted to the CONSULTANT prior to the injection testing procedures. The flow meter shall be sufficiently removed from obstructions in the pipeline, valves, elbows, reductions, to allow the meter to perform within specifications. Manufacturer's specifications shall be submitted to the CONSULTANT prior to installation for approval.
- E. An approved pressure transducer and recording system capable of accurately measuring and detecting pressure changes of as little as 0.01 psi, and temperature changes of as little as 0.05 degree Fahrenheit shall be used. The data recording system shall record in real time and continuous "delta" time. No interruptions of data recording will be permitted for equipment service or any other reason. The CONTRACTOR shall submit manufacturer's product information for the electronic pressure transducers and the recording equipment.
- F. The CONTRACTOR shall furnish and install electronic pressure transducers in (or on) each monitoring zone (upper and lower zone) wellhead and at injection well IW-2 wellhead, to the satisfaction of the CONSULTANT. Pressure transducers shall be installed at both IW-1 and IW-2 for each injection test performed. The CONTRACTOR shall submit verification of pressure-gauge/transducer calibration (certified within the previous 6 months) to the CONSULTANT prior to commencement of the injection test.

### 3.4 INJECTION TESTS

- A. The injection testing of IW-1 and IW-2 shall be conducted separately and shall not occur within 4 days of each other.
- B. After completing setup of all required equipment and instruments, the CONTRACTOR shall perform a brief pre-test. The CONTRACTOR shall establish appropriate valve and pump settings; shall initiate data collection of transducers and data-loggers and shall ensure piping to the injection well is watertight. The maximum duration for pre-test activities is three (3) hours.
- C. The water source for the injection test is anticipated to be the stormwater retention pond located at the Glades WWTF site approximately 600 feet each of IW-1 and 850 feet east of IW-2.
- D. During and upon completion of pre-test activities, the CONTRACTOR shall collect transducer data of: IW-1 and IW-2 wellhead pressures, DZMW-1 water-levels and pressures (both zones), and barometric pressure. Data shall be collected for a minimum of 24 hours prior to performing each injection test. This data collection period is considered the "background phase". The CONTRACTOR shall also collect tidal information from the nearest NOAA station from pre-test activities through the injection testing and final recovery phase of the test.
- E. The injection tests shall be initiated during regular working hours for the FDEP, Monday through Friday. The CONTRACTOR is responsible for contacting and coordinating with the FDEP who require seven (7) days written notice of the injection test.
- F. During the injection tests, the CONTRACTOR shall continue collecting the same data as was collected during the background phase. The frequency of transducer data collection will be determined by the CONSULTANT. The CONTRACTOR shall also collect flowrate data using a flowmeter equipped with a data logger. The CONTRACTOR shall also assist the CONSULTANT in collecting manual data from the flowmeter and pressure gauges.
- G. Upon start-up of injection testing, the CONTRACTOR shall establish the required injection rate with minimum delay. The CONTRACTOR shall adjust pump and valve settings upon direction from the CONSULTANT to achieve desired injection rates. The injection test of IW-1 shall be run at a pumping rate of approximately 2,000 gpm for two hours, 4,500 gpm for two hours and approximately, but not less than, 18,350 gpm for four hours as directed by the CONSULTANT. The injection test of IW-2 shall be run at a pumping rate of approximately 5,200 gpm for three hours, 10,400 gpm for three hours and approximately, but not less than, 20,575 gpm for two hours as directed by the CONSULTANT. If a wellhead pressure of 120 psi is reached prior to reaching the maximum pumping rate, the pumping rate that results in the wellhead pressure of 120 psi shall be used as the maximum pumping rate. The pumping portion of each test shall be run for approximately 8 hours.
- H. To the extent possible, the speed of the pump and motor shall remain constant throughout the test. The injection rate shall be controlled and adjustable by means of a control valve in the pipeline. The pumping rate shall not be adjusted by changing the speed of the motor or pump, except when absolutely necessary and with the permission

of the CONSULTANT. This requirement does not pertain to occasions when the CONSULTANT directs the CONTRACTOR to change the injection rates.

- I. The maximum sustained wellhead pressure during injection testing of IW-2 is not expected to exceed two-thirds (120 psi) of the injection well's pressure rating (based on a successful rating to approximately 180 psi).
- J. Upon completion of the 8-hour injection period, the CONTRACTOR shall shut down all injection pumps and close the valve at the injection well (shut-in the well) with minimum delay. The CONTRACTOR shall continue collecting all transducer data. The CONTRACTOR shall also continue collecting manual pressure data from IW-1, DZMW-1, and IW-2 gauges for a minimum of one (1) hour after shutting in the well until pressures are stabilized (whichever is greater). The CONTRACTOR shall continue collecting tidal data.
- K. The CONTRACTOR shall continue collecting all transducer and tidal data for a minimum of 24 hours after shutting in the injection well. This data collection period is considered the "recovery phase".
- L. The CONTRACTOR shall remove all equipment and piping that is impacting plant operations or other construction activities with minimum delay. Water source connections used for the injection test shall be restored to original conditions.
- M. Upon completion of the recovery phase, the CONTRACTOR shall provide all manual, transducer, and tidal data. The CONSULTANT shall be furnished a copy of all of the basic data recorded as part of the injection tests in Excel format within 24 hours from completing the recovery phase.

### 3.5 FAILURE TO COMPLETE TESTING

- A. In the event of test failure for any cause, including loss or non-recording of data, the CONTRACTOR shall repeat all phases of the test (including background and recovery) at his own cost.
- B. If accidental shutdown or a variation in the injection rate (not directed by the CONSULTANT) occurs prior to the specified end of the test which invalidates the data in the CONSULTANT's opinion, the CONTRACTOR shall make any necessary repairs and re-start the test from the beginning. No payment will be made for testing time (or anything else) prior to any accidental shutdown.

END OF SECTION

## **SECTION 02775 – RADIOACTIVE TRACER SURVEY (RTS)**

### **PART 1 – GENERAL**

#### **1.1 SCOPE OF WORK**

- A. This section covers the work, materials, and equipment necessary for performing radioactive tracer survey (RTS) testing and associated geophysical logging in Injection Well IW-2 at the Port St. Lucie Glades Wastewater Treatment Facility (WWTF).

#### **1.2 SUBMITTALS**

- A. Provide details of RTS tool. Details shall include distances between sensors and ejector port and calculations of ejection times.
- B. Provide Iodine 131 assay label.
- C. Provide flowmeter calibration certificate of flowmeter for RTS.
- D. Provide all geophysical logs as follows:
  - 1. Provide Log ACII Standard (LAS) format for each log performed immediately following logging activities and prior to commencing subsequent work activities.
  - 2. Provide Portable Document File (PDF) format for each log performed immediately following logging activities and prior to commencing subsequent work activities.
  - 3. Provide two (2) paper copies for each log performed immediately following logging activities and prior to commencing subsequent work activities.

### **PART 2 – PRODUCTS (NOT USED)**

### **PART 3 – EXECUTION**

#### **3.1 GENERAL**

- A. The logging and testing detailed in this section, to be performed in IW-2, include:
  - 1. High-resolution temperature logging
  - 2. Background gamma-ray logging
  - 3. Magnetic casing-collar locator
  - 4. Radioactive tracer survey (RTS)
  - 5. Final gamma-ray logging
- B. Upon completion of the video survey and hydrostatic pressure test of the final casing of IW-2, temperature, background gamma-ray, RTS, and final gamma-ray logs shall be performed on IW-2.

- C. The geophysical tool used for the RTS must be capable of ejecting the radioactive tracer and simultaneously monitoring with “scintillation”-type gamma-ray detectors. A casing collar locator shall be positioned below the tool to precisely locate the bottom of the casing.
- D. The tool shall be configured such that one gamma-ray detector will be located above the ejector and two detectors will be located below the ejector.
- E. The radioactive material used for the testing shall be *medical grade* Iodine 131. The RTS tool shall be loaded with a minimum of four (4) millicuries (mCi) of Iodine 131. The CONTRACTOR shall be required to demonstrate that the Iodine 131 tracer utilized for the RTS is not more than 6 days old on the day that the RTS is performed and the CONTRACTOR shall provide a copy of the Iodine 131 certification to the CONSULTANT.
- F. The flowmeter utilized for the test shall be certified as calibrated within the previous 6-month period from date of the RTS test and shall be capable of measuring the flow rate with an accuracy of 5%. The calibration certificate shall be provided *prior* to the initiation of the RTS procedures and shall indicate the date and place of the flowmeter calibration. Verification of the flowmeter calibration shall be submitted to the FDEP representative prior to commencement of the test.

### 3.2 TESTING PROCEDURE

- A. The logging and testing procedure shall be performed as follows and in accordance with FDEP requirements:
  - 1. Prior to initiation of high-resolution temperature logging, approximately three (3) well volumes of freshwater shall be injected to establish a freshwater “bubble” below the final casing seat. Note: 34.29 gallons/foot; Total of 89,154 gallons per well volume (with final casing set at 2,600 feet); Total of 267,462 gallons for three well volumes.
  - 2. After establishing a freshwater bubble, the CONTRACTOR shall shut in the well and maintain shut in conditions for a minimum of twelve (12) hours prior to performing logging.
  - 3. A combination gamma-ray/temperature tool shall be used to initially log the injection well, recording temperature from land surface to the total well depth. The temperature log shall be performed on the downward pass as the combination tool is lowered down the well. The high-resolution temperature log shall include a differential temperature log on the same plot.
  - 4. A background gamma-ray log shall be conducted from the total open-hole depth to pad level. A casing-collar locator log shall be used during this survey to verify the base of the final casing. The temperature log and background gamma-ray log shall be completed prior to loading Iodine 131 into the RTS tool.
  - 5. The RTS tool shall be loaded with a minimum of four (4) mCi of medical grade Iodine 131.

6. The RTS tool shall be positioned with the ejector located approximately 5 feet above the bottom of the final casing, with one gamma-ray detector above the ejector (GRT), and two gamma-ray detectors below the ejector (one inside the casing above the casing seat [GRM] and one outside the casing below the casing seat [GRB]).
7. A low-rate dynamic test shall be performed. A low injection rate shall be established using fresh water. The velocity for this test shall be between 3 and 5 feet per minute (equating to a flow rate between 103 and 171 gpm). A flowmeter with totalizer and an instantaneous flow-rate indicator shall be installed to monitor the flow rate into the well.
8. Time-drive monitoring shall begin and a 1-mCi slug of tracer material shall be ejected. This release will be confirmed by the middle detector (GRM) and the bottom detector (GRB).
9. Gamma-ray levels shall be monitored for one hour while the tool is held stationary. If the tracer slug is detected by the upper gamma-ray detector (GRT) during the one-hour monitoring period, the operator of the logging tool may log out of position to a new position approximately 20 feet above the previous position of the RTS tool and logging shall resume for the remainder of the one-hour monitoring period. If the logging tool is to be moved upwards in the event of detection of tracer by the upper detector, the tool should not be moved prior to the time period required for the tracer to travel from the middle detector to the lower detector (theoretically a minimum of 2 minutes for a 5-foot/minute flow rate). It is important to observe whether tracer material is also reaching the lower detector.
10. Following the end of the time-drive monitoring, the RTS tool shall log "out of position" (moving) to at least 200 feet above the highest point where the tracer was detected.
11. Following the out-of-position gamma-ray log, the RTS tool shall be repositioned with the ejector located approximately 5 feet above the bottom of the casing. If excessive staining (elevated readings) is observed, as determined by the CONSULTANT or the FDEP onsite inspector, the final casing shall be flushed by injecting freshwater up to one injection well volume (up to 89,154 gallons), and steps 12 and 13 (below) shall be completed. If excessive staining is not observed, the CONTRACTOR shall proceed to step 14 (below).
12. Following flushing, the combination logging tool shall be repositioned with the ejector located approximately 5 feet above the bottom of the casing and another gamma-ray log shall be run out of position to at least 200 feet above the highest point where tracer was detected.
13. If tracer movement continues to be detected, multiple out-of-position logs shall be conducted to identify the extent of tracer movement. The out-of-position logs shall be conducted at least 200 feet above the highest point where tracer was detected.
14. The combination logging tool shall then be repositioned with the ejector located approximately 5 feet above the bottom of the casing. This is the same depth as that used for the first low-rate dynamic test. An injection rate between 103 and 171 gpm

shall be established using potable water. The flow rate of the second low-rate dynamic test shall be the same as the first low-rate dynamic test. Time-drive monitoring shall begin, a 1.0-MCI slug of tracer material shall be ejected, and the release of the tracer material will be confirmed by detectors GRM and GRB.

15. Gamma-ray levels shall be monitored for 30 minutes while the tool is held stationary. If the tracer slug is detected by the upper gamma-ray detector (GRT) during the one-hour monitoring period, the operator of the logging tool may log out of position to a new position approximately 20 feet above the previous position of the RTS tool and logging shall resume for the remainder of the 30-minute monitoring period. If the logging tool is to be moved upwards in the event of detection of tracer by the upper detector, the tool should not be moved prior to the time period required for the tracer to travel from the middle detector to the lower detector (theoretically a minimum of 2 minutes for a 5-foot/minute flow rate).
16. Following the end of the time-drive monitoring, the RTS tool shall log “out of position” (moving) to at least 200 feet above the highest point where the tracer was detected .
17. If tracer material is not detected in GRT after both “out of position” logs (steps 10 and 16 above), the RTS tool shall be lowered to approximately 5 feet above the uppermost transmissive injection interval in the open hole. The remaining tracer material shall be ejected while pumping into the well a minimum of 80 gpm.
18. The RTS tool then shall be lowered to the total depth of the well and a final gamma-ray log shall be performed from the total depth to land surface.

END OF SECTION

## SECTION 02780 – MECHANICAL INTEGRITY PRESSURE TESTING

### PART 1 - GENERAL

#### 1.1 SCOPE OF WORK

- A. This section covers the work, materials, and equipment necessary for performing hydrostatic pressure testing in Injection Well IW-2 and IW-1 at the Port St. Lucie Glades Wastewater Treatment Facility (WWTF). The purpose of the tests is to demonstrate mechanical integrity of the wells.

#### 1.2 SUBMITTALS

- A. Provide manufacturer's specification and technical information of proposed packer for the pressure test.
- B. Provide information and calibration certificate of test pressure gauge.

### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. Furnish and install an inflatable packer, as manufactured by Baker, TAM J, Baski, or approved equal, of a diameter appropriate for the size of the IW-2 casing being tested.
- B. Calibrated Pressure Gauge: Six (6) inch dial pressure gauge, graduated from 0 to 300 psi, in increments of 1, with an accuracy of +/- 0.25%.

### PART 3 - EXECUTION

#### 3.1 GENERAL

- A. Hydrostatic pressure testing shall be performed in IW-2 as follows:
  1. (CONTRACTOR's Option): In the 30-inch diameter final casing prior to cementing casing to pad level, the CONTRACTOR may perform a hydrostatic pressure test(s) of the final casing prior to cementing it in place in order to ensure that the casing has mechanical integrity. If the CONTRACTOR elects to perform a "pre-cement" hydrostatic test(s) and satisfactory results are not obtained, the CONTRACTOR shall remove, recondition (re-bevel) and reinstall the casing.
  2. In the 30-inch diameter final casing after cementing casing to pad level. CONTRACTOR may elect to perform testing prior to drilling out cement plug and reaming a nominal 30-inch borehole to total depth.
- B. The CONTRACTOR shall coordinate the date and time of pressure testing so that the FDEP has at least seven (7) day's notice prior to the implementation of MIT procedures. Mechanical integrity tests shall be initiated during regular working hours for the Department, Monday through Friday.

- C. The pressure gauge utilized for each of the hydrostatic pressure tests shall be certified as calibrated within the previous 6-month period from the date of the pressure test. Copies of the pressure-gauge calibration certification shall be provided to the CONSULTANT prior to the initiation of each pressure test and shall indicate the date and place of the pressure-gauge calibration.
- D. The resolution of the 6-inch dial pressure gauge shall be at least 1 pound per square inch (psi) and the pressure gauge shall be graduated from 0 to 300 psi (in increments of 1 psi) with an accuracy of +/- 0.25%. The resolution (precision) of the calibrated pressure gauge (1 psi) shall be sufficient to monitor the pressure in the casing and make a pressure change of less than the allowable 5% easily discernible. The pressure gauge shall be mounted on the wellhead at or near eye level, to make any change in pressure easily discernible.
- E. The temperature of the water column(s) following cementing procedures and prior to pressure testing shall be stable so that an increase of pressure is not observed during testing. A minimum elapsed time of 96 hours may be necessary between cementing procedures and pressure testing, unless the CONTRACTOR can demonstrate that the temperature of the water column is sufficiently cooled and stable prior to pressure testing. This may be done by monitoring and recording the temperature of the water column at set intervals for a sufficient period of time, as determined by the CONSULTANT. A pressure increase during pressure testing (caused by the curing of cement) is not acceptable.
- F. An inflatable packer capable of seating against the casing shall be set within approximately 10 feet above the base of the final casing.
- G. The CONTRACTOR may "kill" or suppress flow from IW-2 to facilitate installation of the packer. The CONTRACTOR is responsible for an accurate measurement of the density of the weighted fluid (in pounds per gallon) prior to the pressurization of the casing.
- H. The casing shall be filled (topped off) with freshwater and placed under a pressure. The pressure for tests performed in IW-2 shall be approximately 180 psi for 60 minutes. If a significant pressure change (> 5%) occurs, the test shall be repeated until satisfactory results are obtained. The CONTRACTOR shall relieve the pressure and measure the volume of water discharged and pressure at 5-gallon increments. Pressure testing shall be witnessed and certified in writing by the CONSULTANT.
- I. The CONTRACTOR shall not be reimbursed for the performance of any additional pressure tests to isolate any leak(s) in the casing.
- J. If during the injection test, wellhead pressures exceed two-thirds the pressure placed on the well during the hydrostatic pressure test, an additional pressure test shall be performed following the injection test. The additional test shall be performed at pressures at (or slightly exceeding) 1.5 times the greatest pressure observed during the injection test.

### 3.2 ANNULAR HYDROSTATIC PRESSURE TESTING OF IW-1

- A. Prior to initiating annular pressure test procedures, CONTRACTOR shall coordinate with operating staff. The annulus pressure observed on OWNER's pressure gauge

shall be recorded. The fluid level in the OWNER's annulus compensation tank also shall be recorded.

- B. CONTRACTOR shall then isolate the annulus at the wellhead from the OWNER's annulus system (compensation tank, compressor and piping).
- C. CONTRACTOR shall furnish and operate a compressor and/or other necessary equipment to pressurize annulus to approximately 180 psi.
- D. CONTRACTOR shall perform testing as noted in Part 3.01 above. CONTRACTOR shall relieve annulus pressure to a level acceptable to the OWNER.
- E. CONTRACTOR shall return the OWNER's annulus system to normal operating conditions.

**END OF SECTION**

## **SECTION 02785 – WATER QUALITY SAMPLING**

### **PART 1 – GENERAL**

#### **1.1 SCOPE OF WORK**

- A. This section covers the work, materials, and equipment necessary for collecting and analyzing water quality samples in Injection Well IW-2 at the Port St. Lucie Glades Wastewater Treatment Facility (WWTF).

#### **1.2 SUBMITTALS**

- A. Provide State and County certifications for proposed laboratory.
- B. Provide sampling reports, completed chain of custody forms and analytical results for all sampling events.

### **PART 2 – PRODUCTS (NOT USED)**

### **PART 3 – EXECUTION**

#### **3.1 GENERAL**

- A. All costs for water sample collection and analyses shall be paid by the CONTRACTOR. Any water samples taken for laboratory analysis during the course of this project shall follow the latest version of the FDEP Standard Operating Procedures for groundwater sampling. The laboratory shall be certified by FDEP and have a current approved ComQAP on file with FDEP with methods approved by FDEP.
- B. All samples shall be properly collected, preserved, and analyzed within the required holding time limits. The method detection limit shall be less than the drinking water maximum contaminant level for all analyses.
- C. Samples for laboratory analysis shall be collected in specially designated and approved sample containers, with appropriate preservatives. The containers shall be provided by a State of Florida certified laboratory for the specific parameters required. The sample containers shall be clearly labeled with the well identification, depth interval, and the time and date of sample collection.
- D. Samples shall be collected and stored in the appropriate manner as instructed by the laboratory, and delivered to the laboratory in accordance with the laboratory's instructions. Chain of Custody forms shall be completed for all water samples. Copies of the Chain of Custody forms shall be submitted to the CONSULTANT within five days of final delivery of the samples to the laboratory. All persons handling the samples shall be required to sign the Chain of Custody form.
- E. The CONTRACTOR shall be aware of applicable water sampling holding times for the samples for which he is responsible and ensure that the samples are transmitted to the laboratory within these time periods. For samples collected by the laboratory, the CONTRACTOR shall be responsible for the performance of the sub-contractor's service analyzing the samples within established holding times.

### 3.2 PAD MONITOR WELL SAMPLING

- A. The CONTRACTOR shall refer to Section 02765 for water-table pad monitor well sampling requirements. Sampling shall also meet requirements described in this section.
- B. Every week for the duration of construction and testing, the CONTRACTOR shall collect and record static water levels from each well prior to purging. Purging and sampling shall meet protocols specified in FS 2200-Groundwater Sampling in the DEP-SOP-001/01 Standard Operating Procedures for Field Activities. The results of the purging techniques and field stabilization parameters shall be provided on DEP Form FD 9000-24. Field parameters on DEP Form FD 9000-24 include: pH, temperature, conductivity, dissolved oxygen, turbidity, color, and odor.
- C. The CONTRACTOR shall perform laboratory analysis for total dissolved solids from each monitor well for the first 4 weekly sampling events.
- D. The CONTRACTOR shall perform laboratory analysis for chlorides from each monitor well each week for the duration of the project.

### 3.3 REVERSE-AIR PILOT HOLE SAMPLING

- A. The CONTRACTOR shall refer to Section 02740 for reverse-air pilot-hole sampling requirements. Sampling shall also meet requirements described in this section.
- B. The CONTRACTOR shall collect reverse-air water quality samples in all pilot holes during reverse-air drilling in IW-2. Samples shall be collected every 90 feet (whichever is more frequent).
- C. Samples shall be field analyzed for temperature and conductivity and laboratory analysis of chloride, ammonia and TKN.

### 3.4 INFLATABLE PACKER TEST SAMPLING

- A. The CONTRACTOR shall refer to Section 02760 for inflatable packer test sampling requirements. Sampling shall also meet requirements described in this section.

### 3.5 INJECTION ZONE SAMPLING

- A. Water quality samples shall be collected from the IW-2 injection zone.
- B. Prior to sampling the IW-2 injection zone, a minimum of one (1) casing volume and five (5) borehole volumes shall be purged to achieve stable water quality as determined by the CONSULTANT. During purging, pumping rates, cumulative purge volume and field conductivity shall be measured and recorded on a regular basis as determined by the CONSULTANT.
- C. After completion of development, grab-type water samples shall be collected from the IW-2 injection zone for laboratory analysis for parameters listed as Primary and Secondary Drinking Water Standards, and municipal "minimum-criteria" parameters, and calcium, magnesium, potassium, alkalinity, and bicarbonate. Samples shall be collected by a state-certified analytical laboratory.

- D. Upon completion of sampling, the CONTRACTOR shall discontinue development and allow the injection zone to return to static conditions or a minimum of two (2) hours (whichever is greater). The CONTRACTOR shall then measure and record the water level under static conditions.

3.6 INJECTION TEST WATER SOURCE SAMPLING

- A. The water source for the injection test is anticipated to be surface water from an onsite stormwater retention pond.
- B. The CONTRACTOR shall collect a grab sample for laboratory analysis of the water sources as required in the FDEP permit.
- C. It is anticipated that the FDEP permit will require the following analysis for the surface water source.

Total dissolved solids (mg/L)	Chloride (mg/L)
Specific Conductance (temperature compensated, umhos/cm)	Total suspended solids (mg/L)
Ammonia, total as N (mg/L)	Total Kjeldahl Nitrogen (mg/L)
Nitrate, total as N (mg/L)	Sodium (mg/L)
Potassium (mg/L)	Calcium (mg/L)
Magnesium (mg/L)	Total Iron (mg/L)
Bicarbonate (mg/L)	Phosphorus, total as P (mg/L)
pH (s.u.)	Sulfate, total as SO <sub>4</sub>
Temperature, field ( C )	Gross alpha (pCi/L)
Combined Radium 226 & 228 (pCi/L)	Total and fecal coliform (cfu/100mL)
Escherichia coli (cfu/100mL)	Enterococci (cfu/100mL)
Turbidity (NTU)	

- D. The injection test source water sample shall be collected at a sufficient length of time prior to injection testing so that the samples can be analyzed by the lab, reviewed by the CONSULTANT and submitted and approved by FDEP before injection testing commences. The CONTRACTOR should anticipate collecting the sample at least 8 weeks prior to the expected injection-testing date.

**END OF SECTION**

## SECTION 02830 – ASPHALT CONCRETE PAVING

### PART 1 - GENERAL

#### 1.01 SCOPE

- A. The work shall consist of furnishing all materials, labor and equipment for compacting subgrade, constructing a base course, priming the base course and constructing an asphaltic concrete surface course as specified on the plans.

#### 1.02 SUBMITTALS

- A. See Section 01300 - Submittals.

#### 1.03 MATERIAL CERTIFICATES

- A. Provide copies of material certificates signed by material producer and CONTRACTOR, certifying that each material item complies with, or exceeds, specified requirements.
- B. The CONTRACTOR shall provide the CONSULTANT and the OWNER the name, location(s) of all imported soil and aggregate materials. CONTRACTOR shall also provide particle size analysis/grading analysis for these materials.

#### 1.04 CODE COMPLIANCE

- A. Comply with the applicable sections of the "State of Florida Department of Transportation's (FDOT) Standard Specifications for Road and Bridge Construction".

### PART 2 - PRODUCTS

#### 2.01 GENERAL

- A. All materials furnished hereunder shall comply with the applicable sections of the Florida Department of Transportation's (FDOT) "Standard Specifications for Road and Bridge Construction" current edition which are hereby incorporated into these specifications by reference.

#### 2.02 MATERIALS

- A. General: Use locally available materials and gradations which exhibit a satisfactory record of previous installations.
- B. Subgrade Stabilizing Material: Stabilization per FDOT Section 160.
- C. Base Course: The base course shall be constructed with either one of the following materials.
  - 1. Limerock Base Course: FDOT Section 911, for on-site pavement and for all pavement within the right-of-way of County Roads. Limerock shall have a minimum LBR of 100% and shall be mined from an FDOT approved source.

- 2. Cemented Coquina Shell Base: FDOT Section 911, for on-site pavement.
- D. Asphaltic Concrete: Comply with FDOT Section 330 requirements and Section 334 for Superpave Asphalt.
- E. Prime and Tack Coats: FDOT Section 300.

### **PART 3 - EXECUTION**

#### **3.01 GENERAL**

- A. All operations hereunder shall adhere to the requirements of the Florida Department of Transportation for construction within the rights-of-way and FDOT's "Standard Specifications" above and particularly with the following sections.
- B. All asphalt shall be replaced to match existing conditions, thickness and type. The bid price will cover any additional work need at no additional cost to the OWNER and shall be done to the satisfaction of the OWNER, CONSULTANT, and permit authorities. If the thickness is unknown, it shall be assumed all asphalt surfaces to be replaced and/or installed are 2.5 to 3.0 inches thick.

#### **3.02 PAVEMENT REMOVAL**

- A. Remove existing pavement by saw cutting on a straight line at a 90 degree angle with the pavement surface.

#### **3.03 PAVEMENT INSTALLATION**

- A. Stabilized subgrade shall have a minimum LBR of 40, and minimum densities shall be 98% of maximum dry density as determined by the AASHTO T-180 method D. Materials, construction methods, and testing shall conform to FDOT specifications Section 160 Stabilization, and shall be paid for as part of the work under this section.
- B. Base course shall consist of Limerock or cemented coquina with a minimum LBR of 100. After compaction, the base shall have a density that is 98% of maximum dry density as determined by the AASHTO T-180 method. Materials, construction methods, and testing shall conform to FDOT specifications Section 200 for the base material used. This base course shall be used for all paving on the project.
- C. Asphalt wearing surface for paved areas shall consist of SP-9.5 or SP-12.5 asphaltic concrete. The asphaltic wearing surface must be placed on an adequately compacted and unyielding base course. Materials, construction methods, and testing shall conform to FDOT specifications Section 334.
- D. Pavement Markings: FDOT Sections 710 and 711.

#### **3.04 TESTING**

- A. In proposed parking/drive areas, a minimum frequency of one in-place density test for each 2,500 sq. ft. of area shall be used. Each 12" lift of fill, as well as the stabilized subgrade (where applicable) and base shall be tested at this frequency.

- B. Additional tests may be required for the driveway construction or at more frequent intervals if deemed necessary by the CONSULTANT.

**END OF SECTION**

## SECTION 02840 – CHAIN LINK FENCE

### PART 1 – GENERAL

#### 1.01 DESCRIPTION

- A. This work consists of all labor, materials, and equipment necessary for furnishing and installing chain link fence, gates, temporary fencing and screening, and accessories in conformance with the specifications, drawings, and details.

#### 1.02 RELATED SECTIONS

- A. All of Division 1.
- B. **Section 02210 – Grading.**
- C. **Section 03700 – Concrete Work.**

#### 1.03 REFERENCES

- A. ASTM F668, Standard Specification for PVC-Coated Steel Chain Link Fence Fabric.
- B. ASTM F900, Standard Specification for Industrial and commercial Swing Gates.
- C. ASTM F1083, Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated .Welded for Fence Structures.
- D. ASTM F567, Standard Practice for Installation of Chain-Link Fences.
- E. ASTM F626 Standard Specification for Fence Fittings.

#### 1.04 SUBMITTALS

- A. Submit manufacturer's data for fabric, posts, gates, and all other materials, finishes, and appurtenances.
- B. Submit shop drawing showing dimensions of materials and layout of posts and gates.
- C. Submit temporary fencing and screening plan.

### PART 2 – PRODUCTS

#### 2.01 GENERAL

- A. Match, style, finish, and color of each fence component with that of other fence components. All fence components shall be black, PVC coated.

#### 2.02 CHAIN LINK FENCE FABRIC

- A. Fence fabric shall be black, PVC coated galvanized fabric conforming to STM F668, Class 1 or 2a with a minimum thickness of five (5) mm.
- B. Fence height shall be 96 inches.
- C. Core wire gauge shall be No. 9 prior to vinyl coating.
- D. Link patten shall be two (2) inch diamond mesh.
- E. Loops of knuckled selvages shall be closed or nearly closed with space not exceeding diameter of wire
- F. Wires of twisted selvages shall be twisted in a closed helix three full turns and cut at an angle to provide sharp barbs that extend a minimum of ¼-inch beyond the twist.
- G. Fencing shall be slatted.

#### 2.03 POSTS

- A. Strength and stiffness requirements shall meet ASTM F1043, except as modified in this section. The steel shall meet the requirements of ASTM F1083.
- B. The post length shall be the manufacturer's standard with an allowance for a minimum of 36 inches of embedment below finished grade.
- C. Protective coating shall be a zinc coating applied to the internal and external portions of the post meeting the requirements of ASTM F1043, Type A.
- D. Color coating shall be applied over the zinc coating a minimum of 10 mils in thickness and matching the color of the chain link fabric.
- E. Line posts shall have an outside diameter of 2½-inches and a minimum weight of 2.96 pounds per foot.
- F. End, corner, angle, and pull posts shall have an outside diameter of three (3) inches and a minimum weight of 4.69 pounds per foot.
- G. Gates posts shall have an outside diameter of four (4) inches and a minimum weight of 4.85 pounds per foot.

#### 2.04 TOP RAILS AND BRACE RAILS

- A. Rails shall be manufactured from galvanized steel pipe.
- B. The protective coating and color coating shall match the coating applied to the posts.
- C. The rails shall have an outside diameter of 1⅝ and a minimum weight of 2.27 pounds per foot.

#### 2.05 FENCE FITTINGS

- A. Post and line caps shall be designed to accommodate passage of top rail through cap.
- B. The protective coating and color coating shall match the coating applied to the posts.
- C. Tension and brace bands shall be vinyl clad.
- D. Truss rods assemblies shall be  $\frac{3}{8}$ -inches in diameter.

#### 2.06 TENSION WIRE

- A. Tension wire shall be zinc-coated steel marcelled tension wire confirming to ASTM A824, Type II, Class 2.
- B. The protective coating and color coating shall match the coating applied to the posts.

#### 2.07 GATES

- A. Gates shall have welded steel joints with coated with zinc-based paint.
- B. The protective coating and color coating shall match the coating applied to the posts.
- C. The chain link fabric shall be attached to the gate frame a maximum of every 15 inches.
- D. Hinges shall be 180-degree commercial duty.

#### 2.08 PVC VERTICAL SLATS

- A. The slats shall be black in color, made of UV-resistant PVC, and installed vertically the entire height of the fence.

#### 2.08 TEMPORARY FENCING AND SCREENING

- A. Fence height shall be 72 inches.
- B. Temporary screening shall be provided with temporary fencing and may consist of non-transparent fabric or PVC vertical slats which provide a visual barrier of all fenced area.
- C. Signage shall be provided and attached to temporary fencing and shall include project emergency contact information.

### **PART 3 – EXECUTION**

#### 3.01 GENERAL

- A. Install chain link fences and gates in accordance with ASTM F567, except as modified in this Section.
- B. Provide necessary hardware for a complete fence and gate system.

### 3.02 POST SETTING

- A. Driven posts are not acceptable.
- B. Post hole depth shall be a minimum of three feet below finished grade.
- C. Post holes shall be backfilled with concrete to two (2) inches above finished grade. The concrete shall have a crown to divert water away from the post. Where posts come in contact with concrete, they shall be coated with Koppers 300M or approved equal.

### 3.03 GATE INSTALLATION

- A. Hang gates and adjust hardware so gates operate satisfactorily from both the open and closed positions and all latches operate freely.

### 3.04 FIELD QUALITY CONTROL

- A. Demonstrate to the ENGINEER proper operation of the gates from both the open and closed position prior to final acceptance.

**END OF SECTION**

## SECTION 02936 – SODDING

### PART 1 - GENERAL

#### 1.01 PERFORMANCE

- A. Section generally defines CONTRACTOR's responsibilities, unless otherwise indicated for the following:
  - 1. Preparation of subsoil.
  - 2. Placing topsoil.
  - 3. Fertilizing.
  - 4. Sod installation.
  - 5. Maintenance.

#### 1.02 RELATED SECTIONS

- A. All of Division 1.
- B. **Section 02210** – Grading.

#### 1.03 REFERENCES

- A. FDOT - Florida Department of Transportation - Standard Specifications for Road and Bridge – Latest Edition.

#### 1.04 QUALITY ASSURANCE

- A. Sod Producer: Company specializing in sod production and harvesting with a minimum five years of experience and certified by the State of Florida.
- B. Installer: Company approved by the sod producer.
- C. Sod: Minimum age of 18 months, with root development that will support its own weight, without tearing, when suspended vertically by holding the upper two (2) corners.
- D. Submit sod certification for grass species and location of sod source.
- E. The CONSULTANT reserves the right to test, reject or approve all materials before application.

#### 1.05 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site no greater than 24 hours in advance of placement. CONTRACTOR responsible for ensuring product is of satisfactory quality/condition, in OWNER'S sole opinion, prior to placement.

- B. Store / protect products as necessary and in accordance with manufacturer instructions.
- C. Deliver sod on pallets. Protect exposed roots from dehydration.
- D. Do not deliver more sod than can be laid within 48 hours.
- E. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- F. The CONTRACTOR shall furnish the CONSULTANT invoices of all materials received in order that the minimum application rate of materials may be determined.

#### 1.07 MAINTENANCE SERVICE

- A. Maintain sodded areas immediately after placement until grass is well established and exhibits a vigorous growing condition.

### **PART 2 - PRODUCTS**

#### 2.01 MATERIALS

##### A. Sod:

1. Sod shall be ASPA approved grade, Argentine Bahia, Tifton Bermuda, Floritam, or St. Augustine to match existing or better as directed, with firm texture having a compacted growth and good root development.
2. Sod shall be absolutely true to varietal type, and free from weeds or other objectionable vegetation, fungus, insects and disease of any kind.
3. Cut sod in area not exceeding 24 inches by 24 inches with minimum one (1) inch and maximum three (3) inch of topsoil base.
4. The sod shall be planted as soon as possible after being harvested and shall be shaded and kept moist from the time of harvesting to the time it is planted.

##### B. Topsoil:

1. Excavated from site and free of weeds.
2. Topsoil to be minimum three (3) inches thick.

##### C. Fertilizer:

1. In accordance with FDOT 982-1.

##### D. Water:

1. Clean, fresh, and free of substances or matter, which could inhibit vigorous growth of grass.

## **PART 3 - EXECUTION**

### **3.01 INSPECTION**

- A. Verify that prepared subsoil is ready to receive the work of this Section.

### **3.02 FERTILIZING**

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to installation of sod.
- C. Apply fertilizer no more than 48 hours before laying sod.
- D. Mix thoroughly into upper two (2) inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

### **3.03 LAYING SOD**

- A. Moisten prepared surface immediately prior to laying sod.
- B. Lay sod tight with no open joints visible, and no overlapping; stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.
- C. Stake sod with 1x2 stakes on all areas with slopes greater than one (1) vertical to five (5) horizontal.
- D. Coordinate sod installation with irrigation system components.

### **3.04 MAINTENANCE**

- A. Water to prevent grass and soil from drying out.
- B. Immediately replace sod in areas, which show deterioration or bare spots.

### **3.05 APPROXIMATE AREA TO BE SODDED**

- A. All construction areas disturbed by construction of the project except those areas receiving pavement, rock, or concrete. CONTRACTOR is to take into account his anticipated ditch width and pit sizes at the surface when accounting for the cost of this work.

**END OF SECTION**

## SECTION 03100 – CONCRETE FORMWORK

### PART 1 - GENERAL

#### 1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to design, install and remove formwork for cast-in-place concrete complete as shown on the Drawings and specified herein.
- 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 CONSULTANT.

#### 1.02 RELATED WORK

- A. Concrete Reinforcement is included in **Section 03200** – Concrete Reinforcement.
- B. Cast-in-Place Concrete is included in **Section 03300** – Cast-in-Place Concrete.

#### 1.03 SUBMITTALS

- A. Submit to the CONSULTANT, in accordance with **Section 01300** - Submittals, shop drawings, and product data showing materials of construction and details of installation for:
  - 1. Form release agent
  - 2. Form ties
  - 3. Tapered Ties : Proposed method and products for sealing form tie hole.
- B. Samples
  - 1. Demonstrate to the CONSULTANT 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.
- C. Certificates
  - 1. Statement of qualification for the formwork designer retained by CONTRACTOR. Formwork designer shall be a professional CONSULTANT registered in the same state as the project site. Designer shall have at a minimum five years of experience designing the required formwork and falsework systems.

2. 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).

#### 1.04 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.

#### 1.05 SYSTEM DESCRIPTION

A. 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. Design forms and ties to withstand concrete pressures without budging, spreading, or lifting forms.

B. 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.

## **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. General: 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 CONSULTANT 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. 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 CONSULTANT 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. 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 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.
- C. 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.
- D. 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 301 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 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 301.

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. Form removal shall conform to the requirements specified in **Section 03300 – Cast-in-Place Concrete** including curing requirements.
- B. Repair all damages resulting from removal of forms.
- C. Clean, fill and seal form tie hole with non-shrink cement grout. The CONTRACTOR shall be responsible for the watertightness of the form ties holes and any repair necessary to maintain watertightness of tie holes.

### 3.05 INSPECTION

- A. The CONSULTANT 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 – Cast-in-Place Concrete** shall be grounds for rejection of that portion of the concrete work. Rejected work shall be repaired or replaced as directed by the CONSULTANT at no additional cost to the OWNER. Such repair or replacement shall be subject to the requirements to this Section and approval of the CONSULTANT.

**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 – Concrete Formwork**.
- B. Cast-in-place Concrete is included in **Section 03300 – Cast-in-Place Concrete**.

#### 1.03 SUBMITTALS

- A. Submit to the CONSULTANT, in accordance with **Section 01300 - Submittals**, 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 the CRSI Manual of Standard Practice and ACI SP-66. 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. All splice and joint locations shall be indicated on placement drawings. Splice lengths shall be clearly dimensioned.
  - 3. Reinforcement cover shall be clearly indicated.
  - 4. Submit reinforcement shop drawing for each structure as a complete package. Submittal showing portions of a structure will not be acceptable, unless acceptable by CONSULTANT in advance.
  - 5. Submittals consisting of schedules without accompanying placement drawings will not be acceptable, unless acceptable by CONSULTANT in advance.
  - 6. Bar bending details. The bars shall be referenced to the same identification marks shown on the placement drawings and shipping tags. Schedules shall be located on the same sheet where the bar mark is referenced. 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. Test Reports

1. Certified copy of mill test on each steel proposed for use showing the physical properties of the steel and the chemical analysis.
2. Mechanical Reinforcing Bar Couplers. Current Evaluation Report prepared by ICC-ES or by other approved testing agency.

## C. Certificates

1. Welder's certification. The certification shall be in accordance with AWS D1.4 when welding of reinforcement is required.
2. Weld Procedures. Provide procedure for each type of welded reinforcing splice in accordance with AWS D1.4 when welding of reinforcing 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 Wire Reinforcement: ASTM A1064. Provide in flat sheets.
- E. Welded Plain Bar Mats: ASTM A704 and ASTM A615 Grade 60 plain bars.
- F. Fabricated Deformed Steel Bar Mats: ASTM A184 and ASTM A615 Grade 60 deformed bars.
- G. 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.
- H. Tie Wire
  - 1. Tie Wires for Reinforcement shall be 16-gauge or heavier, black annealed wire or stranded wire.
- I. Mechanical Reinforcing Bar Couplers
  - 1. General : Use only at locations indicated on the Drawings or where written approval has been obtained from the CONSULTANT.
  - 2. 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 approved 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.
  - 3. Bar couplers shall be torqued to manufacturer's recommended value.
  - 4. 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.
  - 5. 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.
  - 6. Form saver type mechanical couplers shall have flanges with nailing holes to positively attach coupler to formwork.

## J. Fiber Reinforcement

Synthetic reinforcing fiber for concrete shall be 100 percent polypropylene collated, fibrillated fibers as manufactured by Fibermesh Company of Synthetic Industries Inc., Chattanooga, TN - Fibermesh or equal. Fiber length and quantity for the concrete mix shall be in strict compliance with the manufacturer's recommendations as approved by the CONSULTANT.

### 2.01 FABRICATION

- A. Fabrication of reinforcement shall be in compliance with the CRSI Manual of Standard Practice and ACI SP-66.
- 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 SP-66.
- 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 and ACI SP-66. 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 – 2 in.
    - b. Beams and columns (principal reinforcement, ties, spirals and stirrups) – 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 CONSULTANT. 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 CONSULTANT. Do not cut reinforcement to install inserts, conduits, mechanical openings or other items without the prior approval of the CONSULTANT.
- 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 CONSULTANT. 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 CONSULTANT. 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 SP-66. 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 SP-66 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 CONSULTANT.

### 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 CONSULTANT.

### 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 CONSULTANT and the CONSULTANT's release to proceed with the concreting has been obtained. The CONSULTANT shall be given ample prior notice of the readiness of placed reinforcement for observation. The forms shall be kept open until the CONSULTANT 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 – Concrete Formwork**.
- B. Concrete Reinforcement is included in **Section 03200 – Concrete Reinforcement**.

#### 1.03 SUBMITTALS

- A. Submit to the CONSULTANT, in accordance with **Section 01300 - Submittals**, 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 CONSULTANT.

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 Concrete Institute (ACI).

1. ACI 301 - Standard Specification for Structural Concrete
2. ACI 305.1 – Standard Specification for Hot Weather Concreting.
3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
4. ACI 318 – Building Code Requirements for Structural Concrete and Commentary

B. 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.

C. Nation Ready Mixed Concrete Association (NRMCA)

D. Where reference is made to one of the above standards, the revision in effect at the time of bid shall apply.

#### 1.05 QUALITY ASSURANCE

A. Reinforced concrete shall comply with specifications and standards noted above. The most stringent requirement of the specifications, standards and this Section shall apply when conflicts exist.

B. Only one source of cement and aggregates shall be used on any one structure. Concrete shall be uniform in color and appearance.

- C. Well in advance of placing concrete, discuss with the CONSULTANT 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.
- D. 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 CONSULTANT 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.
- E. 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.
- F. Testing of the following materials shall be furnished by the CONTRACTOR to verify conformity with this Specification Section and the stated ASTM Standards.
  - 1. Fine aggregates for conformity with ASTM C33 - Sieve analysis, physical properties, and deleterious substances.
  - 2. Coarse aggregates for conformity with ASTM C33 - Sieve analysis, physical properties, and deleterious substances.
  - 3. Cements for conformity with ASTM C150 - Chemical analysis and physical properties.
  - 4. Pozzolans for conformity with ASTM C618 - Chemical analysis and physical properties.
  - 5. Proposed concrete mix designs - Compressive strength, slump and air content.
- G. Field testing and inspection services will be provided by the CONTRACTOR in accordance with **Section 01400** – General Quality Control.
  - 1. Concrete placements - Compressive strength (cylinders), compressive strength (cores), slump, and air content.
  - 2. Other materials or products that may come under question.
- H. All materials incorporated in the work shall conform to accepted samples.

#### 1.06 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 feet 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 CONSULTANT 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 inches thick or less and the wall height exceeds 12 feet 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 CONSULTANT. 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% maximum.
- H. Ground-Granulated Blast Furnace Slag. Ground-granulated blast furnace slag shall conform to the following:
1. ASTM C989.
  2. Slag activity classification: Grade 100 or 120.
- I. Sheet Curing Materials. Waterproof paper, polyethylene film or white burlap-polyethylene sheeting all complying with ASTM C171.
- J. 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 CONSULTANT 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 CONSULTANT, 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 inches.
- 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	2,500	C150 Type II	C33	57		440 min.
B	3,000	C150 Type II	C33	57		480 min.
C	4,000	C150 Type II	C33	57		560 min.
D	5,000	C150 Type II	C33	57		660 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
<b>NOTES:</b>						
(1)	Minimum compressive strength in psi at 28 days.					
(2)	ASTM Designation.					
(3)	Size number in ASTM C33.					
(4)	Cementitious content in pounds/cubic yard.					
(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 the CONTRACTOR's option except where walls are 14 inches thick or less and the wall height exceeds 12 feet, 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 CONSULTANT. 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 CONSULTANT. 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 CONSULTANT. 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 CONSULTANT 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.

<b>TABLE 2 – MAXIMUM TIME TO DISCHARGE OF CONCRETE</b>	
Air or Concrete Temperature (whichever is higher)	Maximum Time
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

5. 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 APPEARANCE

- 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 304.1. 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 CONSULTANT.

## 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 CONSULTANT 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 CONSULTANT. 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. Water cure 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.
- C. Finished surfaces and slabs shall be protected from the direct rays of the sun to prevent checking and crazing.
- D. Cold Weather Concreting:
1. "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.
  2. 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).
  3. Discuss a cold weather work plan with the CONSULTANT. 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 CONSULTANT.
  4. 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.

5. Salt or other chemicals shall not be used for protection.
6. 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.

**E. 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 305.1, 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 305.1 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 CONSULTANT may direct the CONTRACTOR to immediately cover plastic concrete with sheet material.
3. Discuss with the CONSULTANT 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 CONSULTANT.

**3.06 REMOVAL OF FORMS**

- A. Except as otherwise specifically authorized by the CONSULTANT, 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)

<b>TABLE 3 – MINIMUM TIME TO FORM REMOVAL</b>	
<b>Forms For</b>	<b>Degree Days</b>
Beams and slabs	500
Walls and vertical surfaces	100
(see definition of degree-days in Paragraph 3.05D.4 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 CONSULTANT at all times. The CONTRACTOR shall advise the CONSULTANT of his/her readiness to proceed at least 24 hours prior to each concrete placement. The CONSULTANT 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 CONSULTANT.
- B. Sets of field control cylinder specimens will be taken by the CONSULTANT (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 five 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. The fifth is to be used at 28 days or 56 days where 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 OWNER. Curing boxes shall be acceptable to the CONSULTANT.
- 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 CONSULTANT 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 CONTRACTOR.

### 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 CONSULTANT shall have the right to require changes in proportions outlined to apply to the remainder of the work. Furthermore, the CONSULTANT 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 CONSULTANT 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 CONSULTANT 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 CONSULTANT 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 CONSULTANT, 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 CONSULTANT shall be repaired as specified by the CONSULTANT.
- 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 CONSULTANT.

- D. Immediately after removal of forms remove plugs and break off metal ties as required by **Section 03100 – Concrete Formwork**. 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:

<b>TABLE 4 – CONCRETE SCHEDULE</b>		
Class	Design Strength (psi)	Description
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 09900 – PAINTING

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

- A. This section includes providing all labor, materials, equipment and incidentals required to prepare, clean, furnish and apply paints and coatings to all materials and equipment as specified herein and as noted on the drawings.
- B. Items of work include the following:
  - 1. Above ground piping, fittings, pipe supports, valves, pumps, and appurtenances.
- C. Complete painting in accordance with the Specifications and the paint Manufacturer's current surface preparation and application instructions.

#### 1.02 RELATED SECTIONS

- A. **Section 01300** – Submittals.

#### 1.03 REFERENCES

- A. The following may be referenced in this section:
  - 1. National Association of Corrosion Engineers (NACE): Manual for Painter Safety.
  - 2. American National Standards Institute (ANSI)/NSF International: ANSI/NSF-61 Drinking Water System Components - Health Affects
  - 3. Occupational Safety and Health Act (OSHA)
  - 4. Steel Structure Painting Council (SSPC)
    - a. SP 1-82 Solvent Cleaning
    - b. Surface Preparation Specifications SP-1, SP-2, SP-5, SP-10, SP-6, SP-7 and SP-3.

#### 1.04 SUBMITTALS

- A. Provide submittals in accordance with provisions in **Section 01300** - Submittals.
- B. Provide submittals for each painting system to include:
  - 1. Manufacturer's current printed recommendations and product data sheets for all coating system products supplied under this section including performance criteria, surface preparation and applications, volatile organic compound (VOC) data, and safety requirements.

2. Material Safety Data Sheets (MSDS) for any materials brought on-site including all resurfacing system materials, solvents, and abrasive blast media.
3. Storage requirements including temperature, humidity, and ventilation for resurfacing system materials.
4. Manufacturer's written instructions for applying paint.
5. Color samples for all surfaces to be resurfaced that have been field-matched to existing colors. Color samples shall be submitted to OWNER for approval.
6. List of references substantiating experience. Minimum of five (5) years' experience in the application of specified products.
7. Conduct and submit videotape of all existing equipment, piping and components proposed to be coated, sealed or cleaned prior to starting the work.
8. NSF-61 certification for all paint proposed for use on surfaces having the potential to come in contact with potable water.

#### 1.05 DELIVERY, MATERIAL STORAGE, PREPARATION

- A. Materials shall be stored in accordance with Manufacturer's recommendations in enclosed structures and shall be protected from weather and adverse temperature conditions. Flammable materials shall be stored in accordance with state and local codes. Materials exceeding storage life recommended by the Manufacturer shall be removed from the site.
- B. Deliver, store, handle, and protect products in accordance with provisions in **Section 01600 – Material and Equipment**.
- C. All painting, and coating materials shall be delivered to the job site in unbroken packages bearing the label of the Manufacturer. Labels on all material containers must show the following information:
  1. Name or title of product.
  2. Federal Specification Number if applicable.
  3. Manufacturer's batch number and date of manufacture.
  4. Manufacturer's name.
  5. Generic type of material.
  6. Application and mixing instructions.
  7. Hazardous material identification label.
  8. Shelf life date.
  9. Storage requirements.

- C. Suitable storage space where paint and coatings will be safe from damage shall be provided by the CONTRACTOR. Store all materials only in area or areas designated by the CONSULTANT solely for this purpose. Confine mixing, thinning, clean-up and associated operations, and storage of materials-related debris before authorized disposal, to these areas.
- D. All paints and coatings shall be stored and mixed in accordance with Manufacturer's instructions. Mixing shall be performed in well-ventilated areas. Care shall be taken to prevent separation of coating components following initial mix.
- E. The CONTRACTOR shall take all precautions and implement all measures necessary to avert potential hazards associated with the resurfacing system materials as described on the pertinent Material Safety Data Sheets or container labels.

## **PART 2 - PRODUCTS**

### **2.01 FERROUS METALS**

- A. Surface Preparation : Solvent clean per SSPC-SP1 & Scarify by Brush Blast or Hand Sanding per SSPC-S6.
- B. Coating System for Exterior Ferrous Metals (all colors shall be determined by OWNER).
  - 1. Primer: Tnemec 135-Modified Polyamidoamine Epoxy (3.0 – 5.0 mils, dry film)
  - 2. Intermediate Coat: Tnemec 135-Modified Polyamidoamine Epoxy (3.0 – 5.0 mils, dry film)
  - 3. Finish Coat: Tnemec Series 1095 Endura-shield (3.0 - 5.0 mils, dry film)

### **2.02 UNPAINTED STAIRS, CATWALKS, DECKS, HANDRAILS AND STAINLESS STEEL**

- A. Any unpainted aluminum or stainless steel stairs, catwalks, decks, handrails, etc. shall not be coated.

### **2.03 PVC PIPE (INTERIOR OR EXTERIOR)**

- A. Surface Preparation: Solvent clean per SSPC-SP1 & Scarify by Brush Blast or Hand Sanding.
- B. Coating System.
  - 1. First Coat: Tnemec 66-Color Hi-Build Epoxoline (2.0 – 3.0 mils)
  - 2. Second Coat: Tnemec 1070 Fluoronar (2.0 – 3.0 mils)

## **PART 3 – EXECUTION**

### **1.01 GENERAL**

- A. Hoisting, Scaffolding, Staging, and Planking:

1. Provide, set-up, and maintain all required hoists, scaffolds, staging, and planking, and perform all access related hoisting work required to complete the work of this section as indicated and specified.
2. Scaffolds shall have solid backs and floors to prevent dropping materials to the floors or grounds below.

B. Environmental Requirements:

1. Comply with the Manufacturer's recommendations as to the environmental conditions under which resurfacing system materials can be applied.
2. Do not apply resurfacing system materials when dust is in work site.
3. The CONTRACTOR shall provide all temporary lighting during the work.

C. Protection:

1. Cover or otherwise protect finish work or other surfaces not being resurfaced.
2. Erect and maintain protective tarps, enclosures and/or maskings to contain debris (such as dust or airborne particles resulting from surface preparation) generated during any and all work activities. This includes, but is not limited to, the use of dust/debris collection apparatus as required.

D. Initial Inspection of Surfaces to be Coated:

1. It is the responsibility of the CONTRACTOR to inspect and report unacceptable concrete substrate surface condition to the CONSULTANT prior to the commencement of surface preparation activities.

E. Thinners and Solvents:

1. The CONTRACTOR shall use only solvents and thinners as recommended by the Manufacturer.

## 1.02 SURFACE PREPARATION

A. General

1. Comply fully with Manufacturer's instructions.
2. All specified surface preparation shall be performed in accordance with the latest version of the SSPC, NACE, ICRI and other standards referenced in this section
3. The air used for blast cleaning shall be free of oil and moisture to not cause contamination of the surfaces to be resurfaced.
4. Clean cloths and clean fluids shall be used in solvent cleaning. Cleaning and resurfacing shall be scheduled so that dust and other contaminants from the cleaning process will not fall on wet, newly resurfaced areas.

B. Exterior Ferrous Metals

1. General: Flood surfaces with trisodium phosphate and chlorine solution and pressure clean with minimum of 3,500-psi pressure. Spot sandblast any rusted areas to bare metal.
2. Sand blast to SSPC-SP-6 to near white finish with non-silica blasting material. Do not perform abrasive blast cleaning on wet or damp surfaces.
3. Pumps and motors: Solvent clean as necessary to remove all grease and oil. Clean to SSPC-1.
4. Test compatibility with existing coatings at locations selected by the CONSULTANT or OWNER and using methods recommended by the coating Manufacturer.

C. Unpainted Stairs, Catwalks, Decks, Equipment, Handrails and Stainless Steel.

1. Flood surfaces with trisodium phosphate and chlorine solution and pressure clean with minimum of 3,000-psi pressure with a 0-degree oscillating tip.
2. All aluminum and stainless steel shall be cleaned with Duron MTM cleaning agent to remove all oxidation and overspray.

1.03 APPLICATION

A. General

1. Primer and finish coats shall be produced by the same Manufacturer. The specified Manufacturers shall provide paint and or coatings, no alternatives will be considered. Ensure proposed products are compatible with existing coatings where applicable. Provide testing, where required by the CONSULTANT or OWNER to demonstrate compatibility with existing coating. Some testing will be required.
2. Unless specified elsewhere herein, the CONTRACTOR shall comply with the manufacturer's most recent written instruction with respect to the following:
  - a. Mixing of All Materials.
  - b. Protection and Handling.
  - c. Recoat Limitation and Cure Times.
  - d. Minimum Ambient and Substrate Temperature, Substrate's Degree of Dryness, Relative Humidity, and Dew Point of Air.
  - e. Application.
  - f. Final Curing.
  - g. Use of Proper Application Equipment.

3. Areas not to be resurfaced shall be masked using duct tape or other protection materials to prevent these surfaces from being resurfaced.
4. Where thinning is necessary and permitted only the products and quantities recommended by the Manufacturer may be used.
5. CONTRACTOR shall excavate a minimum of one inch (1') below grade and paint piping extending below grade, walls, etc. prior to backfilling.

B. Exterior Ferrous Metals

1. Do not apply paint in temperatures outside the Manufacturer's recommended maximum or minimum allowed, or in dust or smoke or excessively damp or humid weather. CONTRACTOR shall pay for and coordinate Manufacturer's representative to be on-site to inspect the substrate prior to the first addition of each different product.

1.04 SAFETY AND VENTILATION REQUIREMENTS

- A. Requirements for safety and ventilation shall be in accordance with SSPC Paint Application Guide No. 3.

1.05 INSPECTION

- A. Check existing paint thickness prior to starting work to determine the baseline thickness for determining the new paint/coating thickness applied.
- B. After painting, visually inspect concrete and metal surfaces to ensure proper and complete coverage has been attained.
- C. Paint thickness applied over ferrous metals shall be measured with a magnetic type dry film thickness gauge to ensure specified mil thickness has been obtained.
- D. Paint thickness on concrete substrates shall be checked using Tooke gauge or similar method to ensure specified mil thickness has been applied.
- E. Schedule inspection with CONSULTANT prior to application of primers and top coats.
- F. Provide CONSULTANT a minimum of two (2) days notice prior to applying paints and coatings.

1.06 ACCEPTANCE CRITERIA

- A. Acceptance criteria for surface preparation work: All surfaces shall be prepared in accordance with the specification and referenced standards therein.
- B. Acceptance Criteria for Coating System Application Work.
1. Acceptable coating work will be based upon the following:

- a. No pock-marks, trowel marks, depressions, unconsolidated areas, waviness or ridges, pinholes or holidays in either size or frequency.
  - b. No intercoat bond failures between lifts.
  - c. Proper curing of coatings.
2. Resurfaced areas shall pitch to drains.
3. There shall be no areas that puddle when flood tested.
4. The CONSULTANT or CONSULTANT's representative shall, at their discretion, inspect the following:
  - a. Profile and degree of cleanliness of substrate.
  - b. Thickness of materials/coverage rate confirmation.
  - c. Ambient temperature and humidity requirements and substrate temperature.
  - d. Curing and recoat times.
  - e. Proper curing of the resurfacing materials.
5. Rework required on any holidays or any other inadequacies found by the CONSULTANT or the CONSULTANT's representative in the quality of the coating work shall be marked. Such areas shall be recleaned and reworked by the CONTRACTOR according to these specifications and the Manufacturer's recommendations at no additional cost to OWNER.
6. The CONTRACTOR is responsible for keeping the CONSULTANT informed of all progress so that inspection for quality can be achieved.
7. The CONTRACTOR is ultimately responsible for the quality performance of the applied materials and workmanship. Inspections by the CONSULTANT or the CONSULTANT's representative do not limit this responsibility.

#### 1.07 CLEANUP

- A. During progress of work, remove from site all discarded paint materials, rubbish, cans and rags at the end of each workday. Upon completion of work, clean window glass to remove paint or other materials. Remove spent sandblast material and debris. Disposal of paints, coatings thinners and containers shall be in strict accordance with Local, State and Federal rules and regulations.
- B. Remove all temporary protective barriers, wrappings, tape, glue and paper used for protection of other surfaces.
- C. CONTRACTOR shall be solely responsible for the disposal of cleaning and coating materials including, but not limited to soaps, detergents, solvents, thinners, paint, and other related type products. CONTRACTOR shall also be solely responsible for the

disposal of empty or partially empty containers including but not limited to soaps, detergents, solvents, thinners, paint, and other related type products. CONTRACTOR shall provide to OWNER a manifest of all such containers and chain of custody documents which document proper disposal as required by federal, state and local agencies.

#### 1.08 PROTECTION

- A. Contamination: No overspray, dust, debris or other contaminants will be allowed to enter the water being treated at the plant. The CONTRACTOR will be responsible to take all steps necessary to completely control contamination of the water treatment plant process stream.
- B. Protect surfaces that might otherwise be damaged by dripping, splashing, or spraying of paint or coating materials.
- C. Correct any damage by cleaning, repairing or replacing as acceptable to OWNER.
- D. Provide one or more of the following notices:
  - 1. "Wet Paint" signs as required to protect new paint.
  - 2. Warning signs posted at least one (1) day prior to the start of spray painting.
- E. Clips and supports for equipment, piping, lighting and similar items of any kind that are damaged during the bidder's work shall be replaced.
- F. All motor control centers and electrical field panels shall be protected from dust and overspray. All nearby structures and vehicles shall be protected from overspray. CONTRACTOR shall not apply coating systems when wind conditions could carry overspray to nearby structures or vehicles.
- G. Electric motors shall be protected from dust and moisture. Motors and pumps shall be painted the same color as specified for the associated piping. Nameplate data shall not be painted over.

**END OF SECTION**

## SECTION 16000 – ELECTRICAL GENERAL REQUIREMENTS

### PART 1 – GENERAL

#### 1.01 RELATED DOCUMENTS

- A. The general provisions of the Contract, including General Conditions, apply to all the work specified in the Electrical - **16000 Sections**.

#### 1.02 LAWS, PERMITS, FEES AND NOTICES

- A. Secure and pay all permits, fees and licenses necessary for the proper execution of the work. Submit all notices and comply with all laws, ordinances, rules and regulations of any public agency bearing on the work. CONTRACTOR shall be licensed Electrical CONTRACTOR in the county of construction.

#### 1.03 DEPARTURES

- A. If any departures from the Contract Drawings or Specifications are deemed necessary, details of such departures and the reasons therefore shall be submitted to the CONSULTANT for advance written approval, prior to departure.

#### 1.04 GUARANTEES

- A. Furnish written guarantee covering all materials, workmanship, labor and equipment for a period of one (1) year from the date of acceptance as described in the Contract General Conditions.
- B. The OWNER reserves the right to operate and use all materials and equipment failing to meet the requirements of the Contract Documents until such unacceptable materials and equipment are replaced or repaired to the satisfaction of the CONSULTANT.

#### 1.05 AS-BUILT INFORMATION

- A. A set of “red-lined” electrical drawings shall be carefully maintained at the job site. Actual conditions are to be put on the drawings in red on a daily basis so the drawings will continuously show locations and routes of cable trays, conduits, pull-boxes, circuit numbers, and other information required by the CONSULTANT.

#### 1.06 JOB SITE VISIT

- A. Visit the project site before submitting a bid. Verify all dimensions shown and determine the characteristics of existing facilities which will affect performance of the work, but which may not be shown on drawings or described within these Specifications.

#### 1.07 CLEANUP

- A. Maintain a continuous cleanup during the progress of the work and use appointed storage areas for supplies. The premises shall be kept free from accumulations of waste materials and rubbish.

#### 1.08 CUTTING AND PATCHING

- A. Cut and prepare all openings, chases and trenches required for the installation of equipment and materials. Repair, remodel and finish in strict conformance with the quality of workmanship and materials in the surroundings. Obtain written permission from the CONSULTANT for any alterations to structural members before proceeding.

#### 1.09 MAINTENANCE

- A. Render all necessary measures to ensure complete protection and maintenance of all systems, materials and equipment prior to final acceptance. Any materials or equipment not properly maintained or protected to assure a factory new condition at the time of final acceptance shall be replaced immediately.

#### 1.10 WATERPROOFING

- A. Whenever any work penetrates any waterproofing, seal and render the work waterproof. All work shall be accomplished so as not to void or diminish any waterproofing bond or guarantee.

#### 1.11 TESTS

- A. Conduct an operating test of equipment prior to the CONSULTANT's approval. The equipment shall be demonstrated to operate in accordance with the requirements of these Specifications. The tests shall be performed in the presence of the CONSULTANT or an authorized representative. The Electrical CONTRACTOR shall furnish all instruments, electricity and personnel required for the tests.

#### 1.12 SUMMARY OF ELECTRICAL WORK

- A. Provide all labor, materials, tools, supplies, equipment and temporary utilities to complete the work shown on the drawings and specified herein. All systems are to be completely installed and fully operational. Equipment not supplied with vendor packages is to be supplied by the CONTRACTOR. Specifically, the work includes, but is not necessarily limited to:
  - 1. Power Distribution Equipment, disconnects, j-boxes
  - 2. Coordinate installation of new equipment and reusing existing raceway to install new signal wires as indicated on plans.
  - 3. Provide and install Conduit and wire for power and instruments, and site lighting
  - 4. Provide and install a Grounding and lightning protection
  - 5. Provide and install the Instrumentation and control systems
  - 6. Provide and install site lighting as indicated on drawings.
  - 7. Electrical equipment racks and supports, see the drawings.

8. Provide startup and testing, coordinate with I&C to provide new signals at existing MCP PLC and existing SCADA.
9. Coordinate with OWNER's PLC and SCADA programmer and provide support to test hardwired signals and field instruments including calibration and scaling of 4-20mA loops for proper display of pressure and flow.
10. Provide O&M and as-built drawings as required.
11. Provide training in the use, maintenance and troubleshooting of the equipment.

#### 1.13 CODES AND STANDARDS

- A. General Applicable provisions of the following codes and standards and other codes and standards required by the State of Florida and local jurisdictions are hereby imposed on a general basis for electrical work (in addition to specific applications specified by individual work sections of these specifications):
  1. U.L.: Electrical materials shall be approved by Underwriters' Laboratories, Inc. This applies to materials which are covered by U.L. standards. Factory applied labels are required.
  2. National Electrical Code, latest edition.
  3. OSHA: Standards of the Occupational Safety and Health Administration are to be complied with.
  4. NEMA: National Electrical Manufacturers Association Standards are to be met wherever standards have been established by that agency and proof is specifically required with material submittals for switchboards, motor control centers, panelboards, cable trays, motors, switches, circuit breakers and fuses.
  5. ANSI: America National Standards Institute
  6. NESC: National Electrical Safety Code, latest edition.
  7. NFPA 820, latest edition.
  8. Florida Building Code, latest edition.
  9. All National and Local codes.

#### 1.14 ELECTRICAL TEMPORARY FACILITIES

- A. The Electrical CONTRACTOR shall provide the furnishing, installing, maintaining and removing all materials and equipment required to provide temporary light and power to perform his work during construction and until work is completed.

## B. Safety

1. All reasonable safety requirements shall be observed to protect workers and the public from shock and fire hazards. Ground fault interrupters shall be employed in accordance with codes.
2. Ground wires are required in all circuits. Ground poles are required on all outlets. All metallic cases shall be grounded.
3. Raintight cabinets shall be used for all equipment employed in wet areas.

## 1.15 EXCAVATING FOR ELECTRICAL WORK

### A. General

1. Excavation or drilling, backfill and repair of paving and grassing is to be in the bid of the Electrical CONTRACTOR. The actual work need not be performed by electrical trades. However, the Electrical CONTRACTOR shall be responsible for all excavation, drilling, dewatering, backfilling, tamping and repair of pavements and grassing required in support of electrical work. All areas disturbed by electrical work shall be repaired to their original condition, or as indicated on the drawings.
2. Hand digging shall be required in congested areas or questionable areas.
3. The Electrical CONTRACTOR shall check and avoid existing utilities before commencing any excavation or drilling.
4. Contract drawings and other trades are to be consulted to avoid interferences with other utilities on this project.
5. In the event of damage to existing utilities, the CONSULTANT shall be immediately notified, and damage shall be immediately repaired.
6. PSL personnel shall be consulted to ascertain locations of existing underground equipment and routing of existing raceways to avoid interferences by referring to "As Built" drawings and PSL's experience of what is installed there.

### B. Precautions

1. The Electrical CONTRACTOR must take every reasonable precaution to avoid interferences. In the vicinity of a suspected interference, excavations shall be dug by hand.

## 1.16 ELECTRICAL SUBMITTALS

### A. Submittals for Approval

1. Refer to Contract General Conditions for additional instructions on the General Conditions and this Section, the more stringent requirements shall apply.
2. Shop Drawings and manufacturer's data sheets are required for all electrical materials.

3. Submittals will not be accepted for partial systems. Submit all materials for each specification section at one time. Submittals must be arranged, correlated, indexed and bound in orderly sets for ease of review.
4. Samples are to be supplied for any substitute as requested by the CONSULTANT.
5. Submit shop drawings, manufacturer's data and certifications on all items of electrical work prior to the time such equipment and materials are to be ordered. Order no equipment or materials without approval from the CONSULTANT. Submittals will not be accepted for partial system submittals; submit all data at one time. Submittals will be promptly returned, approved, approved as noted, or not approved. Items "approved as noted" must be changed to comply with the CONSULTANT's comments and need not be resubmitted for "approved" status. Items "not approved" are not suitable, requiring completely new submittals.

#### B. Operation and Maintenance Manuals

1. Submit to the CONSULTANT copies of all manufacturer's service installation and operation manuals, instructions and bulletins. These manuals shall be subject to review of the CONSULTANT. If acceptable they shall be forwarded to the OWNER. If not acceptable they shall be returned to the CONTRACTOR for revision and resubmittal. Manuals shall contain, but not be limited to, the following:
  - a. Brief description of system and basic features.
  - b. Manufacturer's name and model number for all components in the system.
  - c. List of local factory authorized service companies.
  - d. Operating instructions.
  - e. Maintenance instructions
  - f. Trouble shooting instructions
  - g. Manufacturer's literature describing each piece of equipment.
  - h. Power and control wiring diagrams
  - i. Parts lists

### 1.17 ELECTRICAL PRODUCTS

#### A. Standards Products

1. Unless otherwise indicated in writing by the CONSULTANT, the products to be furnished under this Specification shall be the manufacturer's latest design. Units of equipment and components of the same purpose and rating shall be interchangeable throughout the project. All products shall be newly manufactured. Defective equipment or equipment damaged in the course of installation or test, shall be replaced or repaired in a manner meeting with the approval of the CONSULTANT.

#### B. Delivery, Storage and Handling

1. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels and similar information needed for distinct identification; adequately packaged or protected to prevent deterioration during shipment, storage and handling. Store in a dry, well ventilated, indoor space, except where prepared

and protected by the manufacturer specifically for exterior instructions for storage locations.

C. Substitutions

1. Comply with instructions in the Contract General Conditions and Special Conditions and obtain pre-approval of the CONSULTANT regarding substitutions.

1.18 ELECTRICAL IDENTIFICATION

A. Color Coding Conductor colors shall be in accordance with the N.E.C. and NFPA requirements. Refer also to applicable sections of these specifications. Three phase feeder and branch circuits shall be identified by wiring colors based on NEC requirements.

B. Nameplates

1. The following items shall be equipped with nameplates: All motors, motor starters, motor control centers, pushbutton stations, control panels, time switches, disconnect or relays in separate enclosures, receptacles, wall switches, high voltage boxes and cabinets. All light switches and outlets shall carry a phenolic plate with the supply identified. Special Electrical systems shall be identified at junction and pull boxes, terminal cabinets and equipment racks.
2. Nameplates shall adequately describe the function of the particular equipment involved. Nameplates for panelboards and switchboards shall include the panel designation, voltage and phase of the supply. For example, "Panel A, 277/480V, 3-phase, 4-wire". The name of the machine on the motor nameplates for a particular machine shall be the same as the one used on all motor starters, disconnect and P.B. station nameplates for that machine. Normal power nameplates shall be laminated phenolic plastic, white front and back with black core, with lettering etched through the outer covering; black engraved letters on white background. Lettering shall be 3/16 inch high at pushbutton stations, thermal overload switches, receptacles, wall switches and similar devices, where the nameplate is attached to the device plate. At all other locations, lettering shall be 1/4 inch high, unless otherwise detailed on the Drawings. Nameplates shall be securely fastened to the equipment with No. 4 Phillips, round-head, cadmium plated, steel self-tapping screws or nickel-plated brass bolts. Motor nameplates may be non-ferrous metal not less than 0.003 inch thick, die stamped. In lieu of separate plastic nameplates, engraving directly on device plates is acceptable. Engraved lettering shall be filled with contrasting enamel. Equipment nameplate schedule for all equipment shall be submitted with shop drawing submittal for CONSULTANT's approval.

1.19 SKILLED ELECTRICAL CRAFTSMEN

- A. CONTRACTOR shall employ and staff the project with skilled Craftsmen experienced in the project requirements.
- B. As a minimum, a Licensed Journeyman Electrician shall be present on the project at all times.

- C. Other skilled persons shall be present as the project requirements dictate including manufacturers representatives, start-up technicians, CONSULTANTS, etc.

**PART 2 – PRODUCTS (NOT USED)**

**PART 3 – EXECUTION (NOT USED)**

**END OF SECTION**

## SECTION 16050 – BASIC MATERIALS AND METHODS

### PART 1 – GENERAL

#### 1.01 SUBMITTALS

- A. Submit data sheets on all items per **Section 16000** – Electrical General Requirements.

#### 1.02 CODES AND STANDARDS

- A. General applicable provisions of the following codes and standards and other codes and standards required by the State of Florida and local jurisdictions are hereby imposed on a general basis for electrical work (in addition to specific applications specified by individual work sections of these specifications):
  1. U.L.: Electrical materials shall be approved by the Underwriters' Laboratories, Inc. This applies to materials which are covered by U.L. standards. Factory applied labels are required.
  2. National Electrical Code
  3. OSHA: Standard of the Occupational Safety and Health Administration are to be complied with.
  4. NEMA: National Electrical Manufacturers Association Standards are to be met wherever standards have been established by that agency, and proof is specifically required with material submittals for switchboards, motor control centers, panelboards, cable trays, motors, switches, circuit breakers, and fuses.
  5. ANSI: American National Standards Institute
  6. NESC: National Electrical Safety Code

### PART 2 – PRODUCTS

#### 2.01 GROUNDING MATERIALS

- A. All ground rods shall be 20-foot 5/8" copperclad, unless otherwise indicated.
- B. Around wires shall be soft drawn copper sized per National Electrical Code, unless otherwise indicated.

#### 2.02 CONDUIT

- A. PVC Conduit
  1. PVC conduit shall be Schedule 80 or Schedule 40 unless otherwise noted and shall be U.L. approved. Comply with Federal Spec WC-1094 and NEMA TC-1.
- B. Flexible Conduit

1. All flexible conduits shall be liquidtight, made of corrosion resistant plated steel with extruded polyvinyl covering and watertight connectors.

#### C. Rigid Aluminum Conduit

1. Provide Rigid Aluminum conduit along all exposed raceways installed onto the IW-2 areas. Provide conduit supports as required by NEC.
2. Provide UL listed as manufactured by American conduit or an approved equal.

### 2.03 CABLE, WIRE AND CONNECTORS

#### A. 600 Volt Power Wiring

1. Individual conductors shall be rated for 600 volts and shall meet the requirements below:
  - a. Conductors shall be stranded.
  - b. All wire shall be brought to the job in unbroken packages and shall bear the date of manufacturing; not older than 12 months.
  - c. Type of wire shall be THWN except where required otherwise by the contract drawings.
  - d. No wire smaller than No. 12 gauge shall be used unless specifically indicated.
  - e. Conductor metal shall be copper.
  - f. All conductors shall be meggered after installation. Megger testing shall exceed 50 mega ohms.
2. Multi-conductor cables shall be type TC UL 1277 THWN, PVC jacketed 600V with conductor and quantities as indicated.

#### B. Instrumentation Cable

1. Process instrumentation wire shall be 16 gauge twisted pair, 600 V., aluminum tape shielded, polyvinyl chloride jacketed, as manufactured by the American Insulated Wire Co., Eaton Corp., or equal. Multiconductor cables with individually shielded twisted pairs shall be installed where indicated.

#### C. Control Cable

1. Multiconductor control cable shall be stranded 14 gauge, 600 V. THWN insulated overall shielded with PVC jacket, as manufactured by the American Insulated Wire Co., Eaton Corp., or equal.

### 2.04 TERMINATIONS AND SPLICES (600 VOLTS AND LESS)

- A. Terminations of power cable shall be by means of U.L. approved connectors. All connectors shall meet U.L. 486B and shall be compatible with the conductor material.
- B. Terminate all control and instrumentation cable with fork type compression lugs.

- C. Splicing of power, control, or instrumentation wiring will not be allowed except by written approval of the CONSULTANT. Where splicing is allowed, splices shall be made with approved compression connectors, and splices shall be made waterproof regardless of location.

## 2.05 BOXES

- A. Boxes for wiring devices, switches and receptacles installed outdoors shall be weatherproof fiberglass with polycarbonate cover plates.

## 2.06 PULL BOXES AND SPLICE BOXES

### A. Location

1. Units used outdoor or in a damp or corrosive environment shall be 316 ss, above grade or concrete in the ground unless otherwise indicated on plans.
2. Units used indoors in dry and clean environments shall be NEMA 1.

### B. Size

1. Units shall be sized per NEC as minimum.

### C. Required Units

1. Plans depict minimum requirements. Additional units shall be provided as may be required to complete raceway systems.

## 2.07 MOUNTING AND SUPPORTING ELECTRICAL EQUIPMENT

- A. Furnish and install all supports, hangers, and inserts required to mount fixtures, conduits, cables, pull boxes, and other equipment.
- B. Support system used indoors in clean, dry and air-conditioned areas shall be galvanized steel.
- C. Perforated straps and wires are not permitted for supporting electrical devices. Anchors shall be of approved types.
- D. All supports, hangers, hardware, etc. shall be 316 stainless steel. Supports shall be selected to avoid galvanic reactions. Support devices shall be submitted for approval.
- E. Provide trapeze, bridge systems or wall bracketed cantilevered system to support the raceway system.
- F. Spacing of support systems shall be per NEC. Provide spacing of conduits according to the NEC and the materials used. For PVC conduit, refer to NEC table 347-8.
- G. Plans depict minimum requirements. Provide additional units as required to complete raceway system.

- H. Refer to material schedule on plans. These specified requirements shall apply to all requirements not included in the material schedule.

## 2.08 SAFETY DISCONNECT SWITCH

- A. Fusible and non-fusible disconnect switches shall be heavy-duty, NEMA type H, quick-make, quick-break, visible blades, 600 volt, 3 pole with full cover interlock. Switches shall have copper lugs.
- B. Unless otherwise indicated, disconnects shall be 3-pole, nonfusible switch in a NEMA 4x, stainless steel enclosure.
- C. Switches shall be horsepower rated, heavy duty as manufactured by the Square D Co., or equal.
- D. Units provided as main service disconnects, shall be fused and labeled for service equipment.
- E. Provide auxiliary contracts as may be required by drawings.
- F. Units shall be padlockable.
- G. For small motor loads less than 2HP, such as motor operated valves and the like. U.L. listed motor rated manual switches shall be used; unless otherwise indicated, provide NEMA 4 enclosures, padlockable.

## 2.09 DUCT SEAL

- A. Provide Garvin Industries' duct seal or an approved equal
- B. Provide and install duct seal at all conduit ends for all new conduit installations.
- C. Duct seal shall be used to seal around junction boxes, terminal boxes, panels, MCC conduit slab, ATS switch, control panels and the like, it shall be a permanently soft, non-toxic compound. It shall also not affect other plastic materials or corrode metals.

## 2.10 CONTROL STATIONS (where applicable)

- A. Provide units with switch selections as indicated on the drawings, and contact blocks as needed. Include contact blocks for a complete and functional system.
- B. Units shall be cast aluminum, NEMA 4, Square D, Eaton or an approved equal.

# PART 3 –EXECUTION

## 3.01 GROUNDING

- A. Provide ground system as indicated on the drawings and as required by the National Electrical Code.

- B. All raceways require grounding conductors. Metallic raceways are not adequate grounding paths. Bonding conductors through the raceway systems shall be continuous from main switch ground buses to panel ground bars of the panelboards, and from panel grounding bars of panelboards and motor control centers to branch circuit outlets, motors, lights, etc. THESE GROUND CONDUCTORS ARE REQUIRED THROUGHOUT THE PROJECT REGARDLESS OF WHETHER CONDUIT RUNS SHOW GROUND CONDUCTORS ON THE DRAWINGS.
- C. All connections made below grade shall be of the exothermic type.
- D. The grounding system test shall not exceed a 48 hour span dry resistance of 10 ohms. Grounding and bonding connections shall not be painted.

### 3.02 CONDUIT

- A. Locations: Conduits shall be used as follows:

1. Refer to schedule on drawings.

- B. Installation

1. Conduits subjected to rough handling or usage shall be removed from the premises.
2. Conduits must be kept dry and free of water or debris with approved pipe plugs or caps. Care shall be given that plugs or caps be installed before pouring of concrete.
3. Where conduits pass through exterior concrete walls or fittings below grade, the entrances shall be made watertight.
4. Infurred ceilings, conduit runs shall be supported from structure, not furring.
5. Conduits entering panelboards, pull boxes, or outlet boxes shall be secured in place by galvanized locknuts and bushings, one (1) locknut outside and one (1) locknut inside of box with bushing on conduit end. The locknuts shall be tightened against the box without deforming the box. Bushings shall be of the insulating type.
6. Field conduit bends shall be made with standard tools and equipment manufactured especially for conduit bending.
7. Where embedded conduits cross expansion joints, furnish and install offset expansion joints or sliding expansion joints. Sliding expansion joints shall be made with straps and clamps.
8. Exposed runs of conduits shall be installed with runs parallel or perpendicular to walls, structural members or intersections of vertical planes and ceilings, with right angle turns consisting of symmetrical bends. No attempts are made in plans to show required pull boxes, gutters, etc. necessary for the construction of the raceway system but the CONTRACTOR shall provide these raceways as may be required.
9. Conduits in structural slabs shall be placed between the upper and the lower layers of reinforcing steel, requiring careful bending of conduits. Conduits embedded in concrete slabs shall be spaced not less than eight (8) inches on centers or as widely spaced as possible where they converge at panels or junction boxes. Conduits running parallel to slab supports, such as beams, columns and structural walls shall be installed not less than 12 inches from such supporting elements. To prevent displacement during concrete pour, saddle supports for conduit, outlet boxes, junction boxes, inserts, etc., shall be secured.
10. Conduit runs shall always be concealed except where indicated on plans.

11. Pull lines shall be installed in all empty conduits. All pull wires shall be identified with conduit number at each end.
12. Where conduits are run individually, they shall be supported by approved pipe straps secured by means of toggle bolts or tapcons on hollow masonry; tapcons on concrete or solid masonry; machine screws or bolts on metal surfaces and wood screws on wood construction. The use of perforated straps or wires will not be permitted.
13. Wire shall not be installed until all work of any nature that may cause damage is completed, including pouring of concrete. Mechanical means shall not be used in pulling in wires No. 8 or smaller.
14. Underground conduits not under concrete slabs are to be buried at least two (2) feet below finished grade for circuits rated 600 volts or less, except under traffic areas where motor vehicles may cross. Under traffic areas, conduits are to be buried at least three (3) feet below finished grade.
15. All conduits shall be cleaned by pulling a brush swab through before installing cables.
16. All conduits shall be sealed at each end with electrical putty. Special care shall be taken at all equipment where entrance of moisture could be detrimental to equipment. Approved backing gauze is required prior to the installation of conduit putty.
17. No more than (2) feet of flexible conduit shall be used at connections of all motors, transformers, motor operated valve and gates, instruments and other items of equipment where vibration is present. It shall be supported where required with stainless steel bands.
18. PVC conduit shall be supported to walls and slabs using carlon snap strap conduit wall hangers. Two hole PVC conduit clamps shall not be permitted.

### 3.03 WIRES, CABLES AND CONNECTIONS

- A. Cables pulled into conduits shall be pulled using pulling eyes attached to conductors.
- B. Shields shall be grounded at only one termination point.

### 3.04 BOXES

- A. Installation of boxes shall be in accordance with the National Electrical Code requirements.
- B. Boxes shall be mounted plumb and level in accessible locations and mounting shall be secure, vibration resistant and galvanically compatible. Hardware shall be used that is specifically intended for the purpose. When mounted in corrosive, damp or wet locations, stainless steel hardware shall be utilized.

### 3.05 WIRING DEVICES

- A. Wiring devices shall be installed in device boxes approved for the application. All connections shall be made with screw terminals. Wiring devices shall be Leviton or approved equal.
- B. Wire devices on UPS systems shall be isolated ground, colored orange.

C. Cover plates shall be provided as follows except as otherwise noted.

1. Interior finished area – brush alum.
2. Wet areas – gasketed plastic with flip cover.

D. Receptacles installed outdoors, below grade, or in areas other than clean and dry environments shall be GFI and weatherproof.

### 3.06 SUPPORTING DEVICES

A. All items shall be supported from the structural portion of the building and studs, except standard ceiling mounted lighting fixtures and small devices may be supported from ceiling system where permitted by the CONSULTANT. However, no sagging of the ceiling will be permitted. Supports and hangers shall be, 316 stainless steel, and types approved by Underwriters' Laboratories.

B. All floor-mounted devices (switchboards, motor control centers, transformers, etc.) shall be securely anchored to the floors or slabs. Where recommendations are made by manufacturer, these recommendations shall be followed.

### 3.07 CLEANING

A. All electrical equipment enclosures shall be thoroughly cleaned before acceptable by FPL. As a minimum, CONTRACTOR shall remove all debris including stripped wire insulation, dirt, empty food wrappers, soda cans, water bottles, coffee cups, etc.

**END OF SECTION**

## SECTION 16110 – LIGHTNING PROTECTION

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

- A. The CONTRACTOR shall furnish all labor and materials and items of service required for the completion of an all functional and unobtrusive system of grounds, conductors and air terminals for protection against damage by lightning of designated structures as approved by the CONSULTANT. Complete installation shall conform in all respects to the current requirements of L.P.I. certified system program and all legal, labor, insurance or other authorities having jurisdiction. The installing CONTRACTOR shall have a minimum of five (5) years experience in this specialized work and be a certified master installer of the Lightning Protection Institute. All materials used shall be furnished and recommended for their intended use by a reputable lightning protection manufacturer who is a Manufacturer Member of the Lightning Protection Institute. All materials shall be provided by Thompson Lightning Protection or an equal. Installer shall be Bonded Lightning Protection System, Inc., Jupiter, Florida or equal.
- B. As a minimum, the following structures and or buildings shall be provided with lightning protection systems.
1. Deep injection well pad & equipment
  2. Area lighting/poles

#### 1.02 SUBMITTALS

- A. Submittals for Approval
1. Refer to Contract General Conditions for additional instructions on submittals and substitutions. Where conflicts occur between the General Conditions and this Section, the more stringent requirements shall apply.
  2. Shop drawings and manufacturer's data sheets are required for all materials.
  3. Samples are to be supplied for any substitute as requested by the CONSULTANT.
  4. The following numbers of copies are required:
    - a. Shop drawings 6 sets
    - b. Samples 1 each
    - c. Manufacturer's data 6 sets
    - d. Certification 6 sets
    - e. Test reports 6 sets
    - f. Warranties/Guarantees 6 sets

5. Submit shop drawings, manufacturer's data and certifications on all items prior to the time such equipment and materials are to be ordered. Order no equipment or materials without approval from CONSULTANT. Submittals will not be accepted for partial system submittals; submit all data at one time. Submittals will be promptly returned, approved, approved as noted, or not approved. Items "approved as noted" must be changed to comply with the CONSULTANT's comments and need not be resubmitted for "approved" status. Items "not approved" are not suitable, requiring complete new submittals.
6. Time delays caused by rejection of submittals are not cause for extra charges to OWNER or time extensions.
7. Provide scaled plan and elevation views of all structures for which lightning protection shall be provided. These plans shall show the proposed location of all air terminals, typical air terminals, size and location for ground rods, cable, connectors and proposed methods of bonding. Bond to telephone and power service ground systems.

#### 1.03 SITE VISIT

- A. Site visit before bid to evaluate existing conditions is recommended.

#### 1.04 SUPPLIER

- A. Supplier shall be Bonded Lightning Protection of Jupiter or an approved equal.

### **PART 2 - PRODUCTS**

#### 2.01 TERMINALS

- A. Provide terminals as per material vendor shop drawings. Terminal materials shall be as follows, bronze saddle and pressure plate, nickel tip highly polished, pure copper point. Provide mounting type and cable connections as required.

#### 2.02 CABLE AND ACCESSORIES

1. Provide stranded copper cable per material vendor. Provide braces, saddle, fittings and connectors as required compatible with materials.

#### 2.03 GROUND RODS

- A. Provide copper clad ground rods, 5/8" x 20' minimum. Provide bronze compression clamps as required.

#### 2.04 MATERIALS

- A. The CONTRACTOR is responsible to adjust lightning protection materials in order to avoid any dissimilar metal interaction.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION REQUIREMENTS**

- A. Locate terminals per vendor shop drawings. All points shall be a minimum of 2" of outside building edges, corners, and ridge ends. Maximum spacing shall be 20'. Maximum protection above object to be protected shall be 10".
- B. Maintain horizontal and downward coursing of main conductor and insure that all bends have at least an 8" radius and do not exceed 90 degrees.
- C. Support all exposed roof, downlead and bonding cables at 3' intervals.
- D. Ground electrodes shall be installed per Vendor shop drawings but install at least 1' below final grade.
- E. Interconnect Lightning Protection ground to electric, telephone and other building ground systems per codes.
- F. System shall be installed per Vendor shop drawings to insure proper code compliance and system certification. Any variance shall entail resubmittal and re-approval and all costs shall be paid by the CONTRACTOR.
- G. As built drawings shall be provided and submitted by the Material Vendor in accordance with certification procedures.
- H. All materials shall be U.L. approved with "A" labels on conductors at 10' intervals and "B" labels on air terminals.
- I. Provide Aluminum stranded conductors, sized per the drawings for all above ground and tops of structures and buildings. Fastening hardware shall also be aluminum or 316SS. Copper stranded conductors shall be used for all below ground and in walls installations. Provide PVC conduit for long vertical runs along exterior walls, from the ground to the top of a building or structure
- J. Complete installation shall bear U.L. Master Label "C" to be secured by the system installer per U.L. 96A.
- K. Installation shall comply in all respects L.P.I. Code 175. Installation shall be made by or under the supervision of an L.P.I. Certified Master Installer. The completed installation shall receive system certification including submittal of forms L.P.I. CI-01, 02, and 03.
- L. Restoration to existing conditions. CONTRACTOR is responsible for restoring all areas which are disturbed by electrical work to original conditions.

**END OF SECTION**

## SECTION 16900 – INSTRUMENTATION AND CONTROL SYSTEM

### PART 1 – GENERAL

#### 1.01 SCOPE OF WORK

- A. The SUPPLIER shall furnish, install and place into service operating process instrumentation, control systems and panel including accessories, related to the control panels as shown on plans and specified herein.
- B. The I&C system shall be completely tested and verified. Provide test equipment as need to verify proper operation. The systems shall be connected to field panels and used in the future.
- C. Coordinate with OWNER's PLC and SCADA programmer and provide support to test hardwired signals and field instruments. Include calibration and scaling of 4-20mA loops for proper display of pressure and flow.

#### 1.02 SINGLE INSTRUMENT SUPPLIER

- A. The SUPPLIER shall assign to the Single Instrument and Control (I&C) supplier full responsibility for the functional operation of all new instrumentation systems. The SUPPLIER shall have said supplier perform all engineering necessary to select, to furnish, to supervise installation, connection, to calibrate, to place into operation all sensors, instruments, alarm equipment, control panels, accessories and all other equipment as specified herein.
- B. The foregoing shall enable the SUPPLIER and the OWNER to be assured that the full responsibility for the requirements of this section will reside in an organization which is qualified and experienced in the water treatment field and its process technology on a functional system basis.
- C. The plant wide I&C supplier shall be a UL listed manufacturer. Acceptable named manufacturers shall be limited to the following, no equal:
  - 1. CC Controls Inc.
  - 2. No equal
- D. SUPPLIER shall review all specifications and drawings. SUPPLIER shall be sure all control panels are included in the bid.
- E. SUPPLIER shall provide equipment listed below and modifications to existing Control Panel. All Control Panels shall be provided with UL labels. Major items of work include:
  - 1. Terminal boxes- 3 point latch only
  - 2. Flow meter and Pressure Transmitter Instruments

3. Provide Digital displays with analog input and analog output where indicated capabilities.
4. TVSS equipment for signal and power, see drawings
5. Coordination with PSL staff to provide updated drawings/as-builts to revise the existing PLC and existing equipment drawings being affected by new signals.
6. Provide configuration, testing, and startup. Based on testing and field observations include any field changes to the controls scheme adjustments into the final set of as-builts and O&M shop drawings.

### 1.03 INSTALLATION WORK

- A. Nothing in this part of the specifications shall be construed as requiring the SUPPLIER to utilize personnel supplied by his assigned instrument manufacturer's organization or any division thereof, to accomplish the physical installation of any elements, instruments, accessories or assemblies specified herein. However, the SUPPLIER shall employ installers who are skilled and experienced in the installation and connection of all elements, instruments, accessories and assemblies; portions of their work shall be supervised or checked as specified herein.

### 1.04 PREPARATION OF SUBMITTAL OF DRAWINGS AND DATA

- A. It is incumbent upon the SUPPLIER to coordinate the work specified in these Sections so that a complete instrumentation and control will be provided and will be supported by accurate shop and record drawings. As part of the responsibility as assigned by the SUPPLIER, the Single I&C supplier shall prepare and submit through the SUPPLIER, complete and organized shop drawings, as specified herein. Interface between instruments, motor starters, flow meters, and existing instruments shall be included in his shop drawing submittal.
- B. In order to provide a fully coordinated system, shop drawings by other equipment vendors associated with the I&C control panel systems shall be reviewed and approved by the SUPPLIER before submittal to the CONSULTANT for approval.
- C. During the period of preparation of this submittal, the SUPPLIER shall authorize direct informal liaison between his single I&C Supplier and the CONSULTANT for exchange of technical information. As a result of this liaison certain minor refinements and revisions in the systems as specified may be authorized informally by the CONSULTANT, but these shall not alter the scope of the work or cause increase or decrease in the contract price. During this informal exchange no oral statement by the CONSULTANT shall be construed to give formal approval of any component or method, nor shall any statement be construed to grant formal exception to or variation from these specifications.
- D. Operation and Maintenance Manual
  1. Submit one preliminary O&M for review and comment by the CONSULTANT. Provide five final O&M.s, bound in a three ring binder. O&M shall include the requirements of I&C materials and minimally include the following: approved

submittal data, start-up corrected as built shop drawings. O&M shall be neatly and logically arranged with a contents page followed by tabbed sections.

#### 1.05 ADDITIONAL TECHNICAL SERVICES

- A. At no additional cost to OWNER, the SUPPLIER shall provide the services of qualified technical representatives of the Single I&C supplier:
  - 1. To supervise installation and connection of all instruments, elements and components of every system, including connection of instrument signals to primary measurement elements and to final control elements such as pumps;
  - 2. To make all necessary adjustments, calibrations and tests;
  - 3. To instruct plant operating and maintenance personnel on instrumentation. This time shall be in addition to whatever time is required for other facets of work at the site and shall be during PSL water plant normal working days and hours.

#### 1.06 GUARANTEE

- A. The SUPPLIER shall guarantee all equipment and installation, as specified herein, for a period of 2 years following the date of completion of the work. To fulfill this obligation, the SUPPLIER shall utilize technical service personnel designated by the Single I&C supplier to which the SUPPLIER originally assigned project responsibility for instrumentation.

#### 1.07 ADDITIONAL PROVISIONS

- A. The applicable provisions of the following sections under Electrical Work shall apply the work and equipment specified herein, the same as if stated in full herein:
  - 1. Codes and Standards
  - 2. Equipment Materials and Workmanship
  - 3. Testing
  - 4. Grounding
  - 5. Equipment Anchoring
  - 6. Conductor and Equipment Identification
  - 7. Terminal Cabinets and Control Compartments
  - 8. Process Control Devices

#### 1.08 NEWEST MODEL COMPONENTS

- 1. All meters, instruments and other components shall be the most recent field proven models marketed by their manufacturers at the time of the submittal of shop

drawings unless otherwise specified to match existing equipment. All technical data publications included with the submittal shall be the most recent issue.

#### 1.09 COORDINATION

- A. I&C supplier shall coordinate with his supplier and other SUPPLIERS on the project. Where large subsystems are provided, the I&C supplier shall coordinate before the priced proposal to be certain all equipment, engineering and labor are provided. Coordination item minimally includes: equipment dimensions, heat rejection, power requirements, control and signal requirements, and interconnection requirements.

#### 1.10 TEST PROCEDURE DEVELOPMENT AND DOCUMENTATION

- A. I&C subcontractor shall prepare and submit to the CONSULTANT for review a detailed description of the test procedures that he proposed to perform to demonstrate conformance of the complete system of instrumentation and controls to this Specification.
- B. It is recommended that the I&C subcontractor develop the test procedures in two steps by first submitting general descriptions and outlines of the tests and then, upon receipt of approval, submit the required detailed procedures and forms.
- C. Operational Acceptance Tests
  - 1. The I&C subcontractor shall prepare check-off sheet(s) for each loop and an instrument calibration sheet for each active I&C element (except simple hand switches, lights, etc.). These check-off and data sheets shall form the basis for these operational tests and this documentation.
  - 2. Each loop check-off sheet shall cite the following information and shall provide spaces for sign-off on individual items and on the completed loop by the I&C subcontractor.
    - a. Project name
    - b. Loop number
    - c. For each element: Tag number, description, manufacturer and model number, installation bulletin, and Specification sheet number.
    - d. Loop description
    - e. Installation check
    - f. Termination check
    - g. Calibration check
    - h. Adjustment check

- i. Space for comments
  - j. Space for loop sign-off I&C subcontractor and date.
3. Each instrument calibration sheet shall provide the following information and a space for sign-off on individual items and on the completed unit by the OWNER's Representative and the I&C subcontractor.
- a. Project name
  - b. Loop number
  - c. Tag number
  - d. Manufacturer
  - e. Model number
  - f. Serial number
  - g. Calibration range
  - h. Calibration data: Input, output and error at 0, 25, 50, 75, and 100% of span.
  - i. Switch setting, contact action and dead band for discrete elements.
  - j. Space for comments
  - k. Space for sign-off by I&C subcontractor and date.
- D. Functional Acceptance Tests: The I&C subcontractor shall prepare two types of test forms as follows:
- 1. For those functions that can be demonstrated on a loop-by-loop basis, the form shall include:
    - a. Project name
    - b. Loop number
    - c. Loop description
    - d. Test procedure description
    - e. For each component: Tag number, description, manufacturer and data sheet number.
    - f. Space for sign-off and date by both I&C subcontractor and OWNER's Representative.

2. For those functions that cannot be demonstrated on a loop-by-loop basis, the test form shall be a listing of the specific tests to be conducted. With each test description, the following information shall be included:
  - a. Spec page and paragraph of function demonstrated
  - b. Description of function
  - c. Space for sign-off and date by both I&C subcontractor and CONSULTANT.

## **PART 2 – PRODUCTS**

### **2.01 INSTRUMENTATION CRITERIA**

#### **A. Designation of Components**

1. In these specifications and on the drawings, all systems, meters, instruments and other elements are represented schematically, and are designated by numbers, as derived from criteria in Instrument Society of America Standard ANSI/ISA S5.1-1973. The nomenclature and numbers designated herein and on the drawings shall be employed exclusively throughout shop drawing, data sheets and similar materials. Any other symbols, nomenclature unique to the manufacturer's standard methods shall not replace these prescribed above, used herein and on the Drawings.

#### **B. Signal Characteristics**

1. Signals shall be electrical, as indicated herein, and shall vary in direct linear proportion to the measured variable, except as noted. Electrical signals outside control panels shall be 4-20 MADC, except as noted.

#### **C. Matching Style, Appearance and Type**

1. All instruments to be panel mounted at the control panels shall have matching style and general appearance. Instruments performing similar functions shall be of the same type, model, or class and shall be one (1) manufacturer.

#### **D. Accuracy and Repeatability**

1. The overall accuracy of each instrumentation system or loop shall be as prescribed in the specifications for that system or loop. Each system's accuracy shall be determined as a probable maximum error; this shall be the square root of the sum of the squares of the certified "accuracies" of certain designated components in each system, expressed as a percentage of the actual span or value of the measured variable. Each individual electronic instrument shall have a minimum accuracy of +0.7 percent of full scale and a minimum repeatability of +0.4 percent of full scale unless otherwise specified. Instruments which do not conform or improve upon these criteria are not acceptable.

E. Signal Isolators, Converters and Power Supplies

1. Signal isolators shall be furnished and installed in each measurement and control loop, wherever required, to assure adjacent component impedance match or where feedback paths may be generated. Signal converters shall be included where required to resolve any signal level incompatibilities. Signal power supplies shall be included, as required by the manufacturer's instrument load characteristics, to insure sufficient power to each loop component.

F. Alternative Equipment or Methods

1. Equipment or methods requiring redesign of any project details are not acceptable without prior written approval of the CONSULTANT. Any changes inherent to a proposal alternative shall be at no additional cost to the OWNER. The required approval shall be obtained in writing by the I&C subcontractor through the SUPPLIER prior to submittal of shop drawings and data. Any proposal for approval of alternative equipment or method specified shall include evidence of improved performance, operational advantage and maintenance enhancement over the equipment or method specified, or shall include evidences that a specified component is not available. Otherwise, alternative equipment (other than direct, equivalent substitutions) and alternative methods shall not be proposed.

G. Special Equipment

1. The I&C Supplier shall provide all necessary equipment to properly interface his system with equipment provided by others. Such equipment shall include but not be limited to special sensing relays for seal failures and the like.

2.02 DETAILED SYSTEMS DRAWINGS AND DATA

- A. Content: The SUPPLIER shall submit detailed shop drawings and data prepared and organized by the Single I&C supplier designated at the time of bidding. The quantity of submitted sets shall be no less than 6 sets. These drawings and data shall be submitted as a complete bound package at one time within 30 calendar days after date of notice to proceed. Provide field investigations before submittal preparation.

1. Drawings showing definite diagrams for every instrumentation loop system shall be provided. These diagrams shall show and identify each component of each loop or system using legend and symbols from ISA standard S5.4, each having the format of ISA Standard S5.1 as used on the project drawings.
2. Coordinate all equipment and instrument tags with the OWNER's existing SCADA system, and per the OWNER's SCADA Standards. All tags shall agree with the standards.
3. Data sheets for each component, together with a technical product brochure or bulletin shall be provided. The data sheets shall show:
  - a. Component function description used herein and on the drawings;
  - b. Manufacturer's model number or other product designation;

- c. Project tag number used herein and on the drawings;
  - d. Project system loop of which the component is a part;
  - e. Project location or assembly at which the component is to be installed;
  - f. Input and output characteristics;
  - g. Scale range, units and multiplier;
  - h. Requirements for electrical supply;
  - i. Requirements for air supply;
  - j. Materials of component parts to be in contact with, or otherwise exposed to process media;
  - k. Special requirements or features.
4. A complete index shall appear in the front of each bound submittal volume. A separate technical brochure or bulleting shall be included with each instrument data sheet. The data sheet shall be indexed in the submittal by systems or loops, as a separate group for each system or loop. If, within a single system or loop, a single instrument is employed more than once, one data sheet with one brochure may cover all identical uses of that instrument in that system. Each brochure shall include a list of tag numbers for which it applies. System groups shall be separated by labeled tags.
5. Drawings shall show both schematic and wiring diagrams for control circuits. Complete details on the circuit interrelationship of all devices within and outside each control panel shall be submitted. Control devices and pertinent mechanical relationships including mechanical parameters shall be included on these diagrams. These parameters as a minimum shall include instrument ranges, sizes, setpoints and the like. The diagrams shall consist of component layout drawings to scale, showing numbered terminals on components together with the unique number of the wire to be connected to each terminal. Piping and wiring diagrams shall show terminal assignments from all primary measurement devices, such as flow meters, and to all final control devices, such as pumps. The SUPPLIER shall furnish all necessary equipment supplier's shop drawings to facilitate inclusion of this information by the I&C system supplier.
6. Assembly and construction drawings for each control panel and for other special enclosed control assemblies for field installation shall be provided. These drawings shall include dimensions, identification of all components, surface preparation and finish data, name plates and the like. These drawings also shall define exactly the style and overall appearance of the assembly; a final treatment sample shall be provided when requested.
7. Installation anchoring and mounting details for all components and assemblies to be field-mounted, including conduit connection or entry details shall be provided.

8. Complete detailed bill of materials including a master bill of materials listing all field mounted devices, control panels and other equipment that will be shipped to the job site and a bill of materials for each control panel listing all devices within the panel.

B. Organization and Binding

1. The organization of the original shop drawing submittal shall be compatible to the eventual inclusion with the technical manuals submittal and shall include final alternations reflecting "as built" conditions. Accordingly, the initial multiple copy shop drawing shall be separately bound in 3-ring binders.

2.03 TECHNICAL MANUALS

- A. One preliminary O&M manual shall be submitted to the CONSULTANT for review and comment. Assuming a favorable review the I&C supplier shall incorporate comments and forward the five final copies to the CONSULTANT. If the preliminary O&M is not acceptable, the I&C supplier shall resubmit.
- B. Five (5) final sets of technical manuals shall be supplied for the OWNER as a condition for final acceptance of the project. Each set shall consist of one (1) or more volumes, each of which shall be bound in a standard size, 3-ring, loose leaf, vinyl plastic hard cover binder suitable for bookshelf storage. Binder ring size shall not exceed 3 inches.
- C. In addition to updated shop drawing information to reflect actual existing conditions, each set of technical manuals shall include installation, connection, operating, trouble-shooting, maintenance and overhaul instructions in complete detail. This shall provide the OWNER with comprehensive information on all systems and components to enable operation, service, maintenance and repair. Exploded or other detailed views of all instruments, assemblies, and accessory components shall be included together with the complete parts lists and ordering instructions.
- D. Shop drawing files shall be provided in the latest version of Autocad with each O&M manual. Provide electronic files on disk.

2.04 SPARE PARTS

- A. The SUPPLIER shall include, as part of the bid package, a list of recommended spare parts covering items required under these specifications.
- B. Minimum spare parts shall be provided boxed and identified including the following:
  1. 1-spare fuse for every type used.
  2. 1-spare signal TVSS for every type used.
  3. 1-spare power TVSS for every type used.
  4. 1- spare pressure transmitter instrument

## 2.05 CONTROL PANELS CONSTRUCTION

### A. General

1. I&C supplier shall construct the control panel to properly control internal and external equipment. No attempt is made to specify or indicate on plans, all required equipment but rather to set forth the minimum requirements.

### B. Engineering

1. I&C supplier shall provide system engineering and produce detailed fully engineered, coordinated and completed drawings.

### C. Construction

1. Control panel construction shall be per these specification and plans.

### D. Signal and Control Circuit Wiring

1. Wire Type and Sizes: Conductors shall be flexible stranded copper wire; these shall be UL listed TFFN, THWN, THHN and shall be rated 600v. Wire for control signal circuits shall be #16 AWG unless otherwise noted. All instrumentation cables shall be shielded #18 AWG with a copper drain wire unless otherwise noted. All special instrumentation cable such as between sensor and transmitter shall be supplied by the I&C supplier. SUPPLIER shall increase wire size per load or impedance requirements.

### E. Wiring Instrumentation

1. All wires shall be run in plastic wireways except (1) field wiring, (2) wiring between mating blocks in adjacent sections, (3) wiring run from components on a swing-out panel to components on a part of the fixed structure, (4) wiring run to panel mounted components on the door and the like. Wiring run on a swing out panel to other components on a fixed panel shall be made up in nylon wire ties bundles and secured so that bundles are not strained at the terminals.
2. Wiring run to control devices on the front panels shall be tied together at short intervals with nylon ties and secured to the inside face of the panel using adhesive mounts and adhesive strips.
3. Wiring to rear terminals on panel mounted instruments shall be run in plastic wares secured to horizontal brackets run above or below the instruments in the same plane as the rear of the instruments.
4. Shields of instrument cable shall only be grounded on one side of each circuit. The side to be grounded shall be nearest the source of excitation.
5. Care shall be exercised to properly insulate the ungrounded side of the loop to prevent ground loops from occurring.

6. Conformance to the above wiring installation requirements shall be reflected by details shown on the shop drawings for the CONSULTANT's review.

#### F. Wire Marking

1. Each signal, alarm, control, and indicating circuit conductor connected to a given electrical point shall be designated by a single unique number which shall be shown on all shop drawings. These numbers shall be marked on all conductors using white plastic heatshrink sleeves with typewritten characters. Instrument signal conductors shall be tagged with unique multiple digit numbers. Wires from the circuit breaker panelboard shall be tagged indicating the branch circuit breaker number.

#### G. Terminal Blocks

1. Compression type terminal blocks shall be molded plastic with barriers and box lug terminals, and shall be rated 15 amps at 600v and mounted securely to DIN rails. White marking strips fastened to the molded sections shall be provided and wire numbers and circuit identifications shall be marked thereon with machine printed marker on top. Terminal blocks shall be IEC style by Entelec M4/6 or an approved equal.

#### H. Wire Color

1. Wire color shall be: Line Power – Black; Neutral or common – White; AC Control – Red; DC Control – Blue; Equipment or Chassis Ground – Green; specified externally powered circuits – Orange.

#### I. Identification

1. All components shall be identified using Lamicoid labels or an approved equal.

#### J. Field Readout Pressure Readout

1. 1/8 inch Red Lion PAX2 meter with 120V power input, 4-20Ma Output option board. See the drawings.

### 2.06 CONTROL PANEL EQUIPMENT

#### A. General Purpose Relays

1. General purpose relays in the control panel shall be the plug in type with contacts rated 10 amps at 120 vac as a minimum. The quantity and type of contacts shall be as required to accomplish the desired control task. Each relay shall be enclosed in a clear plastic heat and shock resistant dust cover. Relays shall be Potter and Brumfield or an approved equal. Differing mounting sockets shall be used to prohibit improper relay installations. Provide tube type base, 8 PIN or 11 PIN. Blade type relays shall not be used.

## B. Time Delay Relays

1. Time delay relay shall be Diversified with digital settings or an approved equal. Timers shall be time delay on, interval on or time delay off relays, as required and shall be Diversified or an approved equal. Instantaneous contacts or auxiliary slave relays shall be provided as required. Provide tube type base, 8 PIN or 11 PIN. Blade type relays shall not be used.

## C. Signal Isolators

1. Additional slave or interposing relays and signal isolators and signal converters shall be installed as required.

## D. Circuit Breakers

1. Circuit breakers shall be single pole, 120vac, 15 amp rating or as required to protect wires and equipment; mounted on the inside of the enclosure or equipment remote from the enclosure.

## E. Name Plates

1. Name plates shall be supplied for identification of control panels and all field mounted elements, including flowmeters and their transmitters. These name plates shall identify the instrument or meter, descriptively as to the function of the system. Nameplates shall be fabricated from black faced, white centered, laminated engraving plastic. A nameplate shall be provided for each signal transducer, signal converter, signal isolator, each electronic trip, and the like, mounted inside the control panels. These shall uniquely identify each control component. Adhesives shall be acceptable for attaching nameplates. Painted surfaces must be prepared to allow permanent bonding of adhesives. Nameplates shall be provided for instruments, function titles for each group of instruments and other components mounted on the front of the control panels as shown. Proposed colors, styles, height and text shall be submitted for approval.

## F. Power Supplies

1. Power supplies shall be provided as required for loop power or other requirements for special equipment. Loop power supplies shall be Phoenix contact, Square D or an approved equal.
2. Power regulators, 24Vdc/12Vdc, 4A

## G. Circuit Breakers

1. Square D
2. Amperage ratings shall be indicated on drawings.

## H. Fuses

1. Fuses and fuse holders 5x 20mm, IEC style, with blown fuse indicating light.

I. Surge and Lightning Arrestors

1. All control panels shall be provided with surge and lightning arrestors as specified.
2. Lightning Surge Suppressor
3. Signal
  - a. Panel surge arrestors (PSA) shall be Edco PC 642C Series, 2 channel or equal.
  - b. Field surge arrestors (PSA) shall be Edco SS64 Series, pipe style or equal.

2.07 FIELD INSTRUMENTATION AND CONTROL EQUIPMENT SPECIFICATIONS

A. General

1. The materials specified below shall establish the type and quality of materials used.
2. Refer to Civil, Mechanical, and Electrical drawings or specifications for additional requirements.

B. Rosemount Pressure Transmitter

1. Unit shall be 3051 series pressure transmitters with proper diaphragm for type of liquid being used in this application.
2. Provide 1/2" impulse piping as required
3. Include 4X enclosed Breather Box with Surge Arrestors

C. Flow Meter:

1. Flow meter, with Converter with Digital indicator, flow tube type Magmeter, shall be as manufactured by Rosemount, no substitutes, magmeter flow tube (confirm size and application with other drawings and specifications). Provide signal sensor cable in conduit, as required between Magmeter sensor or FE element and FIT/converter electronics unit. Flow meter shall provide local display and also a 4-20mA output. Unit shall be 316SS material. provide FIT converter display cover against the sun (cover shall be flip type or removable).
2. Provide 120V surge protection, and analog signal surge suppression devices as required.

D. Provide for local readout at the Dual Zone Monitor Well site two 1/8" Red Lion PAXP series LED digital displays with a built-in analog input and the built-in analog output to provide draw down level signal to the PLC/SCADA, provide one level display unit for each of the two dual zone monitored.

E. Provide drawdown level instruments, Druck, no equal.

F. Provide Allen Bradley limit switches for intrusions detection or equal.

- G. Provide 1/2" (or the size as indicated on the drawings) 316 SS impulse piping for the sample water lines from tap point to the field instrument. Provide ball valve as required and drain hose bib/valve as required to clear line and calibrate instrument properly.

## 2.08 NAMEPLATES, NAME TAGS AND SERVICE LEGENDS

- A. All components provided under this section, both field and panel mounted, shall be provided with permanently mounted name tags bearing the entire IA tag number of the components. Panel mounted tags shall be plastic; field mounted tags shall be stamped stainless steel.
- B. The panel drawings refer to nameplates and service legends: nameplates are defined as inscribed laminated plastic plates mounted under or near a panel face mounted instrument. Service legends are defined as inscribed laminated plastic integrally mounted on a panel face mounted instrument.
- C. Service legends and nameplates shall be engraved, rigid, laminated plastic. Service legends and nameplates shall be fastened to the panel by screws or with a specially applied adhesive. Fastening shall not depend only on the adhesive.

## PART 3 – EXECUTION

### 3.01 INSTALLATION, CALIBRATION, TESTING, START UP AND INSTRUCTION

#### A. General

- 1. Under the supervision of a Single I&C supplier, all systems specified in this section shall be installed, connected, calibrated and tested and in coordination with the OWNER and CONSULTANT shall be started to place the process in operation. This shall include final calibration in concert with equipment specified elsewhere in these specifications.

#### B. Installation and Connection

- 1. The SUPPLIER shall install and connect all field mounted components and assemblies under the criteria imposed in 1.3, herein. The installation personnel shall be provided with a final reviewed copy of the shop drawings and data.
- 2. The instrument process lines, impulse piping lines and air signal tubing shall, in general, be installed in a similar manner to the installation of conduit specified under Section 16000.
- 3. Bends shall be formed with the proper tools and to uniform radii and shall be made without deforming or thinning the walls of the tubing.
  - a. Unless otherwise indicated, all fittings, adapters, impulse piping, valves, etc. shall be 316 stainless. Valves shall be Whitey Series 40 or an approved equal.

4. The SUPPLIER shall have a technical field representative of the I&C supplier to instruct these installation personnel on any and all installation requirements; thereafter the technical field representatives shall be readily available by telephone to answer questions and to provide clarification when needed by installation personnel.
  - a. Where primary elements (supplied by the I&C supplier) will be part of a mechanical system, the I&C supplier shall coordinate the installation of the primary elements with the mechanical system manufacturer.
5. After all installation and connection work has been completed, the technical field representatives shall check all for correctness, verifying polarity of electric power and signal connections making sure all process connections are free of leaks and all such similar details. The technical field representative shall certify in writing to the SUPPLIER that for each loop or system he has completed such check out and that any discrepancies have been corrected by the installation personnel.
6. The field representative of the I&C supplier shall coordinate all work required to interface the new equipment, including all required modifications to the existing equipment and related devices.

#### C. Calibration

1. All new instruments shall be calibrated.
  - a. All instruments and systems shall be calibrated after installation, in accordance with the component manufacturer's written instructions. This shall provide that those components having adjustable features are set carefully for the specific conditions and applications of this installation and that the components and/or systems are within the specified limits of accuracy. Defective elements which cannot achieve proper calibration or accuracy, either individually or within the system shall be replaced. This calibration work shall be accomplished by the I&C Supplier.
  - b. Proof of Conformance – The burden of proof of conformance to the specified accuracy and performance is on the SUPPLIER using his designated I&C supplier. The SUPPLIER shall supply necessary test equipment and technical personnel if called upon to prove accuracy and performance wherever reasonable doubt or evidence of malfunction or poor performance may appear within the guarantee period.

#### D. Testing

1. All systems shall be exercised through operational tests in the presence of the CONSULTANT in order to demonstrate achievement of the specified performance. Operational tests depend upon completion of work specified elsewhere in these specifications. The scheduling of the test shall be coordinated by the SUPPLIER among all parties involved so that the tests may proceed without delays or disruption by incomplete work.

2. All functional/loop tests shall be witnessed and signed off by the PSL's representative and the I&C subcontractor.
3. SUPPLIER shall provide testing service, and configuration as required.

E. Training

1. Plant operating personnel shall be provided with training prior to start-up.
2. One 4-hour training session shall be provided. Training shall be at a time convenient to PSL water plant personnel.
3. Operating and maintenance personnel shall be instructed in the functions and operation of each system and shall be shown the various adjustable and set point features which may require readjustment, resetting or checking, recalibration or maintenance by them from time to time. This instruction shall be scheduled at a time arranged with PSL at least two (2) weeks in advance. Instruction shall be given by qualified persons employed by the I&C supplier.

F. Start Up

1. When all systems are assessed by the SUPPLIER to have been successfully carried through complete operational tests with a minimum of simulation, and the CONSULTANT concurs in his assessment, start up by the plant operating personnel can follow.

**END OF SECTION**

# **Appendix A:**

GEOTECHNICAL ENGINEERING SERVICES REPORT



Holtz Consulting Engineers, Inc.  
3270 South Central Boulevard, Suite 207  
Jupiter, FL 33458

Attn: Mr. Harrison Barron, P.E.

**SUBSURFACE SOIL EXPLORATION AND  
GEOTECHNICAL ENGINEERING EVALUATION  
DEEP INJECTION WELL EQUIPMENT PADS  
GLADES WWTP & RANGELINE WTP  
PORT ST. LUCIE, ST. LUCIE COUNTY, FLORIDA**

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**INTRODUCTION**

In accordance with your request and authorization, Andersen Andre Consulting Engineers, Inc. (AACE) has completed a subsurface exploration and geotechnical engineering evaluation for the above referenced project. The purpose of performing this exploration was to explore shallow soil types and groundwater levels as they relate to the proposed building construction, and restrictions which these soil and groundwater conditions may place on the proposed project. Our work included a Standard Penetration Test (SPT) boring, hand auger borings, limited laboratory testing, and engineering analysis. This report documents our explorations and tests, presents our findings, and summarizes our conclusions and recommendations.

**SITE INFORMATION AND PROJECT UNDERSTANDING**

The proposed Deep Injection Well (DIW) equipment pads will be constructed in close proximity to the Glades Wastewater Treatment Plant and the Rangeline Water Treatment Plant in Port St. Lucie, St. Lucie County, Florida (within Section 17, Township 36 South, Range 39 East and Section 18, Township 37 South, Range 39 East, respectfully). The locations of the two sites are shown on an aerial photograph presented on the attached Sheet No. 1.

According to the USDA NRCS Web Soil Survey, the predominant surficial soil types within the two sites are as follows:

- Chobee loamy sand, frequently ponded, 0 to 1 percent slopes (USDA NRCS Map Unit 11)
- Nettles and Oldsmar sands (USDA NRCS Map Unit 25)
- Riviera fine sand, 0 to 2 percent slopes (USDA NRCS Map Unit 38)
- Wabasso sand, 0 to 2 percent slopes (USDA NRCS Map Unit 48)

These soil types are noted to consist of loamy alluvium and sandy and loamy marine deposits originating from within depressions and flatwoods on marine terraces, with loamy sand, sandy clay loam, sands, sandy loam and sandy loam present to depths in excess of 80 inches.

The approximate locations of the two sites are shown below.



Glades WWTP Equipment Pad Site



Rangeline WTP Equipment Pad Site

Based on our conversations, we understand that DIW's are planned to be constructed at the Glades WWTP and the Rangeline WTP. As part of this work, two equipment concrete pads are proposed. We have not been provided with any specific structural information relative to these two equipment pads, however, we expect that they will be constructed as concrete slabs-on-grade potentially with thickened edges or sections.

#### **FIELD EXPLORATION PROGRAM**

To explore subsurface soil conditions at the site, one (1)  $\pm 20$ -ft deep Standard Penetration Test (SPT) boring (ASTM D1586) and two (2)  $\pm 7$ -ft deep hand auger borings (ASTM D1452) were completed on August 8, 2025. We note that our original scope of work included two (2) 20-ft SPT borings, however, standing water following recent rain events prevented our truck-mounted drilling equipment to access the proposed Rangeline WTP DIW equipment pad site. Instead, two hand auger borings completed with static penetrometer probing and using casing were completed at the Rangeline site.

The field work locations shown on Sheet No. 1 were determined in the field by our field crew using the provided aerial photographs, existing site features, and a hand-held GPS unit. The locations should be considered accurate only to the degree implied by the method of measurement used. We preliminarily anticipate that the actual locations are within 15 feet of those shown on Sheet No. 1.

Summaries of AAACE's field procedures are included in Attachment 1 and the individual boring profiles are presented on the attached Sheet No. 2. Samples obtained during performance of the borings were visually classified in the field, and representative portions of the samples were transported to our laboratory in sealed sample jars for further classification by AAACE's project engineer to determine their engineering classification in accordance with the Unified Soil Classification System, USCS. The soil samples recovered from our explorations will be kept in our laboratory for 60 days, then discarded unless you specifically request otherwise.

#### **OBSERVED SUBSURFACE SOIL AND GROUNDWATER CONDITIONS**

Detailed subsurface conditions are illustrated on the soil boring profiles presented on the attached Sheet No. 2. The stratification of the boring profiles represents our interpretation of the field boring logs and the results of laboratory examinations of the recovered samples. The stratification lines represent the approximate boundary between soil types. The actual transitions may be more gradual than implied.

In general, at the locations and depths explored, our borings encountered a surficial layer of topsoil (sands with organics and roots), followed by loose to medium fine sands (SP), slightly clayey fine sands (SP-SC) and clayey fine sands (SC) reaching the termination depths of our borings.

The groundwater table depth as encountered in the borings during the field investigations is shown adjacent to the soil profiles on the attached Sheet No. 2. As can be seen, the groundwater table was generally encountered at a depth of 1.5 feet below grade at the Glades WWTP site and less than 1 foot below grade at the Rangeline WPT site. Further, the general area around Rangeline site was noted to have standing water at several locations.

Fluctuations in groundwater levels should be anticipated throughout the year primarily due to seasonal variations in rainfall and other factors that may vary from the time the borings were conducted.

#### **GEOTECHNICAL ENGINEERING EVALUATION**

Based on the findings of our site exploration, our evaluation of subsurface conditions, and judgment based on our experience with similar projects, we conclude that the soils underlying these sites are generally satisfactory to support the proposed equipment pad construction. However, in our opinion, the near-surface soils should be improved in order to reduce the risk of unsatisfactory slab and foundation performance. The general soil improvement we recommend includes proofrolling the building sites with a vibratory roller.

The building area within lines five feet outside construction perimeters should be cleared, grubbed and stripped of all surface vegetation, trash, debris and topsoil. Stumps and significant root systems should be removed entirely and their excavations backfilled and compacted to the specifications noted below.

Following clearing, the proposed equipment pad areas should be proofrolled with a vibratory roller; any soft, yielding soils detected should be excavated and replaced with clean, compacted backfill that conforms with the recommendations below. Sufficient passes should be made during the proofrolling operations to produce dry densities not less than 95 percent of the modified Proctor (ASTM D1557) maximum dry density of the compacted material to depths of 1 foot below the bottom of footings/thickened edges, whichever is lower. In any case, the building areas should receive not less than 10 overlapping passes, half of them in each of two perpendicular directions.

After the exposed surface has been proofrolled and tested to verify that the desired dry density has been obtained, the proposed construction areas may be filled to the desired grades. All fill material should consist of clean sands, free of organics and other deleterious materials. The fill material should have not more than 12 percent by dry weight passing the U.S. No. 200 sieve, and no particle larger than 3 inches in diameter. Further, the fill materials should be placed in uniform layers not exceeding 12 inches in loose thickness, with each layer compacted to a dry density not less than 95 percent of its modified Proctor (ASTM D1557) maximum value.

After completion of the general site preparations discussed above, the bottom of thickened edge excavations (if any) dug through the compacted natural ground, fill or backfill, should be compacted so as to densify soils loosened during or after the excavation process, or washed or sloughed into the excavation prior to the placement of forms. A vibratory, walk-behind plate compactor can be used for this final densification immediately prior to the placement of reinforcing steel, with previously described density requirements to be maintained below the foundation level.

We recommend establishing a quality control program to verify that all site preparation and slab/foundation construction is conducted in accordance with the appropriate plans and specifications. Materials testing and inspection services should be provided by Andersen Andre Consulting Engineers, Inc.

After the foundation soils have been prepared as recommended above, the site should be suitable for supporting the proposed equipment pad construction. Should the concrete pads be constructed with thickened edges or sections, they can be proportioned for an allowable bearing stress of 1,500 pounds per square foot [psf], or less.

**CLOSURE**

The geotechnical evaluation submitted herein is based on the data obtained from the soil boring profiles presented on Sheet No. 2 and our understanding of the project as previously described. Limitations and conditions to this report are presented in Attachment 2.

Our report has been prepared in accordance with generally accepted soil and foundation engineering practices for the exclusive use of Holtz Consulting Engineers, Inc. and the City of Port St. Lucie. No other warranty, expressed or implied, is made.

We are pleased to be of assistance to you on this phase of your project. When we may be of further service to you or should you have any questions, please contact us.

Sincerely,  
**ANDERSEN ANDRE CONSULTING ENGINEERS, INC.**

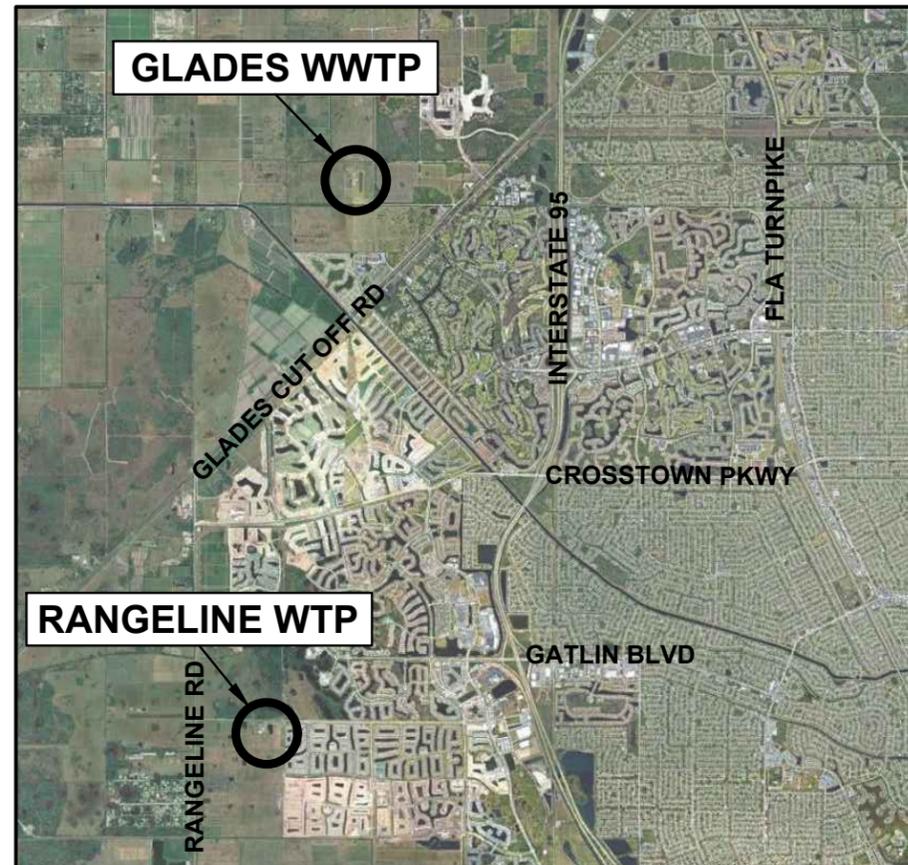


Peter G. Andersen, P.E.  
Principal Engineer  
Fla. Reg. No. 57956



David P. Andre, P.E.  
Principal Engineer  
Fla. Reg. No. 53969

This report has been digitally signed by Peter G. Andersen, P.E. on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.



**GLADES WWTP**



**RANGELINE WTP**



**GLADES WWTP**  
**PUBLIC LAND SURVEY SYSTEM**  
 Section 17, Township 36 South, Range 39 East

**RANGELINE WTP**  
**PUBLIC LAND SURVEY SYSTEM**  
 Section 18, Township 37 South, Range 39 East

**LEGEND**

- TB-# Standard Penetration Test Boring
- # Hand Auger Boring (HAB-#)

**NOTES**

Shown and noted boring locations are approximate and were located using the provided aerial photographs, existing site features, and a hand-held sub-meter GPS unit. Atmospheric disturbances and local weather conditions may affect the accuracy of the GPS instrument readings. The shown boring locations should be considered accurate only to the degree implied by the method of measurement used.



NOT TO SCALE

Source: Google Earth Pro



**ANDERSEN ANDRE CONSULTING ENGINEERS, INC.**

834 SW Swan Avenue, Port St. Lucie, FL 34983 772-807-9191 www.AACEinc.com

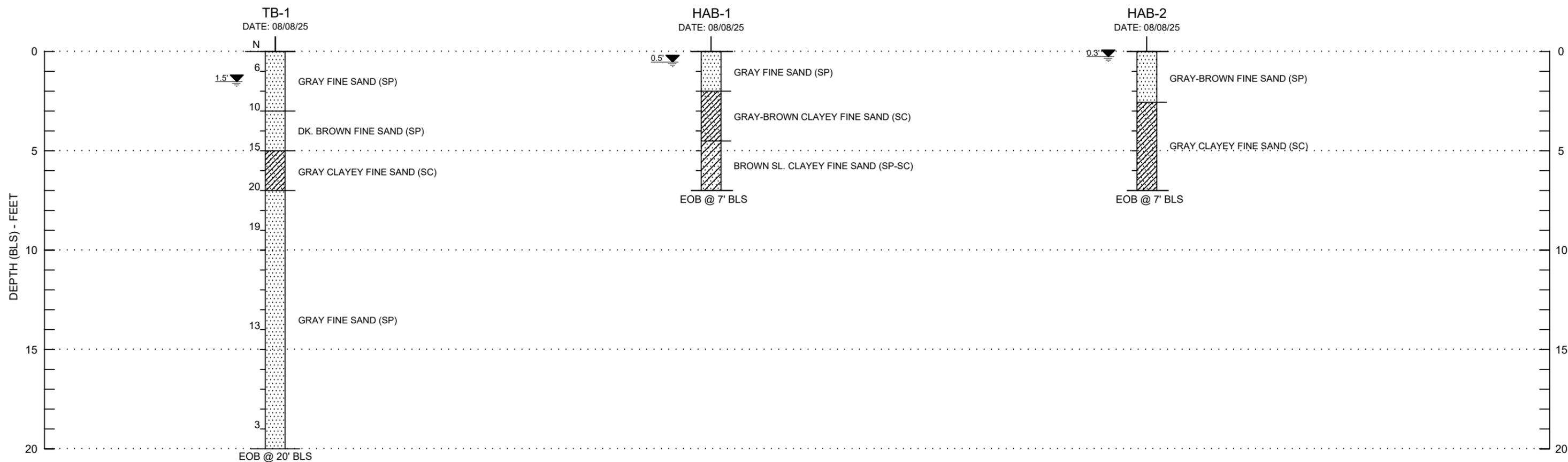
**SITE VICINITY MAP AND  
 BORING LOCATION PLANS**

SUBSURFACE SOIL EXPLORATION AND  
 GEOTECHNICAL ENGINEERING EVALUATION  
 DEEP INJECTION WELL EQUIPMENT PADS  
 GLADES WWTP & RANGELINE WTP  
 PORT ST. LUCIE, ST. LUCIE COUNTY, FLORIDA

Drawn by: PGA  
 Checked by: DPA  
 AAACE File No: 25-119

Date: August 2025  
 Date: August 2025

**Sheet No. 1**



**SOIL GRAPHICAL LEGEND:**

- FINE SAND (SP)
- SLIGHTLY CLAYEY FINE SAND (SP-SC)
- CLAYEY FINE SAND (SC)

NOTE: 3"-6" of topsoil encountered in most borings (not shown on boring profiles)

**DRILLING NOTES:**

TB-# STANDARD PENETRATION TEST [SPT] BORING (ASTM D1586)  
 N SPT RESISTANCE IN BLOWS PER FOOT  
 HAB HAND AUGER BORING (ASTM D1452)  
 xx Groundwater Table (FT-BLS) AT TIME OF DRILLING  
 EOB END OF BORING  
 BLS BELOW LAND SURFACE  
 SP, SP-SC, SC UNIFIED SOIL CLASSIFICATION SYSTEM [USCS]  
 USCS GROUPS DETERMINED BY VISUAL CLASSIFICATION  
 4" DIA. PVC CASING USED TO SLEEVE HAND AUGER BORINGS

DRILL CREW CHIEF: DT  
 DRILL RIG: CME-45  
 DRILLING METHOD: ROTARY-WASH/BENTONITE SLURRY  
 SPLIT-SPOON SAMPLER:  
 INSIDE DIAMETER: 1.375"  
 OUTSIDE DIAMETER: 2.0"  
 LENGTH: 24"  
 SPT HAMMER:  
 AVERAGE DROP: 30"  
 WEIGHT: 140 LBS  
 TYPE: SAFETY/MANUAL



**ANDERSEN ANDRE CONSULTING ENGINEERS, INC.**

834 SW Swan Avenue, Port St. Lucie, FL 34983 772-807-9191 www.AACEinc.com

**SOIL BORING PROFILES**

SUBSURFACE SOIL EXPLORATION AND  
 GEOTECHNICAL ENGINEERING EVALUATION  
 DEEP INJECTION WELL EQUIPMENT PADS  
 GLADES WWTP & RANGELINE WTP  
 PORT ST. LUCIE, ST. LUCIE COUNTY, FLORIDA

Drawn by: PGA

Date: August 2025

Checked by: DPA

Date: August 2025

AAACE File No: 25-119

**Sheet No. 2**

# **Attachment 1**

## **General Notes**

(Soil Borings, Sampling and Testing Methods)

**ANDERSEN ANDRE CONSULTING ENGINEERS, INC.**  
**SOIL BORING, SAMPLING AND TESTING METHODS**

**GENERAL**

Andersen Andre Consulting Engineers, Inc. (AACE) borings describe subsurface conditions only at the locations drilled and at the time drilled. They provide no information about subsurface conditions below the bottom of the boreholes. At locations not explored, surface conditions that differ from those observed in the borings may exist and should be anticipated.

The information reported on our boring logs is based on our drillers' logs and on visual examination in our laboratory of disturbed soil samples recovered from the borings. The distinction shown on the logs between soil types is approximate only. The actual transition from one soil to another may be gradual and indistinct.

The groundwater depth shown on our boring logs is the water level the driller observed in the borehole when it was drilled. These water levels may have been influenced by the drilling procedures, especially in borings made by rotary drilling with bentonitic drilling mud. An accurate determination of groundwater level requires long-term observation of suitable monitoring wells. Fluctuations in groundwater levels throughout the year should be anticipated.

The absence of a groundwater level on certain logs indicates that no groundwater data is available. It does not mean that groundwater will not be encountered at that boring location at some other point in time.

**STANDARD PENETRATION TEST**

The Standard Penetration Test (SPT) is a widely accepted method of in situ testing of foundation soils (ASTM D-1586). A 2-foot (0.6m) long, 2-inch (50mm) O.D. split-barrell sampler attached to the end of a string of drilling rods is driven 24 inches (0.60m) into the ground by successive blows of a 140-pound (63.5 Kg) hammer freely dropping 30 inches (0.76m). The number of blows needed for each 6 inches (0.15m) increments penetration is recorded. The sum of the blows required for penetration of the middle two 6-inch (0.15m) increments of penetration constitutes the test result of N-value. After the test, the sampler is extracted from the ground and opened to allow visual description of the retained soil sample. The N-value has been empirically correlated with various soil properties allowing a conservative estimate of the behavior of soils under load. The following tables relate N-values to a qualitative description of soil density and, for cohesive soils, an approximate unconfined compressive strength (Qu):

<b>Cohesionless Soils:</b>	<b><u>N-Value</u></b>	<b><u>Description</u></b>
	0 to 4	Very loose
	4 to 10	Loose
	10 to 30	Medium dense
	30 to 50	Dense
	Above 50	Very dense

<b>Cohesive Soils:</b>	<b><u>N-Value</u></b>	<b><u>Description</u></b>	<b><u>Qu</u></b>
	0 to 2	Very soft	Below 0.25 tsf (25 kPa)
	2 to 4	Soft	0.25 to 0.50 tsf (25 to 50 kPa)
	4 to 8	Medium stiff	0.50 to 1.0 tsf (50 to 100 kPa)
	8 to 15	Stiff	1.0 to 2.0 tsf (100 to 200 kPa)
	15 to 30	Very stiff	2.0 to 4.0 tsf (200 to 400 kPa)
	Above 30	Hard	Above 4.0 tsf (400 kPa)

The tests are usually performed at 5 foot (1.5m) intervals. However, more frequent or continuous testing is done by AACE through depths where a more accurate definition of the soils is required. The test holes are advanced to the test elevations by rotary drilling with a cutting bit, using circulating fluid to remove the cuttings and hold the fine grains in suspension. The circulating fluid, which is bentonitic drilling mud, is also used to keep the hole open below the water table by maintaining an excess hydrostatic pressure inside the hole. In some soil deposits, particularly highly pervious ones, flush-coupled casing must be driven to just above the testing depth to keep the hole open and/or prevent the loss of circulating fluid. After completion of a test borings, the hole is kept open until a steady state groundwater level is recorded. The hole is then sealed by backfilling, either with accumulated cuttings or lean cement.

Representative split-spoon samples from each sampling interval and from different strata are brought to our laboratory in air-tight jars for classification and testing, if necessary. Afterwards, the samples are discarded unless prior arrangement have been made.

### **POWER AUGER BORINGS**

Auger borings (ASTM D-1452) are used when a relatively large, continuous sampling of soil strata close to the ground surface is desired. A 4-inch (100 mm) diameter, continuous flight, helical auger with a cutting head at its end is screwed into the ground in 5-foot (1.5m) sections. It is powered by the rotary drill rig. The sample is recovered by withdrawing the auger out of the ground without rotating it. The soil sample so obtained, is classified in the field and representative samples placed in bags or jars and returned to the AACE soils laboratory for classification and testing, if necessary.

### **HAND AUGER BORINGS**

Hand auger borings are used, if soil conditions are favorable, when the soil strata are to be determined within a shallow (approximately 5-foot [1.5m]) depth or when access is not available to power drilling equipment. A 3-inch (75mm) diameter hand bucket auger with a cutting head is simultaneously turned and pressed into the ground. The bucket auger is retrieved at approximately 6-inch (0.15m) interval and its contents emptied for inspection. On occasion post-hole diggers are used, especially in the upper 3 feet (1m) or so. Penetrometer probings can be used in the upper 5 feet (1.5m) to determine the relative density of the soils. The soil sample obtained is described and representative samples put in bags or jars and transported to the AACE soils laboratory for classification and testing, if necessary.

## **UNDISTURBED SAMPLING**

Undisturbed sampling (ASTM D-1587) implies the recovery of soil samples in a state as close to their natural condition as possible. Complete preservation of in situ conditions cannot be realized; however, with careful handling and proper sampling techniques, disturbance during sampling can be minimized for most geotechnical engineering purposes. Testing of undisturbed samples gives a more accurate estimate of in situ behavior than is possible with disturbed samples.

Normally, we obtain undisturbed samples by pushing a 2.875-inch (73 mm) I.D., thin wall seamless steel tube 24 inches (0.6 m) into the soil with a single stoke of a hydraulic ram. The sampler, which is a Shelby tube, is 30 (0.8 m) inches long. After the sampler is retrieved, the ends are sealed in the field and it is transported to our laboratory for visual description and testing, as needed.

## **ROCK CORING**

In case rock strata is encountered and rock strength/continuity/composition information is needed for foundation or mining purposes, the rock can be cored (ASTM D-2113) and 2-inch to 4-inch diameter rock core samples be obtained for further laboratory analyses. The rock coring is performed through flush-joint steel casing temporarily installed through the overburden soils above the rock formation and also installed into the rock. The double- or triple-tube core barrels are advanced into the rock typically in 5-foot intervals and then retrieved to the surface. The barrel is then opened so that the core sample can be extruded. Preliminary field measurements of the recovered rock cores include percent recovery and Rock Quality Designation (RQD) values. The rock cores are placed in secure core boxes and then transported to our laboratory for further inspection and testing, as needed.

## **SFWMD EXFILTRATION TESTS**

In order to estimate the hydraulic conductivity of the upper soils, constant head or falling head exfiltration tests can be performed. These tests are performed in accordance with methods described in the South Florida Water Management District (SFWMD) Permit Information Manual, Volume IV. In brief, a 6 to 9 inch diameter hole is augered to depths of about 5 to 7 feet; the bottom one foot is filled with 57-stone; and a 6-foot long slotted PVC pipe is lowered into the hole. The distance from the groundwater table and to the ground surface is recorded and the hole is then saturated for 10 minutes with the water level maintained at the ground surface.

If a constant head test is performed, the rate of pumping will be recorded at fixed intervals of 1 minute for a total of 10 minutes, following the saturation period.

## **LABORATORY TEST METHODS**

Soil samples returned to the AACE soils laboratory are visually observed by a geotechnical engineer or a trained technician to obtain more accurate description of the soil strata. Laboratory testing is performed on selected samples as deemed necessary to aid in soil classification and to help define engineering properties of the soils. The test results are presented on the soil boring logs at the depths at which the respective sample was recovered, except that grain size distributions or selected other test results may be presented on separate tables, figures or plates as discussed in this report.

**THE PROJECT SOIL DESCRIPTION PROCEDURE FOR SOUTHEAST FLORIDA**  
**CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES**

The soil descriptions shown on the logs are based upon visual-manual procedures in accordance with local practice. Soil classification is performed in general accordance with the United Soil Classification System and is also based on visual-manual procedures.

BOULDERS (>12" [300 MM]) and COBBLES (3" [75 MM] TO 12" [300 MM]):

**GRAVEL:**            Coarse Gravel:            3/4" (19 mm) to 3" (75 mm)  
                                  Fine Gravel:                No. 4 (4.75 mm) Sieve to 3/4" (19 mm)

Descriptive adjectives:

0 - 5%	– no mention of gravel in description
5 - 15%	– trace
15 - 29%	– some
30 - 49%	– gravelly (shell, limerock, cemented sands)

**SANDS:**

COARSE SAND:    No. 10 (2 mm) Sieve to No. 4 (4.75 mm) Sieve  
 MEDIUM SAND: No. 40 (425 μm) Sieve to No. 10 (2 mm) Sieve  
 FINE SAND:                No. 200 (75 μm) Sieve to No. 40 (425 μm) Sieve

Descriptive adjectives:

0 - 5%	– no mention of sand in description
5 - 15%	– trace
15 - 29%	– some
30 - 49%	– sandy

**SILT/CLAY:**            < #200 (75μM) Sieve

SILTY OR SILT:    PI < 4  
 SILTY CLAYEY OR SILTY CLAY: 4 ≤ PI ≤ 7  
 CLAYEY OR CLAY: PI > 7

Descriptive adjectives:

< - 5%	– clean (no mention of silt or clay in description)
5 - 15%	– slightly
16 - 35%	– clayey, silty, or silty clayey
36 - 49%	– very

**ORGANIC SOILS:**

<b>Organic Content</b>	<b>Descriptive Adjectives</b>	<b>Classification</b>
0 - 2.5%	Usually no mention of organics in description	See Above
2.6 - 5%	slightly organic	add "with organic fines" to group name
5 - 30%	organic	SM with organic fines  Organic Silt (OL) Organic Clay (OL) Organic Silt (OH)

**THE PROJECT SOIL DESCRIPTION PROCEDURE FOR SOUTHEAST FLORIDA  
CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES**

Organic Clay (OH)

**HIGHLY ORGANIC SOILS AND MATTER:**

<b>Organic Content</b>	<b>Descriptive Adjectives</b>	<b>Classification</b>
30 - 75%	sandy peat	Peat (PT)
	silty peat	Peat (PT)
> 75%	amorphous peat	Peat (PT)
	fibrous peat	Peat (PT)

**STRATIFICATION AND STRUCTURE:**

<b><u>Descriptive Term</u></b>	<b><u>Thickness</u></b>
with interbedded	
seam	-- less than ½ inch (13 mm) thick
layer	-- ½ to 12-inches (300 mm) thick
stratum	-- more than 12-inches (300 mm) thick
pocket	-- small, erratic deposit, usually less than 1-foot
lens	-- lenticular deposits
occasional	-- one or less per foot of thickness
frequent	-- more than one per foot of thickness
calcareous	-- containing calcium carbonate (reaction to diluted HCL)
hardpan	-- spodic horizon usually medium dense
marl	-- mixture of carbonate clays, silts, shells and sands

**ROCK CLASSIFICATION (FLORIDA) CHART:**

<b><u>Symbol</u></b>	<b><u>Typical Description</u></b>
LS	Hard Bedded Limestone or Caprock
WLS	Fractured or Weathered Limestone
LR	Limerock (gravel, sand, silt and clay mixture)
SLS	Stratified Limestone and Soils

**THE PROJECT SOIL DESCRIPTION PROCEDURE FOR SOUTHEAST FLORIDA**  
**CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES**

**LEGEND FOR BORING LOGS**

N:	Number of blows to drive a 2-inch OD split spoon sampler 12 inches using a 140-pound hammer dropped 30 inches
R:	Refusal (less than six inches advance of the split spoon after 50 hammer blows)
MC:	Moisture content (percent of dry weight)
OC:	Organic content (percent of dry weight)
PL:	Moisture content at the plastic limit
LL:	Moisture content at the liquid limit
PI:	Plasticity index (LL-PL)
qu:	Unconfined compressive strength (tons per square foot, unless otherwise noted)
-200:	Percent passing a No. 200 sieve (200 wash)
+40:	Percent retained above a No. 40 sieve
US:	Undisturbed sample obtained with a thin-wall Shelby tube
k:	Permeability (feet per minute, unless otherwise noted)
DD:	Dry density (pounds per cubic foot)
TW:	Total unit weight (pounds per cubic foot)

## **Attachment 2**

### AACE Project Limitations and Conditions

## **ANDERSEN ANDRE CONSULTING ENGINEERS, INC.**

### ***Project Limitations and Conditions***

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Andersen Andre Consulting Engineers, Inc. has prepared this report for our client for his exclusive use, in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made herein. Further, the report, in all cases, is subject to the following limitations and conditions:

#### **VARIABLE/UNANTICIPATED SUBSURFACE CONDITIONS**

The engineering analysis, evaluation and subsequent recommendations presented herein are based on the data obtained from our field explorations, at the specific locations explored on the dates indicated in the report. This report does not reflect any subsurface variations (e.g. soil types, groundwater levels, etc.) which may occur adjacent or between borings.

The nature and extent of any such variations may not become evident until construction/excavation commences. In the event such variations are encountered, Andersen Andre Consulting Engineers, Inc. may find it necessary to (1) perform additional subsurface explorations, (2) conduct in-the-field observations of encountered variations, and/or re-evaluate the conclusions and recommendations presented herein.

We at Andersen Andre Consulting Engineers, Inc. recommend that the project specifications necessitate the contractor immediately notifying Andersen Andre Consulting Engineers, Inc., the owner and the design engineer (if applicable) if subsurface conditions are encountered that are different from those presented in this report.

No claim by the contractor for any conditions differing from those expected in the plans and specifications, or presented in this report, should be allowed unless the contractor notifies the owner and Andersen Andre Consulting Engineers, Inc. of such differing site conditions. Additionally, we recommend that all foundation work and site improvements be observed by an Andersen Andre Consulting Engineers, Inc. representative.

#### **SOIL STRATA CHANGES**

Soil strata changes are indicated by a horizontal line on the soil boring profiles (boring logs) presented within this report. However, the actual strata's changes may be more gradual and indistinct. Where changes occur between soil samples, the locations of the changes must be estimated using the available information and may not be at the exact depth indicated.

#### **SINKHOLE POTENTIAL**

Unless specifically requested in writing, a subsurface exploration performed by Andersen Andre Consulting Engineers, Inc. is not intended to be an evaluation for sinkhole potential.

## **MISINTERPRETATION OF SUBSURFACE SOIL EXPLORATION REPORT**

Andersen Andre Consulting Engineers, Inc. is responsible for the conclusions and recommendations presented herein, based upon the subsurface data obtained during this project. If others render conclusions or opinions, or make recommendations based upon the data presented in this report, those conclusions, opinions and/or recommendations are not the responsibility of Andersen Andre Consulting Engineers, Inc.

## **CHANGED STRUCTURE OR LOCATION**

This report was prepared to assist the owner, architect and/or civil engineer in the design of the subject project. If any changes in the construction, design and/or location of the structures as discussed in this report are planned, or if any structures are included or added that are not discussed in this report, the conclusions and recommendations contained in this report may not be valid. All such changes in the project plans should be made known to Andersen Andre Consulting Engineers, Inc. for our subsequent re-evaluation.

## **USE OF REPORT BY BIDDERS**

Bidders who are reviewing this report prior to submission of a bid are cautioned that this report was prepared to assist the owners and project designers. Bidders should coordinate their own subsurface explorations (e.g.; soil borings, test pits, etc.) for the purpose of determining any conditions that may affect construction operations. Andersen Andre Consulting Engineers, Inc. cannot be held responsible for any interpretations made using this report or the attached boring logs with regard to their adequacy in reflecting subsurface conditions which may affect construction operations.

## **IN-THE-FIELD OBSERVATIONS**

Andersen Andre Consulting Engineers, Inc. attempts to identify subsurface conditions, including soil stratigraphy, water levels, zones of lost circulation, "hard" or "soft" drilling, subsurface obstructions, etc. However, lack of mention in the report does not preclude the presence of such conditions.

## **LOCATION OF BURIED OBJECTS**

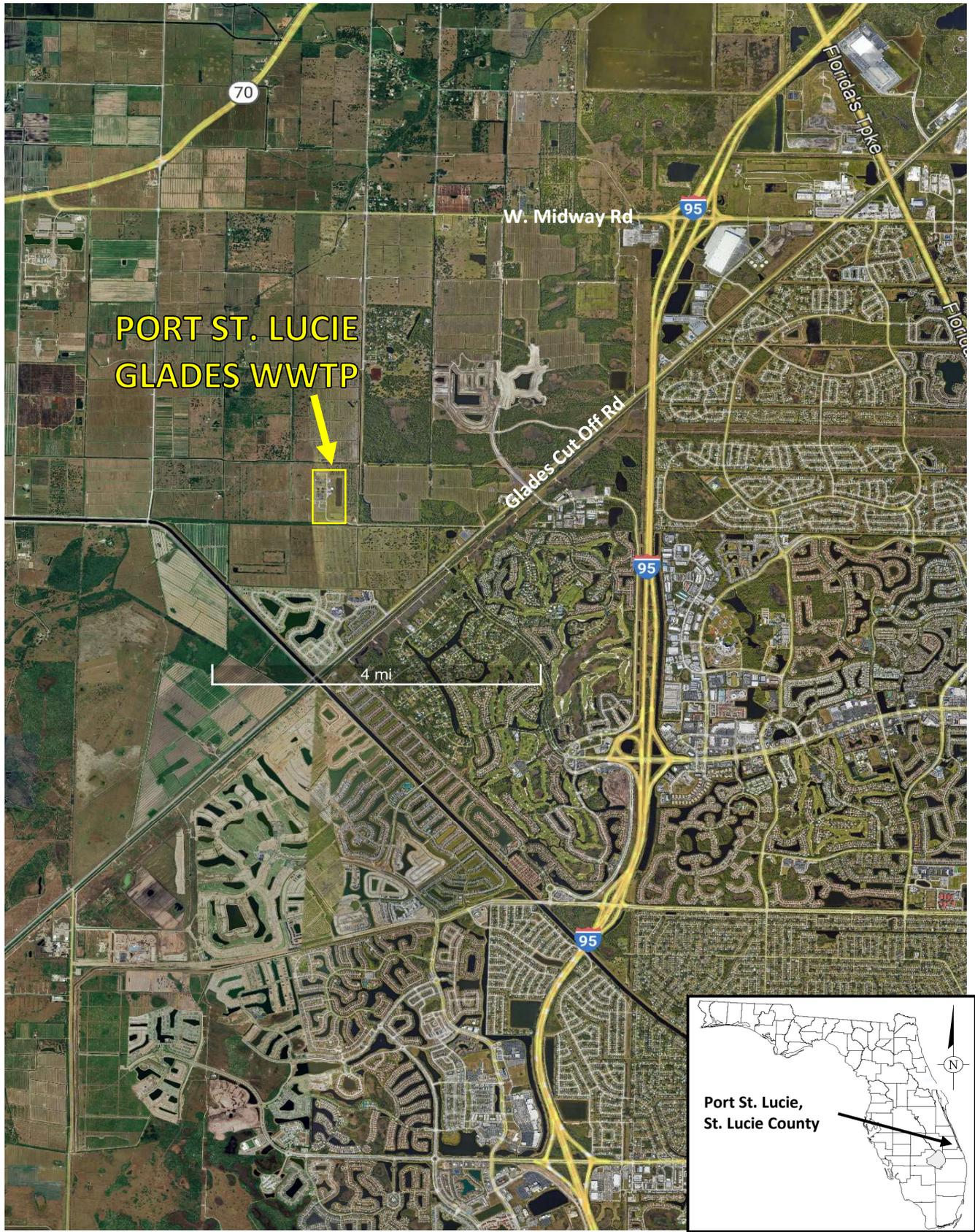
Users of this report are cautioned that there was no requirement for Andersen Andre Consulting Engineers, Inc. to attempt to locate any man-made, underground objects during the course of this exploration, and that no attempts to locate any such objects were performed. Andersen Andre Consulting Engineers, Inc. cannot be responsible for any buried man-made objects which are subsequently encountered during construction.

## **PASSAGE OF TIME**

This report reflects subsurface conditions that were encountered at the time/date indicated in the report. Significant changes can occur at the site during the passage of time. The user of the report recognizes the inherent risk in using the information presented herein after a reasonable amount of time has passed. We recommend the user of the report contact Andersen Andre Consulting Engineers, Inc. with any questions or concerns regarding this issue.

# **Appendix B:**

ADDITIONAL FIGURES

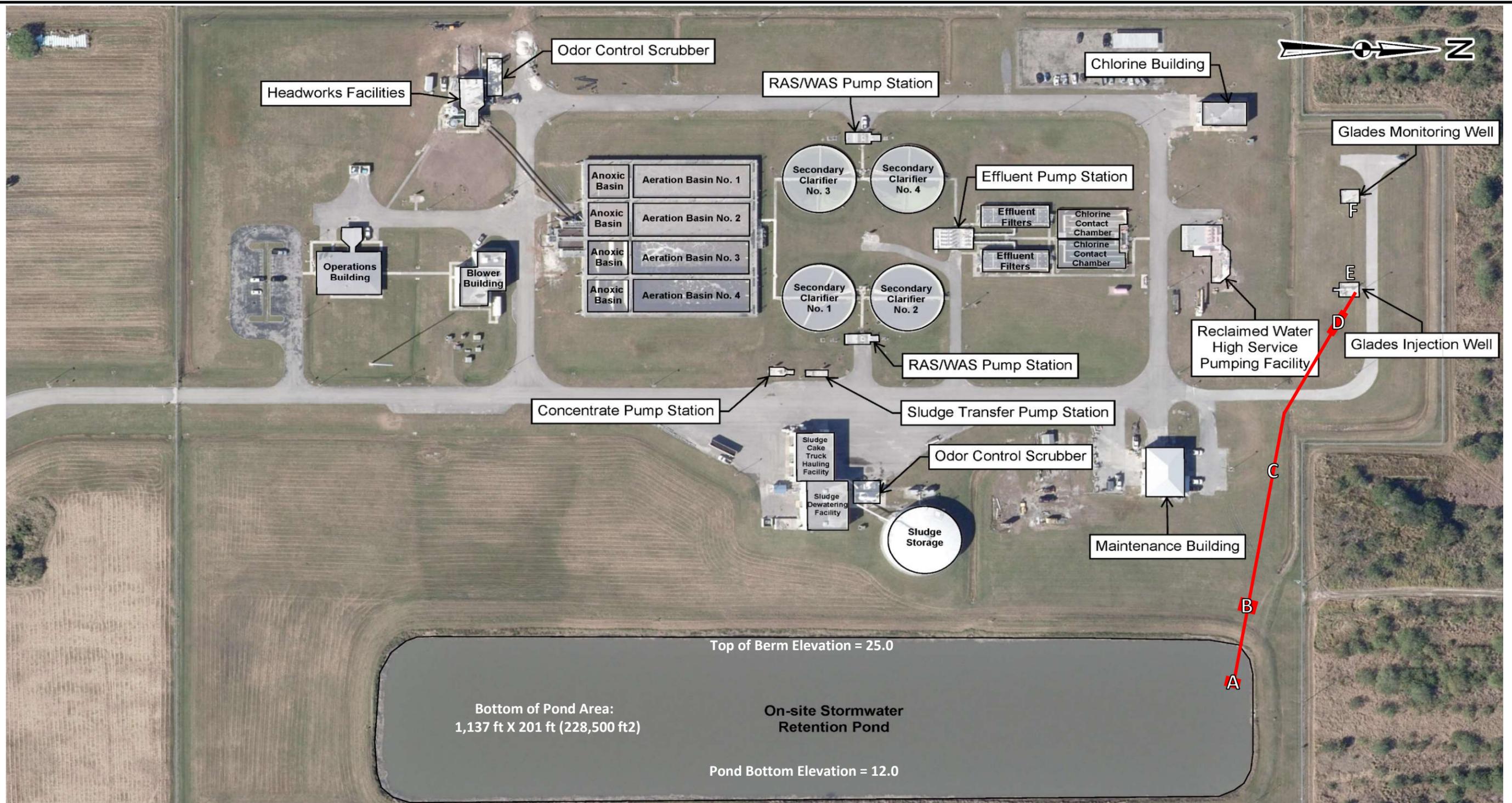


**MMHC**

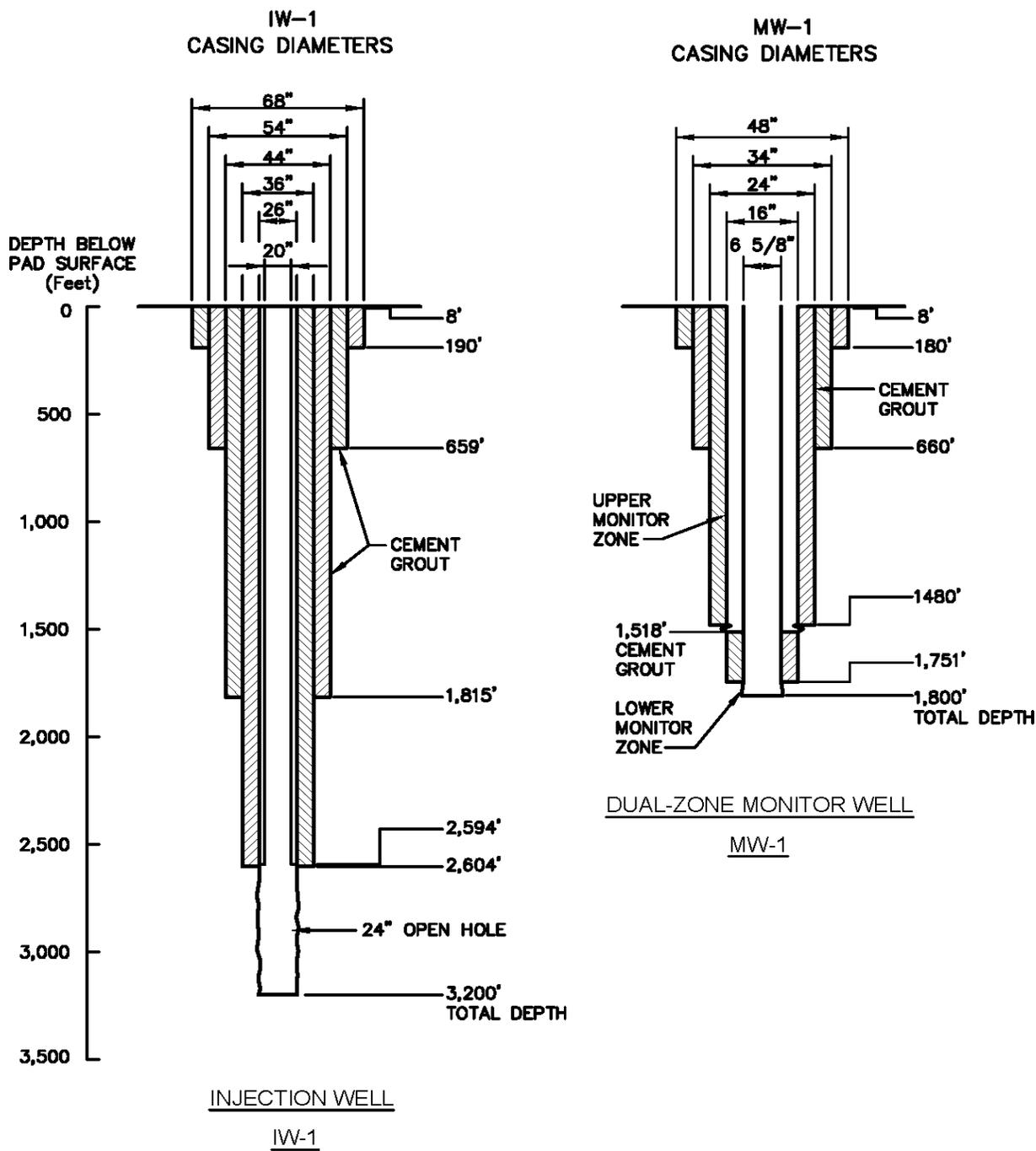
McNABB-MILLER  
HYDROGEOLOGIC  
CONSULTING, INC.

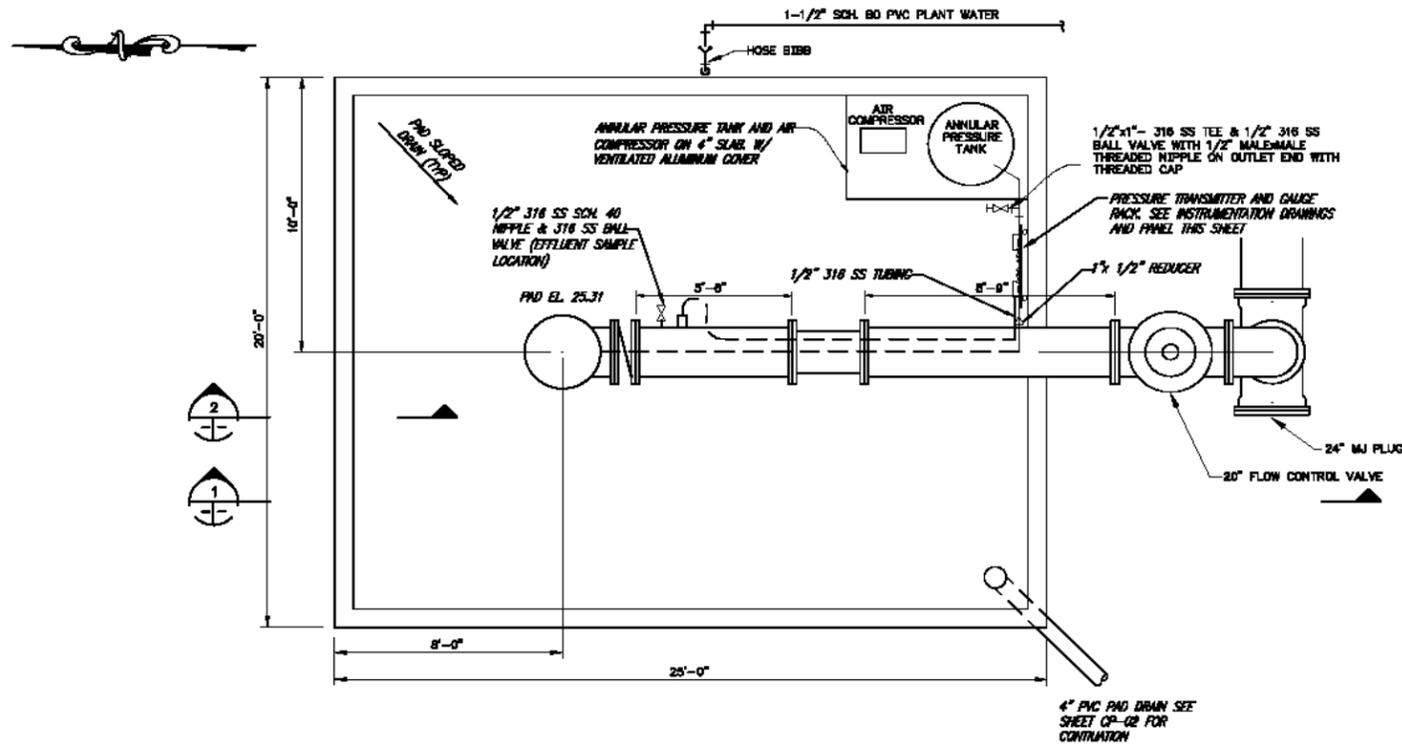
**CITY OF PORT ST LUCIE  
GLADES WASTEWATER TREATMENT PLANT  
INJECTION WELL SYSTEM  
LOCATION MAP**

**FIGURE  
1**

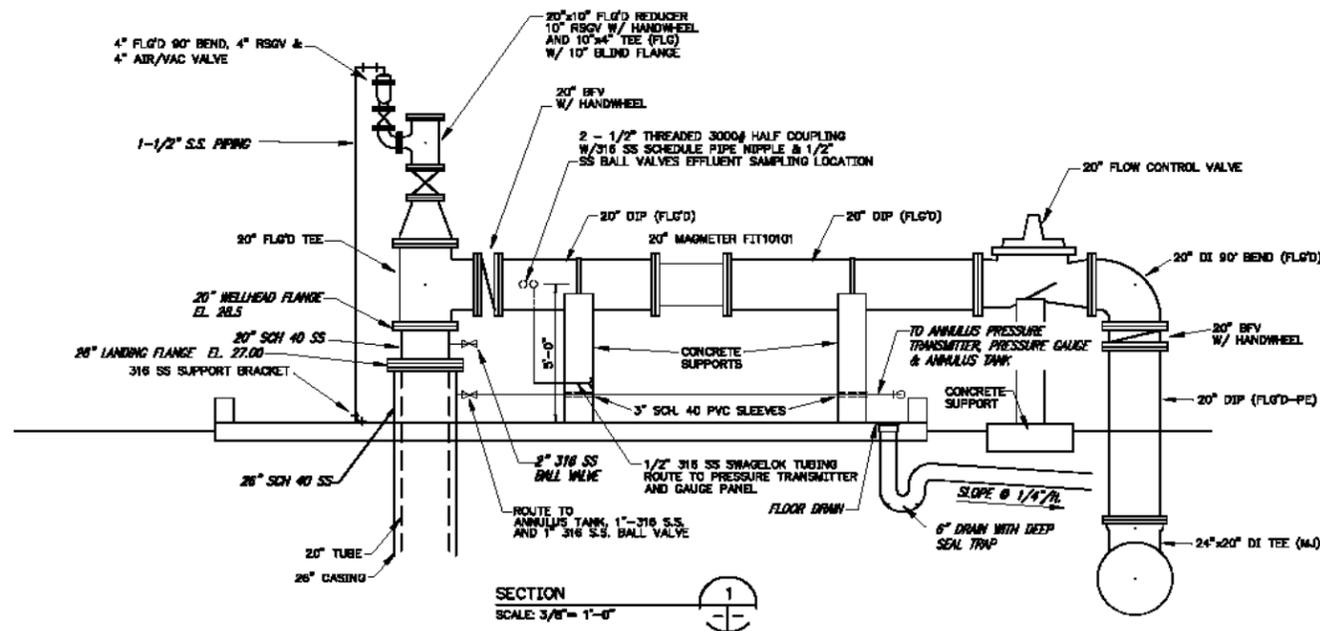


- (A) Pipe Intake: Provide details of pipe intake. The intake shall be a minimum of 18 inches above the bottom of the pond. The intake shall be equipped with a strainer and vortex breaker.
- (B) Pumps: Provide details of proposed pumps. Pumps shall be capable of providing flows between 2,000 gpm and 18,350 gpm with maximum wellhead pressures of 120 psi
- (C) Pipe Route: Provide details of proposed piping route, pipe material, and pipe diameter.
- (D) Valving and Flowmeter: Provide details of valves and flowmeters. Minor adjustments to flow rate shall be made with valves. A calibrated flowmeter shall be provided as required in specifications.
- (E) IW-1 Wellhead: Provide details of IW-1 temporary wellhead. Temporary wellhead shall be configured to allow for Owner to utilize the well with minimum delay.
- (F) MW-1 Monitoring: Provide details for monitoring MW-1 water levels.





INJECTION WELL IW-1 PLAN  
SCALE: 3/8" = 1'-0"



SECTION  
SCALE: 3/8" = 1'-0"





## **Appendix C:**

FDEP PERMIT: 0347645-003-UC/1M



## FLORIDA DEPARTMENT OF Environmental Protection

Bob Martinez Center  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

Ron DeSantis  
Governor

Jay Collins  
Lt. Governor

Alexis A. Lambert  
Secretary

**Sent Via Electronic Mail**

September 19, 2025

In the Matter of an Application for Permit by:

City of Port St. Lucie  
Kevin Matyjaszek  
Utility Systems Director  
1001 SE Prineville Street  
Port St. Lucie, FL 34983  
[KMatyjaszek@CityofPSL.com](mailto:KMatyjaszek@CityofPSL.com)

UIC Permit: 0347645-003-UC/1M  
WACS Facility ID: 98446  
County: St. Lucie  
Class I Injection Well System, IW-2  
Construction Permit  
Glades Wastewater Treatment Facility

### Notice of Permit

Enclosed is permit number 0347645-003-UC/1M for a Class I injection well system.

Any party to this Order (permit) has the right to seek judicial review of the permit pursuant to Section 120.68, Florida Statutes, (F.S.), by the filing of a Notice of Appeal pursuant to Rules 9.110 and 9.190, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, [Agency\\_Clerk@FloridaDEP.gov](mailto:Agency_Clerk@FloridaDEP.gov); and by filing a copy of the Notice of appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date this Notice is filed with the Clerk of the Department.

**Permittee:** City of Port St. Lucie  
Kevin Matyjaszek, Utility Systems Director  
Glades Wastewater Treatment Facility

**UIC Permit:** 0347645-003-UC/1M  
**WACS Facility ID:** 98446  
**Date:** September 19, 2025

**Executing and Clerking:**

Executed in Tallahassee, Florida.  
State of Florida Department of Environmental Protection

*Richard Lobinske*

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Richard Lobinske, Ph.D.  
Environmental Administrator  
Aquifer Protection Program  
Division of Water Resource Management

**Certificate of Service**

The undersigned duly designated clerk hereby certifies that this **Notice of Permit** and all copies were sent on the filing date September 19, 2025, to the following listed persons:

- Richard Lobinske, DEP/TLH, [Richard.Lobinske@FloridaDEP.gov](mailto:Richard.Lobinske@FloridaDEP.gov)
- Walsta Jean-Baptiste, DEP/TLH, [Walsta.JeanBaptiste@FloridaDEP.gov](mailto:Walsta.JeanBaptiste@FloridaDEP.gov)
- Edith Chuy, DEP/TLH, [Edith.Chuy@FloridaDEP.gov](mailto:Edith.Chuy@FloridaDEP.gov)
- Cheryl Greenwell, DEP/TLH, [Cheryl.Greenwell@FloridaDEP.gov](mailto:Cheryl.Greenwell@FloridaDEP.gov)
- Len Fishkin, DEP/SED, [Len.Fishkin@FloridaDEP.gov](mailto:Len.Fishkin@FloridaDEP.gov)
- Adam Ullery, DEP/SED [Adam.Ullery@FloridaDEP.gov](mailto:Adam.Ullery@FloridaDEP.gov)
- Curtis Robinson, Holtz Consulting Engineers, Inc., [Curtis.Robinson@HoltzConsulting.com](mailto:Curtis.Robinson@HoltzConsulting.com)
- David McNabb, McNabb-Miller Hydrogeologic, [David@McNabbHydroConsult.com](mailto:David@McNabbHydroConsult.com)
- Rodney Miller, McNabb-Miller Hydrogeologic Consulting, [Rod@McNabbHydroConsult.com](mailto:Rod@McNabbHydroConsult.com)
- John Eason, City of Port St. Lucie, [JEason@CityofPSL.com](mailto:JEason@CityofPSL.com)
- Colleen Jacobsen, City of Port St. Lucie, [CJacobsen@CityofPSL.com](mailto:CJacobsen@CityofPSL.com)
- Todd Leyland, City of Port St. Lucie, [TLeyland@CityofPSL.com](mailto:TLeyland@CityofPSL.com)
- Jason Meadows, USEPA/ATL, [Meadows.JasonB@EPA.gov](mailto:Meadows.JasonB@EPA.gov)

**Filing and Acknowledgment**

Filed, on this date, pursuant to Section 120.52, Florida Statutes, (F.S.), with the designated Department Clerk, receipt of which is hereby acknowledged.

**Kaiden Miller**

Digitally signed by Kaiden  
Miller  
Date: 2025.09.19 08:47:00  
-04'00'

---

Clerk

9/19/2025

---

Date



## FLORIDA DEPARTMENT OF Environmental Protection

Bob Martinez Center  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

Ron DeSantis  
Governor

Jay Collins  
Lt. Governor

Alexis A. Lambert  
Secretary

### Underground Injection Control Class I Injection Well System Construction and Testing Permit

#### Permittee

City of Port St. Lucie  
Kevin Matyjaszek  
Utility Systems Director  
1001 SE Prineville Street  
Port St. Lucie, FL 34983  
[KMatyjaszek@CityofPSL.com](mailto:KMatyjaszek@CityofPSL.com)

#### Permit/Certification

UIC Permit: 0347645-003-UC/1M  
WACS Facility ID: 98446  
Date of Issuance: September 19, 2025  
Date of Expiration: September 19, 2030  
Permit Processor: Walsta Jean-Baptiste

#### Facility

Glades Wastewater Treatment Facility  
10700 Glades Cutoff Road  
Port St. Lucie, FL 34986

#### Location

County: St. Lucie  
Latitude: 27° 20' 38.19" N  
Longitude: 80° 27' 13.46" W

#### Project: Class I Injection Well System IW-2

This permit is issued under the authority of Chapter 403, Florida Statutes (F.S.), and the rules promulgated thereunder, particularly Chapters 62-4, 62-520, and 62-528, Florida Administrative Code (F.A.C.).

The above-named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents attached hereto or on file with the Department of Environmental Protection (Department or DEP) and made a part hereof and specifically described as follows.

**To Construct and Operationally Test:** One Class I injection well (IW-2) for the disposal of domestic wastewater treated to high-level disinfection standards from the Glades Wastewater Treatment Facility (FLA326321).

The injection well is proposed to be constructed with a 30-inch outside diameter injection casing set to approximately 2,600 feet below land surface (bls) with a cemented annulus and a total depth of approximately 3,500 feet bls. The proposed injection zone is a Class G-IV aquifer in accordance with Chapter 62-520.410(1), F.A.C.

Injection well IW-2 is designed for a maximum injection rate of 20,575 gallons per minute (gpm) and a maximum injection volume of 29.63 million gallons per day (mgd) at an injection velocity of 10 feet per second in the proposed injection casing of the well. The permitted injection rate and volume will be established after testing of the well is complete.

**In Accordance With:** The Application to Construct DEP Form No. 62-528.900(1) dated June 18, 2025, and supporting information submitted to the Aquifer Protection Program (APP) Tallahassee office.

Permittee: City of Port St. Lucie  
 Kevin Matyjaszek, Utility Systems Director  
 Glades Wastewater Treatment Facility

UIC Permit: 0347645-003-UC/1M  
 WACS Facility ID: 98446  
 Date: September 19, 2025

**Location:** Glades Wastewater Treatment Facility, 10700 Glades Cutoff Road, Port St. Lucie, Florida 34986, in St. Lucie County.

The injection and monitor wells, as designated below by well name and Water Assurance Compliance System (WACS) test site identification (ID), and construction details at this facility, are as follows:

**Table 1**  
*Injection Wells*

Well Name	WACS Testsite ID	Well Depth (feet bls)	Casing Size <sup>1</sup> (inches)	Casing Thickness (inches)	Casing or Tubing Type	Casing Depth or Interval (feet bls)
IW-1 0347645-002-UC/1X	13245	3,200	68	0.375	Steel	8
			54	0.375	Steel	190
			44	0.375	Steel	659
			36	0.375	Steel	1,815
			26	0.500	Steel	2,604
			20	0.82	FRP <sup>2</sup> Tubing	2,594
					Open Hole <sup>3</sup>	2,604 – 3,200
IW-2 <sup>4</sup>	14297	3,500	66	0.375	Steel	10
			58	0.375	Steel	190
			48	0.375	Steel	660
			40	0.375	Steel	1,600
			30	0.500	Steel	2,600
					Open Hole	2,600 – 3,500

**Injection Well Notes:**

- <sup>1</sup> All sizes in outside diameter or nominal size. Depths are approximate.
- <sup>2</sup> Red Box® series 1250 fiberglass-reinforced plastic (FRP) injection tubing with packer in fluid-filled annulus and 17.98-inch inside diameter.
- <sup>3</sup> Open hole diameter is 24 inches.
- <sup>4</sup> IW-2 will have a cemented annulus.

**Table 2**  
 Monitor Well

Well Name	WACS Testsite ID	Monitor Zone	Casing Size <sup>1</sup> (inches)	Casing Thickness (inches)	Casing Type	Casing Depth (feet bls)	Monitoring Depth (feet bls)
MW-1 0347645-002-UQ/1X	23441A		48	0.375	Steel		
			34	0.375	Steel		
			24	0.375	Steel		
			16	0.375	Steel		
	Upper					1,480 – 1,518	
23441B	Lower	6%	0.39	FRP <sup>2</sup>			
						1,751 – 1,810	

Monitor Well Notes:

<sup>1</sup> All sizes in outside diameter.

<sup>2</sup> Red Box® series 1750 fiberglass-reinforced plastic (FRP) casing with 5.43-inch inside diameter.

**Subject To:** Specific Conditions I-IX and General Conditions 1-24.

**Specific Conditions**

**I. General Requirements**

1. This permit is for City of Port St. Lucie to construct and operationally test one Class I injection well (IW-2) for the disposal of domestic wastewater treated to high-level disinfection standards from the Glades Wastewater Treatment Facility (FLA326321). This permit does not authorize the construction or operational testing of any other well. [62-528.440(2)(a), F.A.C.]
2. No underground injection is allowed that causes or allows movement of fluid into an underground source of drinking water (USDW) if such fluid movement may cause a violation of any primary drinking water standard under Title 40 of the Code of Federal Regulations (C.F.R.) section 141, or may otherwise adversely affect the health of persons. The applicant for a permit shall have the burden of showing that the requirements of this paragraph are met. [62-528.440(2)(c), F.A.C.]
3. In the event a well must be plugged or abandoned, the permittee shall obtain approval from the Department as required by Rule 62-528, F.A.C. When no longer used for their intended purpose, these wells shall be properly plugged and abandoned. 180 days prior to well abandonment, the permittee shall submit to the Department the proposed plugging method, pursuant to Rule 62-528.460, F.A.C. [62-528.435(6) and 62-528.460(1), F.A.C.]
4. If injection is to continue beyond the expiration date of this permit the permittee shall apply for and obtain an operation permit. If necessary to complete the maximum two-year operational testing period as referenced in Rule 62-528.450(3)(e), F.A.C., the permittee shall apply for renewal of the construction permit at least 60 days prior to the expiration date of this permit. [62-528.307(2)(a) and 62-528.450(3)(e), F.A.C.]

## II. Site Requirements

1. A drilling pad shall be provided to collect spillage of contaminants and to support the heaviest load that will be encountered during drilling. *[62-528.410(9)(b), F.A.C.]*
2. No drilling operations shall begin without an approved disposal site for drilling fluids, cuttings, or waste. It shall be the permittee's responsibility to obtain the necessary approval(s) for disposal prior to the start of construction. A detailed disposal plan shall be submitted to the Department prior to the commencement of drilling activities for the injection and monitor wells. *[62-528.410(9)(a), F.A.C.]*
3. Specific drilling pad dimensions and design drawings for Department record shall be provided prior to commencing construction and shortly after selection of the drilling contractor. *[62-528.410(9)(b), F.A.C.]*
4. Hurricane Preparedness – Upon the issuance of a "Hurricane Watch" by the National Weather Service, the preparations to be made include but are not necessarily limited to the following:
  - a. Secure all on-site salt and stockpiled additive materials to prevent surface and/or groundwater contamination.
  - b. Properly secure drilling equipment and rig(s) to prevent damage to well(s) and on-site treatment process equipment.  
*[62-528.307(1)(f), F.A.C.]*

## III. Construction and Testing Requirements

### A. General

1. Any construction, modification, repair, or abandonment of a well shall be performed by a Florida licensed water well contractor, licensed under Rule 62-532, F.A.C., to engage in the business of construction, modification, repair, or abandonment of a well. *[62-532.200, F.A.C.]*
2. Well construction shall follow the requirements of Rule 62-532.500 for Water Well Construction Standards. *[62-532.500, F.A.C.]*
3. The measurement points for drilling and logging operations shall be surveyed and referenced to the NAVD of 1988 prior to the onset of drilling activities for the injection and monitor wells. *[62-160.240(3)(b)3., F.A.C.]*
4. Blow-out preventers or comparable flow control devices shall be installed on the injection and monitor wells prior to penetration of the Floridan aquifer system. *[62-528.410(9)(c), F.A.C.]*
5. The Department shall be notified 30 days prior to the mobilization of drilling operations to the site, and again 7 days prior to the mobilization of drilling operations to the site. *[62-528.430(1), F.A.C.]*
6. Waters spilled during construction or testing of the injection well system shall be contained and properly disposed. *[62-528.307(1)(e) and (f), and 62-528.410(9)(b), F.A.C.]*
7. If additives that were not approved in the permit application are to be used during grouting, for lost circulation, or for any other reason, information on their properties

shall be submitted to the Department prior to their use for review and approval. [62-528.410(5)(c), F.A.C.]

8. No more than 6% bentonite gel shall be used to cement any casing or tubing unless advance approval is received from the Department due to conditions found during the drilling and logging of the well. [62-528.410(5)(f) and 62-528.420(5)(c), F.A.C.]
9. Casings used in the construction of the wells shall be designed for the life expectancy of the well, and shall be new and unused. [62-528.410(4)(a)]
10. Casings shall be centralized to provide adequate annular space around the casing for proper cementing. [62-528.410(5)(i)3]

#### **B. Testing and Monitoring**

1. The construction, geophysical logging, and packer testing programs shall be implemented in accordance with this permit and as proposed in the following submittals:
  - June 18, 2025, "Well Construction Application";
  - Other approved submittals received by the Department.[62.528.307(1)(b), F.A.C.]
2. Exact depths of casing seats and monitor intervals shall be determined based on field conditions and the results obtained during the construction and testing program, and are subject to the conditions of this permit. The injection well will be constructed first followed by the monitor wells. In the case of a multi-well injection system, at least one injection well shall be constructed first. [62-528.410(4)(c), F.A.C.]
3. Packer tests shall be conducted in both injection and monitor wells to identify confinement and the base of the USDW.
  - a. The program shall include the number of packer tests identified in the permit application, at intervals which are to be field determined.
  - b. At least one packer test shall be conducted in each proposed monitor interval.
  - c. Packer tests shall be conducted in the anticipated confining intervals, from the lowermost zone of the USDW to the top of the injection zone. Results from the packer tests will contribute to the demonstration of confinement. To the extent feasible, the packer tests shall be performed over intervals that are sufficiently narrow so as not to include high hydraulic conductivity beds.
  - d. Water samples shall be collected from each packer test, and analyzed for total dissolved solids (TDS), chlorides, specific conductance, ammonia, total Kjeldahl nitrogen, and sulfate.[62-528.405(1)(a) and (2)(a), and 62-528.420(6)(f), F.A.C.]
4. Department approval is required prior to the following stages of construction and testing:
  - a. Intermediate (40-inch) casing seat in each injection well
  - b. Final (30-inch) casing seat in each injection well
  - c. Final seat for tubing and packer in each injection well
  - d. Short-term injection test
  - e. Operational testing[62-528.410(4)(c) and 62-528.420(4)(c), F.A.C.]

5. The depth of the USDW and the background water quality of the monitor zones shall be determined during drilling and testing using the following information:
  - a. Water samples from packer test data with analysis and interpretation.
  - b. Geophysical logging upon reaching the total depth of the appropriate pilot hole interval including the following logs at a minimum: caliper, gamma ray, dual induction, and borehole compensated sonic. Other logs as identified in the permit application documents shall be run.  
*[62-528.405(1)(a) and 62-528.405(3)(b), F.A.C.]*
6. The upper monitor interval shall be established within the lowermost portion of the USDW unless it can be demonstrated that no zone is present that can produce adequate water for collection of representative groundwater samples. *[62-528.425(1)(g)4., F.A.C.]*
7. The lower monitor interval shall be positioned in a zone below the base of the USDW that can produce adequate water for collection of representative groundwater samples. The purpose of the lower monitor zone is to verify the effectiveness of the confining unit and external mechanical integrity of the injection well. This zone shall be placed far enough below the base of the USDW to function as an early warning for fluid movement. *[62-528.425(1)(g)4., F.A.C.]*
8. The data and analysis supporting the selection of the monitor intervals shall be submitted to the Department after the collection, interpretation, and analysis of all pertinent cores, geophysical logs, packer tests and analysis of fluid samples. The Department shall approve the final selection of the specific upper and lower monitor intervals prior to monitor well completion. *[62-528.420(4)(c), F.A.C.]*
9. To identify the upper and lower monitor zones, the following information from the injection and monitor wells and all available on-site sources of data shall be analyzed, interpreted and submitted for Department review and approval:
  - a. Borehole televiewer or downhole television survey.
  - b. The characteristics of the transition zone (especially regarding TDS) in the vicinity of the base of the USDW.
  - c. Packer test data including water quality (TDS, chlorides, sulfate, specific conductance, ammonia, and total Kjeldahl nitrogen, at a minimum).
  - d. The specific capacity of the proposed upper and lower monitor zones based on packer testing results.
  - e. The identification of the base of the USDW.  
*[62-528.420(4)(c), F.A.C.]*
10. Confinement shall be demonstrated using at a minimum, directly measured lithologic properties, geophysical evidence, and tests performed while pumping the formation. *[62-528.405(2)(c), F.A.C.]*
11. Test results pertaining to formation testing shall include and/or specifically reference the following informational and quality control items:
  - a. Information that documents the calibration of tools, including field checks prior to testing.
  - b. The conditioning/development of the borehole prior to logging, including the techniques used and the time periods in which they were applied, and

- c. Pertaining to packer/pump testing - recording the pumping rate regularly throughout the test to account for possible variations in the pumping rate, and providing information regarding the detection of packer leaks, if any, during testing.  
*[62-528.405(2) and (3), F.A.C.]*
12. Representative samples of circulation fluid shall be collected when drilling with water, air, or reverse air during the drilling of the pilot holes of injection and monitor wells. Representative samples of circulation fluid shall be collected at a minimum of every 90 feet during drilling. The circulation fluid samples shall be analyzed for chloride and specific conductance at a minimum. *[62-528.405(1)(a) and 62-528.420(6)(g), F.A.C.]*
13. At sites where previous injection has occurred, the representative samples of circulation fluid below the intermediate 40-inch casing in the injection well(s) shall be analyzed for TDS, chloride, sulfate, specific conductance, ammonia, and total Kjeldahl nitrogen, at a minimum. *[62-528.405(2)(c) and (3)(b), F.A.C.]*
14. If effluent is encountered or suspected during pilot hole drilling and testing, the Department shall be notified immediately by telephone and in writing and immediate appropriate precautionary measures shall be taken to prevent any upward fluid movement. *[62-528.440(2)(d), F.A.C.]*

### **C. Mechanical Integrity**

1. Mechanical Integrity:
  - a. Injection is prohibited until the permittee affirmatively demonstrates that the well has mechanical integrity. Prior to operational testing the permittee shall establish, and thereafter maintain the mechanical integrity of the well at all times.
  - b. If the Department determines that the injection well lacks mechanical integrity, written notice shall be given to the permittee.
  - c. Within 48 hours of receiving written notice that the well lacks mechanical integrity, unless the Department requires immediate cessation of injection, the permittee shall cease injection into the well unless the Department allows continued injection pursuant to subparagraph d below.
  - d. The Department shall allow the permittee to continue operation of a well that lacks mechanical integrity if the permittee has made a satisfactory demonstration that fluid movement into or between underground sources of drinking water is not occurring.  
*[62-528.307(2)(f), F.A.C.]*
2. Mechanical integrity of each injection well shall be determined pursuant to Rule 62-528.300(6)(b) and (c), F.A.C. For wells with a fluid-filled casing/tubing annulus, this includes both continuous annular monitoring and a pressure test of the casing/tubing annulus every 5 years. *[62-528.300(6)(b) and (c), F.A.C.]*
3. Verification of pressure gauge calibration must be provided to the Department representative at the time of the test and in the certified test report. *[62-528.300(6)(f), F.A.C.]*
4. The Department's Southeast District office must be notified a minimum of seven (7) calendar days prior to all testing for mechanical integrity on the injection wells. Any change in the approved testing procedure must be approved by the Department

before testing begins. All testing must be initiated during daylight hours, Monday through Friday other than State Holidays, unless approval has been given by the Department. An evaluation of test results must be submitted with all test data. [62-528.300(6)(f), F.A.C.]

#### **D. Surface Equipment**

1. The integrity of the monitor zone sampling systems shall be maintained at all times. Sampling lines shall be clearly and unambiguously identified by monitor zone at the point at which samples are drawn. All reasonable and prudent precautions shall be taken to ensure that samples are properly identified by monitor well name or zone and that samples obtained are representative of those zones. Sampling lines and equipment shall be kept free of contamination with independent discharges and no interconnections with any other lines. [62-528.307(1)(f) and 62-528.307(2)(b), F.A.C.]
2. The surface equipment for each injection well disposing of domestic (municipal) effluent shall maintain compliance with Rule 62-600.540(5), F.A.C., for water hammer control, screening, access for logging and testing, and reliability and flexibility in the event of damage to the well and effluent piping. [62-600.540(5), 62-528.307(1)(f), and 62-528.307(2)(b), F.A.C.]
3. Injection wells not disposing of domestic (municipal) effluent shall maintain compliance with Rule 62-528.450(2)(j), F.A.C. for water hammer control, as well as access for logging and testing, and reliability and flexibility in the event of damage to the well and effluent piping. [62-528.450(2)(j), 62-528.307(1)(f), and 62-528.307(2)(b), F.A.C.]
4. The surface equipment and piping for the injection and monitor wells shall be kept free of corrosion at all times. [62-528.307(1)(f) and 62-528.307(2)(b), F.A.C.]
5. Spillage onto the injection well pad(s) during construction activities, and any waters spilled during mechanical integrity testing, maintenance, testing, or repairs to the system(s) shall be contained on the pad(s) and directed to a sump which in turn discharges to the pumping station wet well, via other approved means to the injection well system, or by another method approved by the Department. [62-528.307(1)(f) and 62-528.307(2)(b), F.A.C.]
6. After well construction activities are complete, the injection well pads are not, unless specific approval is obtained from the Department, to be used for storage of any material or equipment at any time. [62-528.307(1)(f) and 62-528.307(2)(b), F.A.C.]
7. Four surficial aquifer monitor wells, identified as Pad Monitor wells (PMWs), shall be located near the corners of the pads to be constructed for the injection and monitor wells, and shall be identified by number or pad location, i.e. NW, NE, SW, and SE. If located in a traffic area the well head(s) must be protected by traffic bearing enclosure(s) and cover(s). Each cover must lock and be specifically marked to identify the well and its purpose. The PMWs shall be sampled as follows:
  - a. The PMWs shall be sampled and analyzed prior to drilling the injection or monitor wells and then weekly thereafter. The PMWs must also be sampled at other times specifically requested by the Department and laboratory analyses of requested parameters may be required.

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- b. During the construction and associated testing phases, the PMWs shall be sampled for total dissolved solids (milligram per liter [mg/L]), specific conductance (micromhos/centimeter [ $\mu$ mhos/cm]), pH (standard units), chloride [mg/L], field temperature ( $^{\circ}$ Celsius [C]), and water level (pound per square inch [psi] or feet [ft] North American Vertical Datum [NAVD] of 1988). Chloride and specific conductance may be from field or lab samples.
- c. Initial PMW analyses shall be submitted prior to the onset of drilling activities.
- d. Laboratory analysis of total dissolved solids (mg/L) is required during the first four weeks of PMW sampling.
- e. The results of the PMW analyses shall be submitted to the Department in the weekly progress report. The PMWs shall be retained in service throughout the construction phase of the project. Upon completion of construction, sampling shall continue until sample concentrations return to concentrations observed prior to drilling activity followed by capping, or plugging and abandonment of the PMWs.  
*[62-528.410(9)(b), F.A.C.]*

#### IV. Quality Assurance/Quality Control

1. The permittee shall ensure that the operation of this injection well system shall be as described in the application and supporting documents. Any proposed modifications to the permit, construction procedures, testing procedures, completion procedures, operation procedures, or any additional work not described in the application or supporting documents shall be submitted in writing to the Tallahassee office of the Aquifer Protection Program for review and clearance prior to implementation. Changes of negligible impact to the environment and staff time will be reviewed by the program manager, cleared when appropriate and incorporated into this permit. Changes or modifications other than those described above will require submission of a completed application and appropriate processing fee as per Rule 62-4.050, F.A.C. *[62-4.050, F.A.C.]*
2. Proper operation and maintenance include effective performance and appropriate quality assurance procedures; adequate operator staffing and training; and adequate laboratory and process controls. *[62-528.307(2)(b), F.A.C.]*
3. All water quality samples required by this permit shall be collected in accordance with the appropriate Department Standard Operation Procedures (SOP), pursuant to Rule 62-160.210, F.A.C., *Approved Field Procedures*. A certified laboratory shall conduct the analytical work, as provided by Rule 62-160.300, F.A.C., *Laboratory Certification*. Department approved test methods shall be utilized, unless otherwise stated in this permit. All calibration procedures for field testing and laboratory equipment shall follow manufacturer's instrumentation manuals and satisfy the requirements of the Department SOPs. A listing of the SOPs pertaining to field and laboratory activities is available at the Department's website: <https://floridadep.gov/dear/quality-assurance/content/dep-sops>. *[62-4.246 and 62-160, F.A.C.]*
4. All indicating, recording and totalizing devices associated with the injection well system shall be maintained in good operating condition and calibrated annually at a minimum. The pressure gauges, flow meter, and chart recorders shall be calibrated using standard engineering methods. *[62-528.307(1)(f) and 62-528.307(2)(b), F.A.C.]*

5. All reports submitted to satisfy the requirements of this permit shall be signed by a person authorized under Rule 62-528.340(1), F.A.C., or a duly authorized representative of that person under Rule 62-528.340(2), F.A.C. All reports required by this permit which are submitted to the Department shall contain the following certification as required by Rule 62-528.340(4), F.A.C.:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. *[62-528.340(1), (2), and (4), F.A.C.]*

6. Analyses shall be conducted on unfiltered samples, unless filtered samples have been approved by the Department as being more representative of groundwater conditions. *[62-520.310(5), F.A.C.]*
7. A professional engineer registered pursuant to Chapter 471, F.S., shall be retained throughout the construction period to be responsible for the construction operation and to certify the application, specifications, completion report, and other related documents. The Department shall be notified immediately of a change of the engineer of record. *[62-528.440(5)(b), F.A.C.]*
8. Continuous on-site supervision by qualified personnel (engineer and/or geologist, as applicable) is required during all testing and geophysical logging operations. *[62-528.440(5)(b), F.A.C.]*

#### **V. Reporting Requirements**

1. The drilling and construction schedule, site layout of drilling pad, and pad monitor well locations shall be submitted to the Department during site preparation but prior to drilling operation commencement for the injection well system. *[62-528.430(2)(a), F.A.C.]*
2. Weekly progress reports shall be submitted to the Department's Tallahassee and Southeast District offices throughout the construction period for each well. These reports, which may be submitted by electronic mail, shall be submitted within 48 hours of the end of the period of record and shall include at a minimum the following information:
  - a. A cover letter summary of the daily engineer report, driller's log, and a projection for activities in the next reporting period.
  - b. Daily engineer's reports and driller's/work logs with detailed descriptions of all drilling progress, cementing, testing, logging, and casing installation activities.
  - c. Description of daily footage drilled by diameter of bit, size of hole opener, or reamer being used.
  - d. Collection of drilling cuttings every 10 feet and at every formation change.
  - e. Description of work during installation and cementing of casing, including amounts of casing and cement used. Details of cementing operations shall include the

number of cementing stages, and the following information for each stage of cementing: the volume and type of cement pumped, the theoretical fill depth, and the actual tag depth. From both the physical tag and the geophysical logs, a percent fill shall be calculated. An explanation of any deviation between actual versus theoretical fill shall be provided.

- f. Details of the additions of salt or other materials to suppress well flow, including the date, depth, and amount of material used.
  - g. Description of testing accomplished including (but not limited to) pumping and packer tests.
  - h. Lithologic logs and core descriptions with cuttings description, formation and depth encountered.
  - i. Geophysical logs, video logs, and deviation survey results.
  - j. Water quality analyses, including but not limited to the weekly water quality analysis and water levels for the PMWs.
  - k. Well development records.
  - l. Description of any construction problems that developed during the reporting period and current status.
  - m. Interpretations included with all test results and logs submitted.
  - n. Documentation of disposal of drilling fluids, cuttings, formation water, or waste as per Specific Condition II.2.  
*[62-528.410(9)(a) and 62-528.430(1), F.A.C.]*
3. The final selection of specific injection and monitor intervals must be approved by the Department. In order to obtain an approval, the permittee shall submit a written request to the APP Tallahassee office. All casing seat requests for the injection and monitor wells shall be accompanied by technical justification. To the extent possible, each casing seat request should address the following items:
- a. Lithologic and geophysical logs with interpretations, as the interpretations relate to the casing seat.
  - b. Water quality data (including but not necessarily limited to TDS concentrations).
  - c. Identification of confining units, including hydrogeologic data and interpretations.
  - d. Identification of monitor zones.
  - e. Casing depth evaluation (mechanically secure formation, potential for grout seal).
  - f. Lithologic drilling rate and weight on bit data, with interpretations (related to the casing seat).
  - g. Identification of the base of the USDW using water quality and geophysical log interpretations.
  - h. A certified (PE or PG) evaluation of all logging and test results submitted with test data.
  - i. Transmissivity or specific capacity of proposed monitor zone.
  - j. Packer test drawdown curves and interpretation.  
*[62-528.410(4)(c) and 62-528.420(4)(c), F.A.C.]*
4. The short-term injection test request shall contain the following justifications:
- a. Cement bond logs and interpretation.
  - b. Final downhole television survey with interpretation.

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- c. Demonstration of mechanical integrity, which shall include radioactive tracer test results, pressure testing results, and temperature logging results (if the injection test is to be after any of these mechanical integrity tests).
- d. Reasonable assurance that adequate confinement exists.
- e. Planned injection testing procedures.
- f. Proposed source water to be used. Per Rule 62-528.405(3)(b), F.A.C., if an adequate potable water supply for the injection test does not exist, and the data collected during drilling provide assurance of the presence of confining bed(s), the applicant shall, after demonstrating mechanical integrity pursuant to Rules 62-528.300(6)(b)2. and (c), F.A.C., be allowed to use an alternate source for testing only with specific prior written authorization from the Department. An analysis of the alternate water source is required prior to Department approval, according to the table below:

Water Source	Required Analyses
Potable Water	No analysis needed.
Secondarily Treated Domestic Wastewater*	A copy of the latest comprehensive analysis submitted to the Department's domestic wastewater program.
Desalination Concentrate*	A copy of the latest comprehensive analysis submitted to the Department's industrial wastewater program. If more than one year old, sample the water for the parameters required for monthly monitoring of the wastewater in Specific Condition VI.
Groundwater	Sample the water for: <ul style="list-style-type: none"> <li>• total dissolved solids (mg/L)</li> <li>• chloride (mg/L)</li> <li>• specific conductance (temperature compensated, <math>\mu\text{mhos/cm}</math> or <math>\text{mS/cm}</math>)</li> <li>• total suspended solids (TSS) (mg/L)</li> <li>• nitrogen, ammonia, total as N (mg/L)</li> <li>• nitrogen, total Kjeldahl as N (TKN, mg/L)</li> <li>• nitrogen, nitrate, total as N (mg/L)</li> <li>• sodium (mg/L)</li> <li>• potassium (mg/L)</li> <li>• calcium (mg/L)</li> <li>• magnesium (mg/L)</li> <li>• total iron (mg/L)</li> <li>• bicarbonate (mg/L)</li> <li>• phosphorous, total as P (mg/L)</li> <li>• pH (standard units)</li> <li>• sulfate, total as <math>\text{SO}_4</math> (mg/L)</li> <li>• field temperature (<math>^{\circ}\text{C}</math>)</li> <li>• gross alpha (picoCuries per liter [pCi/L])</li> <li>• combined radium-226 and radium-228 (pCi/L)</li> </ul>
Surface Water	As above for groundwater, with the additional constituents: <ul style="list-style-type: none"> <li>• total and fecal coliform (cfu/100mL)</li> <li>• <i>Escherichia coli</i> (cfu/100mL)</li> <li>• Enterococci (cfu/100mL)</li> <li>• turbidity (Nephelometric Turbidity Unit [NTU])</li> </ul>

\*Requires specific prior written authorization from the Department.  
 [62-528.405(3)(b), F.A.C.]

5. Upon completion of analysis of cores and sample cuttings recovered during the construction of wells covered by this permit (when no longer needed by the well owner), the permittee shall contact the Geological Sample Acquisition & Management Section of the Florida Geological Survey (FGS) to arrange for the transfer of the cores and cuttings. [62-528.450(5), F.A.C.]
6. All cores and cuttings for FGS shall be shipped to the Florida Geological Survey, Geological Sample Acquisition & Management Section, 3915 Commonwealth Boulevard, Tallahassee, Florida 32399. All cores and samples shall clearly identify the site name, well name/number, depths of samples/cores, and the latitude/longitude location of the well(s) using the form in this permit. [62-528.450(5), F.A.C.]

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7. A final report of the construction and testing of the injection and monitor wells shall be submitted no later than 120 days after commencement of operational testing, pursuant to Rule 62-528.430(1)(e), F.A.C.
  - a. A copy of the cover letter for the report shall be sent to the U. S. Environmental Protection Agency, Region 4, Underground Injection Control (UIC) Program, 61 Forsyth St. SW, Atlanta, Georgia 30303-8909, or [R4qwui@EPA.gov](mailto:R4qwui@EPA.gov).
  - b. The report shall include as a minimum, definitions of the injection interval, all relevant confining units, the depth of the base of the USDW, and all monitoring zones, including all relevant data and interpretations.  
*[62-528.430(1)(e), 62-528.450(2), (3), F.A.C.]*

## **VI. Operational Testing and Monitoring Requirements**

### **A. Operational Testing**

1. The permittee shall conduct operational testing of the injection well system to demonstrate that the well can absorb the design and peak daily flows that are expected, prior to granting approval for operation. *[62-528.450(3)(a), F.A.C.]*
2. Prior to operational testing, the permittee shall comply with the requirements of rule 62-528.450(3)(a),(b), and (c), F.A.C. *[62-528.307(2)(e), F.A.C.]*
3. The operational testing of the Class I injection well system under this permit shall not commence without written authorization from the Department. *[62-528.450(3)(b), F.A.C.]*
4. Prior to operational testing approval, the following items must be submitted with the request for operational testing approval for APP Tallahassee office review and approval:
  - a. Lithologic and geophysical logs with interpretations.
  - b. A copy of the borehole television survey(s) or borehole televiewer log(s) of the injection well with interpretation.
  - c. Certification (PE or PG) of mechanical integrity and interpreted test data.
  - d. Results of the short-term injection test with interpretation of the data.
  - e. A description of the actual injection procedure including the anticipated maximum pressure and flow rate at which the well will be operated under normal and emergency conditions.
  - f. Information concerning the compatibility of the injected waste with fluids in the injection zone and minerals in both the injection zone and the confining zone.
  - g. Certification of completion of well construction from water well contractor and certification by the Engineer of Record that permit conditions are met.
  - h. Surface equipment (including piping, pressure gauges and flow meters, and all appurtenances) completion certified by the Engineer of Record.
  - i. Draft operation and maintenance manual, including a description of surge and water hammer control and emergency discharge management plan procedures. The emergency discharge system must be fully constructed and operational (ready to operate) prior to approval of operational testing.
  - j. Calibration certificates for pressure gauges and flow meters.

- k. Signed and sealed record "as-built" engineering drawings of the injection well system including all well construction, subsurface and surface piping and equipment, and appurtenances.
  - l. Demonstration of confinement and definition of the injection and confining sequences shall utilize data collected during the drilling, logging, and testing of the injection and monitor wells. This submittal shall be prepared, signed, and sealed by a Florida Registered Professional Geologist or appropriately qualified Florida Registered Professional Engineer.
  - m. Background water quality data from the monitoring and injection zones, analyzed for primary and secondary drinking water standards (62-550, F.A.C.).
  - n. A wastestream analysis for the same parameters as in condition VI.A.4.m., above. Unless already submitted, this analysis shall be submitted within 60 days after the beginning of operational testing.
  - o. Other data obtained during well construction needed by the Department to evaluate whether the injection well system will operate in compliance with Department rules.
  - p. A survey indicating the exact location in metes and bounds of all wells authorized by this permit shall be provided prior to issuance of an operating permit.  
*[62-528.450(3)(a)3. and 62-528.455(1)(c)6., F.A.C.]*
5. Pressure gauges and flow meters shall be installed on the injection wells prior to initiating injection activities at the site. *[62-528.450(3)(a), F.A.C.]*
  6. Prior to the authorization of operational testing by the APP Tallahassee office, the permittee shall contact the Southeast District office to arrange a site inspection. The inspection will determine if the conditions of the permit have been met and to verify that the injection well system is operational. During the inspection, emergency procedures and reporting requirements shall be reviewed. *[62-528.450(3)(c), F.A.C.]*
  7. The Engineer of Record or designated qualified representative must be present for the start-up operations and the APP Tallahassee office must be notified in writing of the date operational testing commenced for the subject wells. *[62-528.440(5)(b), F.A.C.]*

**B. Monitoring**

1. The permittee shall submit monthly to the APP Tallahassee office the results of all injection well and monitor well data required by this permit no later than the last day of the month immediately following the month of record. The report shall include:
  - a. A cover page summarizing the current status of all monthly activities, including, but not limited to, the certification and signature required in Specific Condition Number IV.5. above.
  - b. Operational and water quality data in a tabular format. The following identifying information must be included on each data sheet:
    - i. Facility name
    - ii. Well name
    - iii. UIC permit number
    - iv. WACS facility ID
    - v. WACS testsite ID on the appropriate data sheet (as provided in Table 1 and Table 2).

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- c. Laboratory pages and original supporting documentation including DEP Form FD 9000-24, *Groundwater Sampling Log*, for the purging of each monitor well. [62-528.307(2)(d), F.A.C.]
2. Submit the report in portable document format (.pdf) to the following Program e-mail addresses:
- |                            |  |
|----------------------------|--|
| Southeast District         | <a href="mailto:DEP_SED@FloridaDEP.gov">DEP_SED@FloridaDEP.gov</a> |
| Aquifer Protection Program | <a href="mailto:TAL_UIC@FloridaDEP.gov">TAL_UIC@FloridaDEP.gov</a> |
- Submit paper copies of the report to the following addresses:
- |                            |  |
|----------------------------|--|
| Southeast District         | 3301 Gun Club Road, MSC 7210-1<br>West Palm Beach, FL 33406  |
| Aquifer Protection Program | 2600 Blair Stone Road, MS 3530<br>Tallahassee, FL 32399-2400 |
- [62-528.307(3)(d), F.A.C.]
3. The injection system shall be monitored in accordance with Rules 62-528.425 and 62-528.430, F.A.C. The following injection well performance data and monitor zone data shall be recorded and reported in the *Monthly Operation Report (MOR)* as indicated below. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. [62-528.307(2)(c),(d), 62-528.425, 62-528.430, and 62-528.450(3), F.A.C.]
- a. Monthly (M) samples and measurements shall be taken as close to 30 days apart as possible.
- b. Annual (A) samples and measurements
- The period for reports of annual samples and measurements shall be for the calendar year ending December 31.
- Annual samples and measurements taken in consecutive years shall be taken at least 6 months apart and as close to a year apart as possible. If a MOR includes annual results, it shall be noted as such on the title page of the report.
- [62-528.307(1)(m) F.A.C.]
4. The permittee shall submit the results of all injection well and monitor well data required by this permit to the Department no later than the last day of the month immediately following the month of record. [62-528.307(2)(d)]
5. Technical malfunctions and emergencies that interfere with the sampling schedule can be explained in the comment section of the MOR. The explanation shall include what issues occurred, how long it will take to address the issues, and an estimated time when the samples and measurements will be completed and submitted.

**Table 3**  
*Monitoring Schedule*

Parameters	Unit	Recording Frequency or Sampling Method	Frequency of Analyses
			IW-2 14297
Injection Pressure, Max.	psi	Continuous	D/M*
Injection Pressure, Min.	psi	Continuous	D/M*
Injection Pressure, Avg.	psi	Continuous	D/M*
Flow Rate, Max.	gpm	Continuous	D/M*
Flow Rate, Min.	gpm	Continuous	D/M*
Flow Rate, Avg.	gpm	Continuous	D/M*
Volume Injected per Well	MG	Daily/Monthly	D/M
Total Volume Injected Facility	MG	Daily/Monthly	M
Pressure or Water Level Max.	psi or ft NAVD	Continuous	
Pressure or Water Level Min.	psi or ft NAVD	Continuous	
Pressure or Water Level Avg.	psi or ft NAVD	Continuous	
pH <sup>b</sup>	standard units	Grab/Purge	
Specific Conductance <sup>b</sup>	umhos/cm	Grab/Purge	
Temperature <sup>b</sup>	°C	Grab/Purge	
Dissolved Oxygen <sup>b</sup>	mg/L	Grab/Purge	
Chloride	mg/L	Grab/Purge	M
Sulfate	mg/L	Grab/Purge	M
Total Dissolved Solids	mg/L	Grab/Purge	M
Nitrate + Nitrite as N	mg/L	Grab/Purge	M
Ammonia as N	mg/L	Grab/Purge	M
Total Kjeldahl Nitrogen	mg/L	Grab/Purge	M
Sodium	mg/L	Grab/Purge	M
Total Suspended Solids <sup>a</sup>	mg/L	Grab	M
Total Coliform <sup>a</sup>	cfu/100mL	See Below	M
Fecal Coliform <sup>a</sup>	cfu/100mL	See Below	M
Fecal Coliform, monthly maximum <sup>a</sup>	cfu/100mL	See Below	M
Fecal Coliform, % below detection limit <sup>a</sup>	%	See Below	M
Primary & Secondary Drinking Water Standards, Source Water		c	A

D - Daily; M - Monthly; A - Annually

\* - Operational data reporting for flows, pressures and water levels: daily maximum, minimum and average from continuous reporting; monthly maximum, minimum and average (calculated from daily averages).

<sup>b</sup> - Field samples

<sup>c</sup> - Composite and grab samples, as appropriate.

Refer to Table 1, Table 2, and above for the appropriate WACS testsite IDs to be used for reporting.

Monitor well MW-1 requirements are included in permit 0347645-002-UO/1X

#### HLD facilities:

- pH, turbidity, and temperature data for effluent may be collected from the in-line meters for the WWTF effluent.
- All TSS samples shall be grab samples taken daily after filtration and before disinfection.
- Effluent samples other than TSS will be composite or grab samples.
- The sample locations for effluent are described in the facility's current Domestic Wastewater Permit.

\* If the sample is also required for compliance under a WWTF permit, those results may be submitted to the Aquifer Protection Program (APP) in Tallahassee to fulfill the sampling

required for this permit. Submit a copy of the Discharge Monitoring Report (DMR), Daily Sample Report, Part B, Site U001. A laboratory analysis for the Primary and Secondary Drinking Water Standards of Chapter 62-550, F.A.C., shall be submitted annually after the beginning of operational testing.

6. A laboratory analysis of the injectate for the Primary and Secondary Drinking Water Standards of Chapter 62-550, F.A.C., shall be submitted annually. The report of analysis shall be submitted in accordance with Specific Condition IV.5 of this permit.
  - a. For facilities permitted to inject domestic wastewater, the domestic wastewater annual sample results may be the same as submitted for the domestic wastewater program if taken within the last 12 months. Primary and secondary drinking water standards of Chapter 62-550, F.A.C., not included in the domestic wastewater annual sample requirements shall be included in the same sample or in a separate sample. If not required annually for the domestic wastewater program, a separate sample shall be taken and reported for this permit. The samples shall be composite and grab samples as appropriate for the domestic wastewater program. The permittee may choose to take a combined annual sample from multiple domestic wastestreams if they are authorized for injection in this permit.
  - b. For facilities permitted to inject water other than domestic wastewater, the source water samples shall not be combined with domestic wastewater samples. The samples shall be grab samples. The permittee may choose to take a combined annual sample from multiple non-domestic wastestreams if they are authorized for injection in this permit.
  - c. The report should be sent to the addresses in Specific Condition VI.B.2
  - d. For renewal of this permit, the permittee shall submit a separate laboratory analysis for each permitted injectate source.  
*[62-528.425(1)(a), F.A.C.]*
7. A specific injectivity test shall be performed monthly on the injection well as required by Rule 62-528.450(3)(b)6., F.A.C. Pursuant to Rule 62-528.430(2)(d), F.A.C., the specific injectivity test shall be performed with the pumping rate to the well set at a predetermined level and reported as the specific injectivity index (gallons per minute/specific pressure). The pumping rate to be used shall be based on the expected flow, the design of the pump types, and the type of pump control used. As part of this test, the well shall be shut-in for a period of time necessary to conduct a valid observation of pressure fall-off. The specific injectivity and pressure fall-off test data shall be submitted along with the monitoring results of the injection and monitor well data. The testing may be reduced to quarterly after a minimum of six months of operational testing and with written APP Tallahassee office approval. *[62-528.430(2)(b) and (d) and 62 528.450(3)(b)6., F.A.C.]*
8. Monitor well purging and field stabilization parameter measurement is required prior to the collection of laboratory samples for the MORs. The facility shall conduct the monitor well sampling following the monitor well sampling protocols specified in FS 2200-*Groundwater Sampling* in the DEP-SOP-001/01 Standard Operating Procedures for Field Activities. The results of the purging techniques and field stabilization parameters shall be provided on DEP Form FD 9000-24 or a similar alternative

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approved by the Department, and the completed forms shall be submitted to the Department with the MORs.

9. The APP Tallahassee office will consider an alternate purging method meeting monitor well sampling protocol in FS 2200-Groundwater Sampling in the DEP-SOP-001/01 Field Sampling Procedures Manual in the case where the above procedure causes a hardship to the facility. The permittee shall request an alternate method and receive written APP Tallahassee approval before implementing it. *[62-160.210(1) and 62-528.430(2), F.A.C.]*
10. The flow from the monitoring zones during well evacuation and sampling shall not be discharged to surface waters or aquifers containing an underground source of drinking water. Waters purged from monitor wells in preparation for sampling shall be diverted to the injection well head via the pad drainage system, wet well, or treatment plant. *[62-4.030, 62-620.320, 62-520.420 and .430, F.A.C.]*

## VII. Abnormal Events

1. In the event the permittee is temporarily unable to comply with any of the conditions of a permit due to breakdown of equipment, power outages or destruction by hazard of fire, wind, or by other cause, the permittee of the facility shall notify the Southeast District office. *[62-528.415(4)(a), F.A.C.]*
2. Notification shall be made in person, by telephone, or by electronic mail (e-mail) within 24 hours of breakdown or malfunction to the Southeast District office. *[62-528.307(1)(x), F.A.C.]*
3. A written report of any noncompliance referenced in Specific Condition Number VII.1 above shall be submitted to the Southeast District office and the APP Tallahassee office within five days after its occurrence. The report shall describe the nature and cause of the breakdown or malfunction, the steps being taken or planned to be taken to correct the problem and prevent its reoccurrence, emergency procedures in use pending correction of the problem, and the time when the facility will again be operating in accordance with permit conditions. *[62-528.415(4)(b), F.A.C.]*

### 4. Reporting Requirements

The permittee shall report to the Department's Southeast District office any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within five days of the time the permittee becomes aware of the circumstances. The written submission shall contain: a description of the noncompliance and its cause; the period of noncompliance including exact dates and time, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

- a. The following shall be included as information which must be reported within 24 hours under this condition:
  - 1) Any unanticipated bypass which causes any reclaimed water or effluent to exceed any permit limitation or results in an unpermitted discharge,
  - 2) Any upset which causes any reclaimed water or the effluent to exceed any limitation in the permit,

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- 3) Violation of a maximum daily discharge limitation for any of the pollutants specifically listed in the permit for such notice, and
  - 4) Any unauthorized discharge to surface or groundwaters.
- b. Oral reports as required by this subsection shall be provided as follows:
- 1) For unauthorized releases or spills of treated or untreated wastewater reported pursuant to subparagraph (a)4. that are in excess of 1,000 gallons per incident, or where information indicates that public health or the environment will be endangered, oral reports shall be provided to the **State Watch Office Toll-Free Number** 800-320-0519, as soon as practical, but no later than 24 hours from the time the permittee becomes aware of the discharge. The permittee, to the extent known, shall provide the following information to the State Watch Office:
    - a) Name, address, and telephone number of person reporting;
    - b) Name, address, and telephone number of permittee or responsible person for the discharge;
    - c) Date and time of the discharge and status of discharge (ongoing or ceased);
    - d) Characteristics of the wastewater spilled or released (untreated or treated, industrial or domestic wastewater);
    - e) Estimated amount of the discharge;
    - f) Location or address of the discharge;
    - g) Source and cause of the discharge;
    - h) Whether the discharge was contained on-site, and cleanup actions taken to date;
    - i) Description of area affected by the discharge, including name of water body affected, if any; and
    - j) Other persons or agencies contacted
  - 2) Oral reports, not otherwise required to be provided pursuant to subparagraph b.1 above, shall be provided to the Department's Southeast District office within 24 hours from the time the permittee becomes aware of the circumstances.
- c. If the oral report has been received within 24 hours, the noncompliance has been corrected, and the noncompliance did not endanger health or the environment, the Department's Southeast District office shall waive the written report.

*[403.077(2)(d), F.S., 62-528.307(1)(e) and 62-528.307(1)(x), F.A.C.]*

#### 5. Pollution Notification

- a. In accordance with subsection 403.077, F.S., in the event of a reportable pollution release, an owner or operator of the installation at which the reportable pollution release occurs must provide to the department information reported to the State Watch Office within the Division of Emergency Management pursuant to any department rule, permit, order, or variance, within 24 hours after the owner's or operator's discovery of such reportable pollution release. The Department's Pollution Notice website is at <https://floridadep.gov/pollutionnotice>.
- b. If multiple parties are subject to the notification requirements based on a single reportable pollution release, a single notification made by one party in accordance with this section constitutes compliance on behalf of all parties subject to the requirement. However, if the notification is not made in accordance with this

section, the department may pursue enforcement against all parties subject to the requirement.

- c. If, after providing notice pursuant to paragraph (a), the owner or operator of the installation determines that a reportable pollution release did not occur or that an amendment to the notice is warranted, the owner or operator may submit a letter to the department documenting such determination.
- d. If, after providing notice pursuant to paragraph (a), the installation owner or operator discovers that a reportable pollution release has migrated outside the property boundaries of the installation, the owner or operator must provide an additional notice to the department that the release has migrated outside the property boundaries within 24 hours after its discovery of the migration outside of the property boundaries.

*[403.077(2)(d), F.S., 62-528.307(1)(e) and 62-528.307(1)(x), F.A.C.]*

#### **VIII. Emergency Disposal**

1. All applicable federal, state and local permits must be in place to allow for any alternate discharges due to emergency or planned outage conditions. *[62-528.415(4)(c)1, F.A.C.]*
2. Any proposed changes in emergency disposal methods shall be submitted to the Southeast District office and the APP Tallahassee office for review and approval prior to implementation. *[62-528.415(4)(c), F.A.C.]*
3. The emergency disposal method must be fully operational in the event of planned or emergency outages of the injection well system. *[62-528.415(4)(c)2, F.A.C.]*

#### **IX. Financial Responsibility**

1. The permittee shall maintain at all times the financial resources necessary to close, plug, and abandon the injection and associated monitor wells. *[62-528.435(9), F.A.C.]*
2. The permittee shall annually review the cost estimate for plugging and abandonment. Upon the occurrence of the plugging and abandonment cost estimate exceeding, by 10 percent or more on an annual basis, the cost estimate upon which the current financial responsibility is based, the permittee shall submit to the Department certified financial documentation necessary to amend, renew, or otherwise replace the existing financial responsibility pursuant to Rule 62-528.435(9)(b), F.A.C. and the conditions of this permit. *[62-528.435(9)(b), F.A.C.]*
3. In the event that the mechanism used to demonstrate financial responsibility should become insufficient or invalid for any reason, the permittee shall notify the APP Tallahassee office in writing within 14 days of such insufficiency or invalidation. The permittee shall within 90 days of said notification submit to the APP Tallahassee office for approval new financial documentation certifying either the remedy of current financial insufficiency or resolution of the financial instrument invalidation to comply with Rule 62-528.435(9)(b), F.A.C, and the conditions of this permit. *[62-528.435(9)(b), F.A.C.]*

### General Conditions

1. The terms, conditions, requirements, limitations and restrictions set forth in this permit are "permit conditions" and are binding and enforceable pursuant to section 403.141, F.S. *[62-528.307(1)(a), F.A.C.]*
2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action. *[62-528.307(1)(b), F.A.C.]*
3. As provided in subsection 403.087(7), F.S., the issuance of this permit does not convey any vested rights or exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor infringement of federal, state, or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in this permit. *[62-528.307(1)(c), F.A.C.]*
4. This permit conveys no title to land, water, does not constitute State recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title. *[62-528.307(1)(d), F.A.C.]*
5. This permit does not relieve the permittee from liability for harm to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties there from; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department. *[62-528.307(1)(e), F.A.C.]*
6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed and used by the permittee to achieve compliance with the conditions of this permit, or are required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules. *[62-528.307(1)(f), F.A.C.]*
7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at reasonable times, access to the premises where the permitted activity is located or conducted to:
  - a. Have access to and copy any records that must be kept under conditions of this permit;
  - b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and
  - c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.
  - d. Reasonable time will depend on the nature of the concern being investigated. *[62-528.307(1)(g), F.A.C.]*

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8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:
  - a. A description of and cause of noncompliance; and
  - b. The period of noncompliance, including dates and times; or, if not corrected the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent the recurrence of the noncompliance. The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.  
*[62-528.307(1)(h), F.A.C.]*
9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is proscribed by sections 403.111 and 403.73, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules. *[62-528.307(1)(i), F.A.C.]*
10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance; provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules. *[62-528.307(1)(j), F.A.C.]*
11. This permit is transferable only upon Department approval in accordance with rules 62-4.120 and 62-528.350, F.A.C. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department. *[62-528.307(1)(k), F.A.C.]*
12. This permit or a copy thereof shall be kept at the work site of the permitted activity. *[62-528.307(1)(l), F.A.C.]*
13. The permittee shall comply with the following:
  - a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records shall be extended automatically unless the Department determines that the records are no longer required.
  - b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.
  - c. Records of monitoring information shall include:
    - 1) the date, exact place, and time of sampling or measurements;
    - 2) the person responsible for performing the sampling or measurements;

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- 3) the dates analyses were performed;
  - 4) the person responsible for performing the analyses;
  - 5) the analytical techniques or methods used;
  - 6) the results of such analyses.
- d. The permittee shall furnish to the Department, within the time requested in writing, any information which the Department requests to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit.
- e. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.  
*[62-528.307(1)(m), F.A.C.]*
14. All applications, reports, or information required by the Department shall be certified as being true, accurate, and complete. *[62-528.307(1)(n), F.A.C.]*
15. Reports of compliance or noncompliance with, or any progress reports on, requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each scheduled date. *[62-528.307(1)(o), F.A.C.]*
16. Any permit noncompliance constitutes a violation of the Safe Drinking Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. *[62-528.307(1)(p), F.A.C.]*
17. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. *[62-528.307(1)(q), F.A.C.]*
18. The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit. *[62-528.307(1)(r), F.A.C.]*
19. This permit may be modified, revoked and reissued, or terminated for cause, as provided in 40 C.F.R. sections 144.39(a), 144.40(a), and 144.41 (1998). The filing of a request by the permittee for a permit modification, revocation or reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition. *[62-528.307(1)(s), F.A.C.]*
20. The permittee shall retain all records of all monitoring information concerning the nature and composition of injected fluid until five years after completion of any plugging and abandonment procedures specified under rule 62-528.435, F.A.C. The permittee shall deliver the records to the Department office that issued the permit at the conclusion of the retention period unless the permittee elects to continue retention of the records. *[62-528.307(1)(t), F.A.C.]*
21. All reports and other submittals required to comply with this permit shall be signed by a person authorized under rules 62-528.340(1) or (2), F.A.C. All reports shall contain the certification required in rule 62-528.340(4), F.A.C. *[62-528.307(1)(u), F.A.C.]*
22. The permittee shall notify the Department as soon as possible of any planned physical alterations or additions to the permitted facility. In addition, prior approval is required for activities described in rule 62-528.410(1)(h). *[62-528.307(1)(v), F.A.C.]*

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23. The permittee shall give advance notice to the Department of any planned changes in the permitted facility or injection activity which may result in noncompliance with permit requirements. *[62-528.307(1)(w), F.A.C.]*

24. The permittee shall report any noncompliance which may endanger health or the environment including:

- a. Any monitoring or other information which indicates that any contaminant may cause an endangerment to an underground source of drinking water; or
- b. Any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between underground sources of drinking water.

Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause, the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. *[62-528.307(1)(x), F.A.C.]*

Issued this 19<sup>th</sup> day of September 2025  
State of Florida  
Department of Environmental Protection

*Richard Lobinske*

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Richard Lobinske, Ph.D.  
Environmental Administrator  
Underground Injection Control  
Aquifer Protection Program  
Division of Water Resource Management

# GLADES WASTEWATER TREATMENT FACILITY INJECTION WELL IW-2

PREPARED FOR  
CITY OF PORT ST. LUCIE  
ST. LUCIE COUNTY, FLORIDA  
SECTION 17, TOWNSHIP 36S, RANGE 39E



VICINITY MAP

NTS

CITY OF PORT ST. LUCIE  
UTILITY SYSTEMS DEPARTMENT  
1001 S.E. PRINEVILLE STREET  
PORT ST. LUCIE, FL 34983  
PHONE (772) 873-6400  
FAX (772) 873-6433

OCTOBER 2025

KEVIN MATYJASZEK ..... UTILITY DIRECTOR

SHEET INDEX	
SHEET No.	SHEET TITLE
G-01	COVER
G-02	LEGEND AND NOTES
C-01	SITE PLAN
C-02	EXISTING WELL PROFILES AND PROPOSED WELL CONSTRUCTION PROFILE
M-01	INJECTION WELL NO. IW-2 PLAN AND PROFILE
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S-1	GENERAL STRUCTURAL NOTES ABBREVIATIONS AND SYMBOLS
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I-3	I&C DETAILS, SHEET 1
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PSLUD PROJECT: 63-0007



100% PLANS

CURTIS D. ROBINSON, PE

License No. 65685

G-01

HCE PROJ. No. 102\_2501

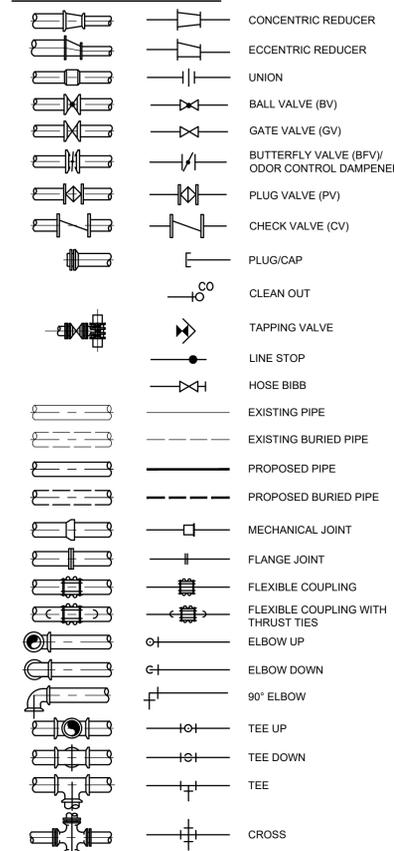
PSLUD PROJECT: 63-0007

GLADES WASTEWATER TREATMENT FACILITY INJECTION WELL IW-2

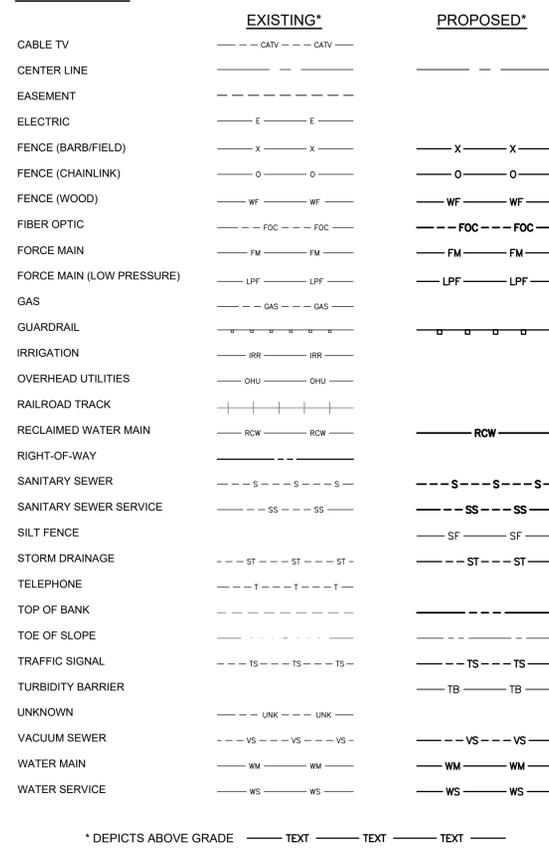
**GENERAL ABBREVIATIONS**

ABND	Abandon or Abandoned	MAX	Maximum
ACP	Asbestos Cement Pipe	MB	Mailbox
ADDL	Additional	MECH	Mechanical
AL	Alum	MH	Manhole
APPROX	Approximate	MIN	Minimum
ARV	Air Release Valve	MISC	Miscellaneous
ASP	Asph	MJ	Mechanical Joint
BFP	Backflow Preventer	ND	Nail and Disk
BFV	Butterfly Valve	No	Number
B/L	Base Line	NTS	Not to Scale
BLDG	Building	OC, O/C	On Center
BM	Benchmark	OD	Outside Diameter
BO	Blowoff	OHW	Overhead Wire
BOP	Bottom of Pipe	ORB	Official Records Book
CATV	Cable Television	PB	Plat Book
CB	Catch Basin	PE	Polyethylene Piping
CO	Cleanout	PGL	Profile Grade Line
CL	Center Line	PVC	Polyvinyl Chloride/Polyvinyl Chloride Pipe
CLF	Chain Link Fence	RC	Reinforced Concrete
CIP	Cast Iron Pipe / Cast in Place	RCP	Reinforced Concrete Pipe
CMP	Corrugated Metal Pipe	RCW	Reclaimed Water
CMC	Concrete	RED	Reducer
CONST	Construct/Construction	REINF	Reinforce/Reinforced
DE	Drainage Easement	RJ	Restrained Joint
DJ	Ductile Iron	RWM	Raw Water Main
DIP	Ductile Iron Pipe	R/W, ROW	Right of Way
DIA	Diameter	S-	Slope (FT/FT)/(Rise/Run)
DR	Dimensional Ratio/Drainage	SAN	Sanitary
DWY	Driveway	SCH/SCHEDULE	Schedule
EL	Elevation	SEC	Section
EP	Edge of Pavement	SF	Silt Fence
ESMT	Easement	SP	Sample Point
EOW	Edge of Water	SS	Sanitary Sewer
EX, EXIST	Existing	STA	Station
FDOT	Florida Department of Transportation	TBM	Temporary Benchmark
FH	Fire Hydrant	TEMP	Temporary
FL	Flanged	TOB	Top of Bank
FM	Force Main	TON	Top of Nut
FND	Found	TOP	Top of Pipe
FNPT	Female Nominal Pipe Thread	TOS	Toe of Slope
FPL	Florida Power and Light	TYP	Typical
FW	Finished Water	UE	Utility Easement
GPS	Global Positioning System	UEC	Underground Electric Conduit
GV	Gate Valve	UGE	Underground Electric
HB	Hose Bibb	UGT	Underground Telephone
HDD	Horizontal Directional Drill	UNK	Unknown
HDPE	High Density Polyethylene	W/	With (Combined Form)
HYD	Hydrant	WF	Wood Fence
ID	Identification/Inside Diameter	WM	Water Main or Water Meter
INV	Invert/Elevation	WPB	Wire Pullbox
IRC	Iron Rod & Cap	WTP	Water Treatment Plant
IRR	Irrigation	WV	Water Valve
LAE	Limited Access Easement	WWTP	Waste Water Treatment Plant
LF	Linear Feet		
LP	Light Pole		
LS	Lift Station		
LSA	Landscape Area		

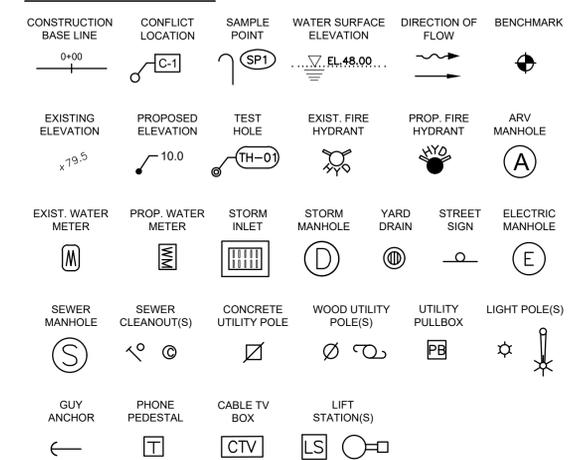
**PIPING SYMBOLOGY**



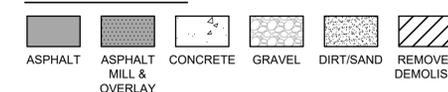
**LINETYPES**



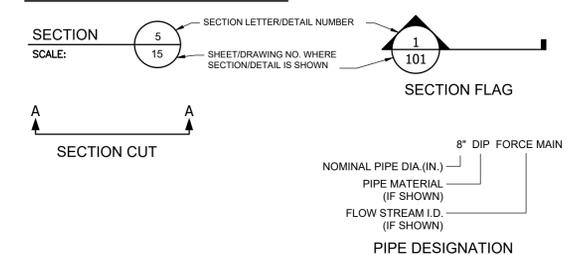
**CIVIL SYMBOLOGY**



**HATCH LEGEND**



**SECTION/DETAIL SYMBOL**



**SURVEYOR'S NOTES**

- SURVEY DATA MEETS OR EXCEEDS APPLICABLE ACCURACY REQUIREMENTS AND IS PREPARED ACCORDING TO THE STANDARDS OF PRACTICE SET FORTH BY THE FLORIDA ADMINISTRATIVE CHAPTER 5J-17 AS CODE, ADOPTED BY THE BOARD OF PROFESSIONAL SURVEYOR AND MAPPERS.
- THERE WAS NO ATTEMPT TO LOCATE ANY UNDERGROUND UTILITIES, EXCEPT AS SHOWN.
- LAST DATE OF DATA ACQUISITION: 4/19/2025
- BEARINGS SHOWN HEREON ARE BASED ON THE NORTH AMERICAN DATUM OF 1983 (NAD83), ADJUSTMENT OF 2011, FLORIDA STATE PLANE EAST ZONE. ALL OTHER BEARINGS ARE RELATIVE THERETO. FLORIDA DEPARTMENT OF TRANSPORTATION PERMANENT REFERENCE NETWORK WAS USED AS HORIZONTAL CONTROL AND GPS RTK WITH REDUNDANT MEASUREMENTS. HORIZONTAL ACCURACY IS 0.10 FOOT, PLUS OR MINUS.
- ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88), AS ESTABLISHED BY ST. LUCIE CONTROL POINT "MAPLE" HAVING A PUBLISHED ELEVATION OF 24.92' (NAVD88). BENCHMARK ELEVATIONS HAVE AN EXPECTED ACCURACY.
- CONTOUR AND SPOT ELEVATIONS DEPICTED ON THIS SURVEY WERE OBTAINED USING LIDAR METHODS WITH AN EXPECTED ACCURACY OF +/- 0.15'.

**LIDAR & PHOTOGRAMMETRIC FLIGHT NOTES & ACCURACY REPORT**

- THIS SITE WAS FLOWN DURING APRIL 4, 2025 UTILIZING A DJI MATRICE 350 UAV WITH A TRUEVIEW 537 3D DIGITAL IMAGING SYSTEM.
- FLIGHT PLANNING WAS PERFORMED WITH LITCHI MISSION HUB AND POST-PROCESSED USING LP 360 DRONE, AGISOFT METASHAPE, AND TRIMBLE BUSINESS CENTER.
- THE FLIGHT WAS FLOWN BY CERTIFIED REMOTE PILOT 5112060.
- GROUND ELEVATIONS WERE SPOT CHECKED WITH LEVELED OBSERVATION.
- LIDAR RELATIVE ACCURACY:
  - VERTICAL ACCURACY IS ±0.15' FOR OPEN AREAS ON HARD SURFACES
  - VERTICAL ACCURACY IS ±0.20' FOR OPEN AREAS ON SOFT SURFACES
  - VERTICAL ACCURACY IS ±0.50' FOR DENSE VEGETATION.
  - TOTAL POINTS COLLECTED: 12.8 MILLION
- PHOTOGRAMMETRIC ACCURACY:
  - GROUND SAMPLING DISTANCE 1.11 CM/PIXEL
  - TOTAL ROOT MEAN SQUARE DEVIATION (RSM): X: 0.10', Y: 0.10', Z: 0.15', XY 0.10', TOTAL ERROR: 0.15'
  - EXTRACTED TOPOGRAPHY SHOWN BASED ON A POINT CLOUD DENSITY OF : 21.9 POINTS/FT
- SURVEY DATA MEETS OR EXCEEDS THE AMERICAN SOCIETY FOR PHOTOGRAMMETRY AND REMOTE SENSING (ASPRS) ACCURACY STANDARDS FOR DIGITAL GEOSPATIAL DATA.
- PARCEL LINE WAS OBTAINED FROM ST. LUCIE PROPERTY APPRAISER ON 5/29/2025. THIS LINE IS PROVIDED AS A COURTESY REFERENCE AND THIS SURVEYOR DOES NOT CERTIFY TO THE LOCATION OF THIS LINE.
- NATIVE TREES 4" AND LARGER WERE LOCATED TO THE WEST OF THE PROJECT ON 5/29/2025.

**GENERAL NOTES:**

- CONTRACTOR IS RESPONSIBLE FOR ALL DEWATERING OPERATIONS AND RELATED PERMITS.
- CONTRACTOR SHALL SUBMIT PROPOSED SEQUENCE OF CONSTRUCTION PLAN FOR APPROVAL PRIOR TO COMMENCING CONSTRUCTION. THE SEQUENCE OF CONSTRUCTION PLAN SHALL DEMONSTRATE MAINTAINING EXISTING CONTINUITY OF SERVICES DURING CONSTRUCTION.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR POTHOLING, TEST PITS, ETC. IN THE VICINITY OF THE PROJECT WORK AREA TO LOCATE AND VERIFY THE EXISTING UTILITY LOCATIONS PRIOR TO INITIATING WORK. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT THE EXISTING UTILITIES DURING CONSTRUCTION.
- THE LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE AND ARE BASED UPON LIMITED RECORD DRAWING INFORMATION AND SURFACE SURVEY. CONTRACTOR SHALL VERIFY EXISTING HORIZONTAL AND VERTICAL LOCATION OF ALL UTILITY CROSSINGS AND FOR UTILITIES IN CLOSE PROXIMITY OF PROPOSED WORK.
- THE PROPOSED PIPING IS TO HAVE A MINIMUM 36" COVER UNLESS OTHERWISE NOTED.
- CONTRACTOR TO COORDINATE WITH CITY OF PORT ST. LUCIE A MINIMUM 48 HOURS PRIOR TO ANY TIE-INS OR INSPECTIONS.
- MINIMUM 7 DAY NOTICE REQUIRED FOR TIE-INS OR BYPASS PUMPING REQUIRING SHUT-DOWNS. REFER TO CONTRACT DOCUMENTS FOR ADDITIONAL REQUIREMENTS.
- CONTRACTOR TO ADEQUATELY RESTRAIN ALL EXISTING VALVES, FITTINGS, PIPES AND APPURTENANCES AS NECESSARY TO MAKE CONNECTIONS.
- DATUM CONVERSION: NAVD 88 + 1.447' = NGVD 29

**VERTICAL DATUM INFORMATION**  
 ALL ELEVATIONS SHOWN ARE IN NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) (NAVD88 + 1.447' = NGVD29)



REV	DATE	REVISIONS	BY

DATE: 10/02/25  
 DESIGN BY: HB  
 DRAWN BY: RR  
 CHECK BY: CR

VERIFY SCALE  
 BAR IS EQUAL TO ONE INCH ON ORIGINAL DRAWING  
 0 1  
 ADJUST ALL SCALED DIMENSIONS ACCORDINGLY

**HOLTZ CONSULTING ENGINEERS, INC.**  
 607 SW ST. LUCIE CRESCENT, SUITE 103  
 STUART, FLORIDA 34994  
 PH. (772) 919-4905  
 CERTIFICATE OF AUTH. No. 26960

**MMHC** McNABB-MILLER HYDROGEOLOGIC CONSULTING, INC.

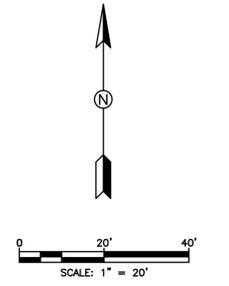
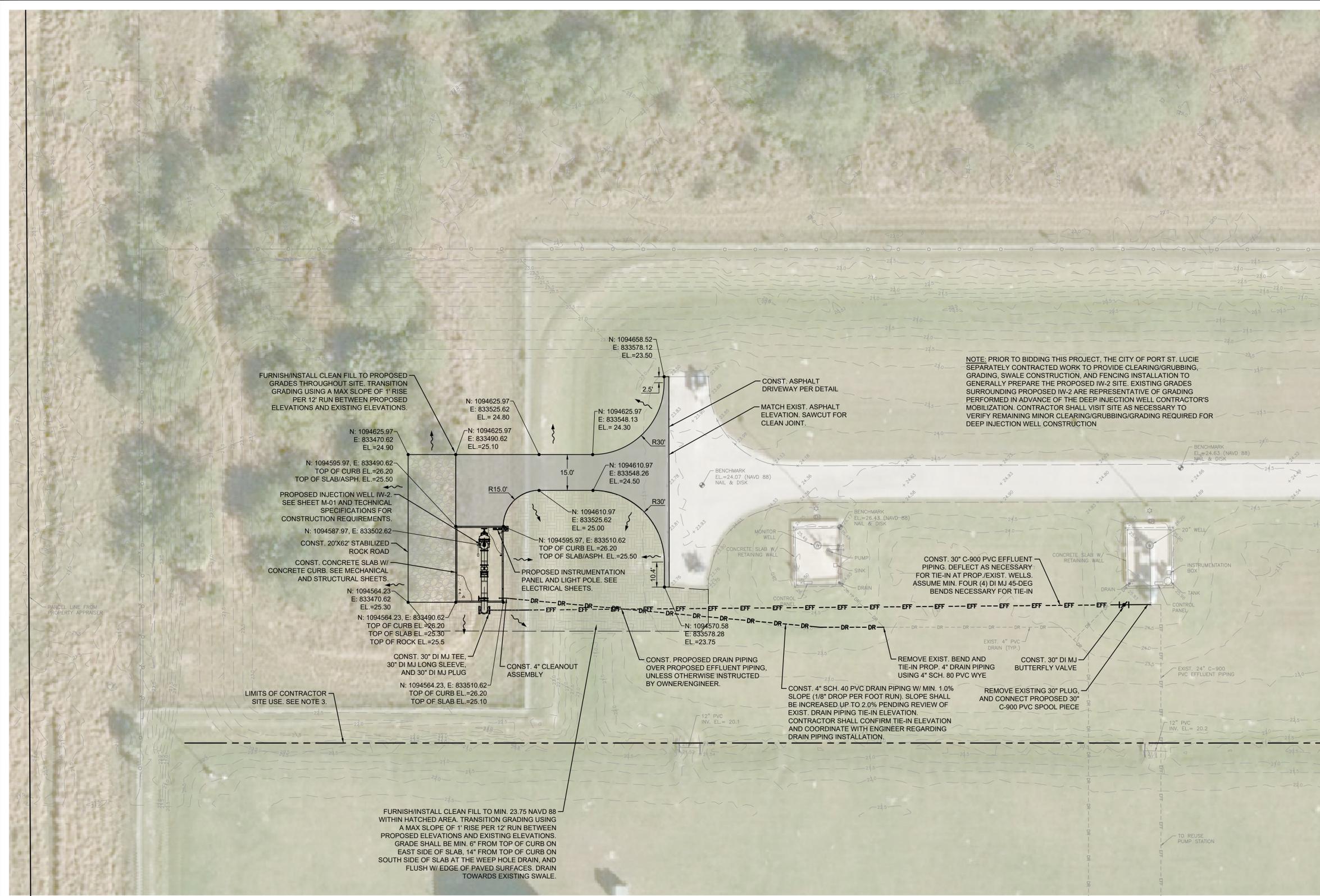
CURTIS D. ROBINSON, PE  
 LICENSE NO: 65685

CITY OF PORT ST. LUCIE  
 UTILITY SYSTEMS DEPARTMENT

GLADES WASTEWATER TREATMENT FACILITY  
 INJECTION WELL IW-2

LEGEND AND NOTES

SHEET NUMBER  
**G-02**  
 PSLUD PROJECT: 63-0007



- HATCH LEGEND**
- PROPOSED ASPHALT
  - PROPOSED CONCRETE
  - PROPOSED STABILIZED ROCK
  - PROPOSED CLEAN FILL / GRADING
  - DIRECTION OF DRAINAGE / NEGATIVE SLOPE

- NOTES:**
1. INSTALL CLEAN SOD FROM EDGES OF PROP. AND EXIST. FACILITIES TO 10' OUTSIDE LIMITS OF PROP. AND EXIST. FACILITIES. ALL OTHER AREAS CLEARED / GRADED AND/OR DISTURBED BY CONSTRUCTION SHALL BE SEED/MULCHED TO MATCH EXIST. CONTRACTOR SHALL WATER AS NECESSARY TO ESTABLISH SODDING.
  2. ALL FILL SHALL BE PLACED AND COMPACTED IN MAX 12" LIFTS. FILL SHALL BE COMPACTED TO 98% MAX DENSITY PER AASHTO T-180 IN FOOTPRINT OF PROP. PAVEMENT, CONCRETE, AND ROCK ROAD. FILL SHALL BE COMPACTED TO 95% MAX DENSITY PER AASHTO T-180 OUTSIDE FOOTPRINT OF PROP. PAVEMENT, CONCRETE, AND ROCK ROAD.
  3. CONTRACTOR USE OF GLADES WWTF SITE SHALL BE LIMITED TO FENCED AREAS NORTH OF PROPOSED DELINEATION. CONTRACTOR ACTIVITIES SHALL NOT DISRUPT OWNER ACCESS/OPERATION OF EXISTING DEEP INJECTION WELL, DUAL-ZONE MONITOR WELL, NOR OTHER WWTF FACILITIES. CONTRACTOR ACCESS, STAGING, EQUIPMENT SETUP, LAYDOWN, STORAGE, ETC. SHALL PROTECT EXISTING ABOVE-GRADE / BELOW-GRADE FACILITIES INCLUDING ASPHALT PAVEMENT, SWALES, CONCRETE, UTILITIES, ETC. ELECTRICAL INSTRUMENTATION, AND CONTROLS IMPROVEMENTS MAY EXTEND BEYOND THESE LIMITS BUT SHALL BE CONCENTRATED TO THE AREAS IMMEDIATELY SURROUNDING PROPOSED IMPROVEMENTS. CONTRACTOR SHALL RESTORE DISTURBED FACILITIES/AREAS TO EXISTING CONDITION OR BETTER AND TO THE OWNER'S SOLE SATISFACTION.
  4. CONTRACTOR SHALL COORDINATE SITE ACCESS WITH OWNER. CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING ALL SITES/FACILITIES IMPACTED BY CONTRACTOR ACCESS TO EXISTING CONDITIONS OR BETTER AND TO THE OWNER'S SOLE SATISFACTION.

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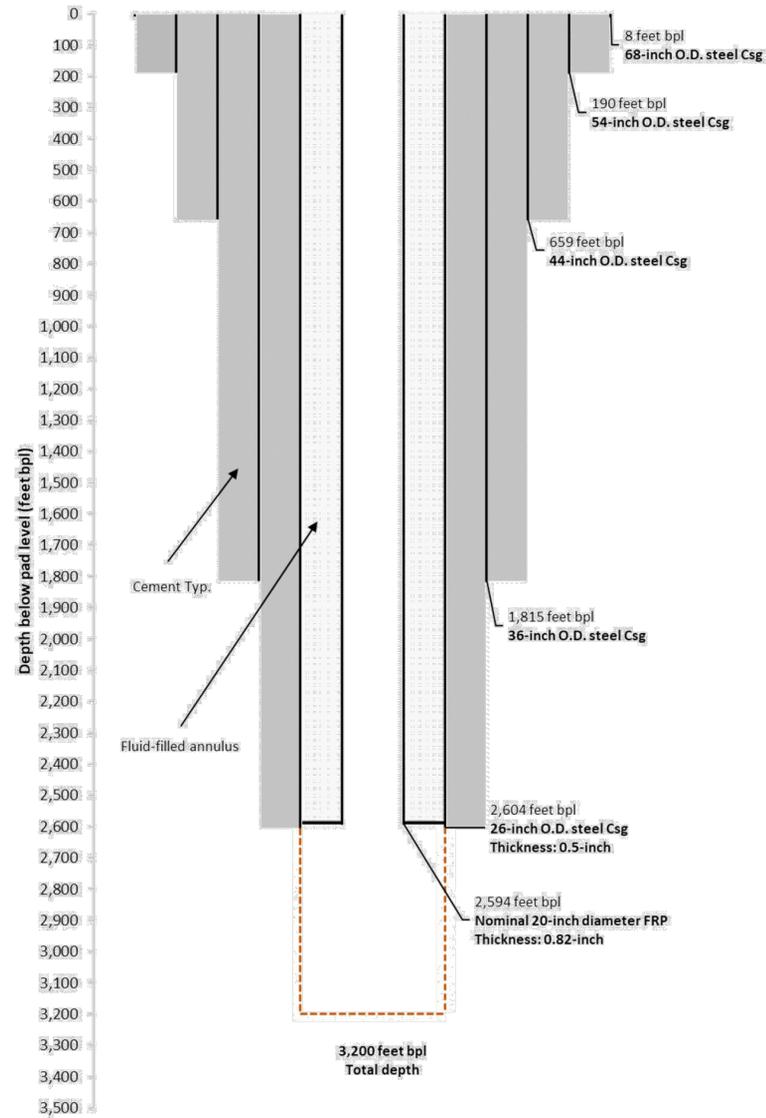
CITY OF PORT ST. LUCIE  
 UTILITY SYSTEMS DEPARTMENT

GLADES WASTEWATER TREATMENT FACILITY  
 INJECTION WELL IW-2

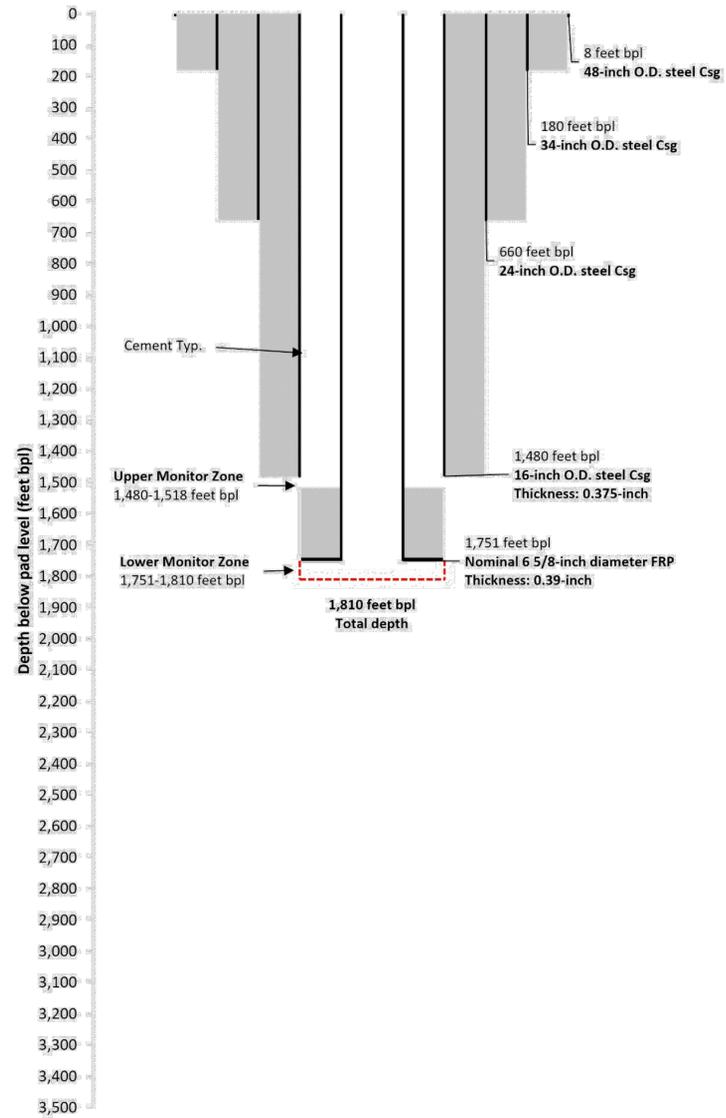
SITE PLAN

SHEET NUMBER  
**C-01**  
 PSLUD PROJECT: 63-0007

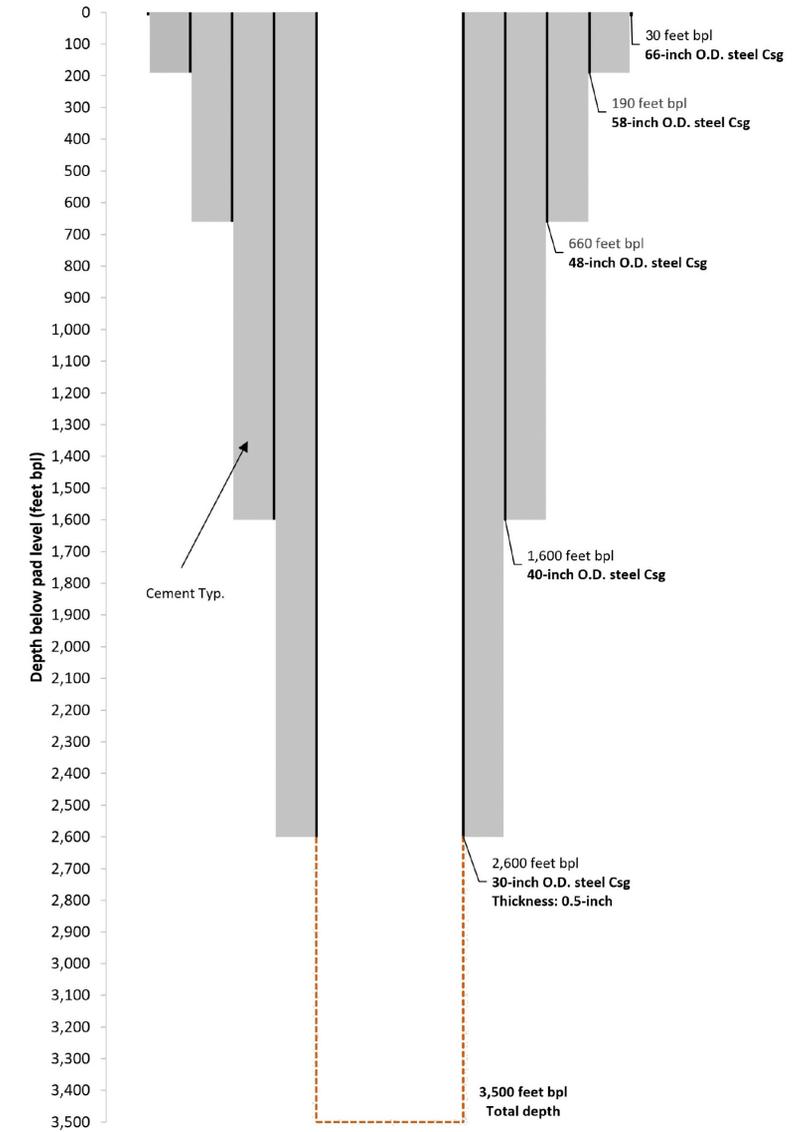
**Existing  
Well Diagram  
IW-1**



**Existing  
Well Diagram  
MW-1**



**Proposed  
Well Diagram  
IW-2**



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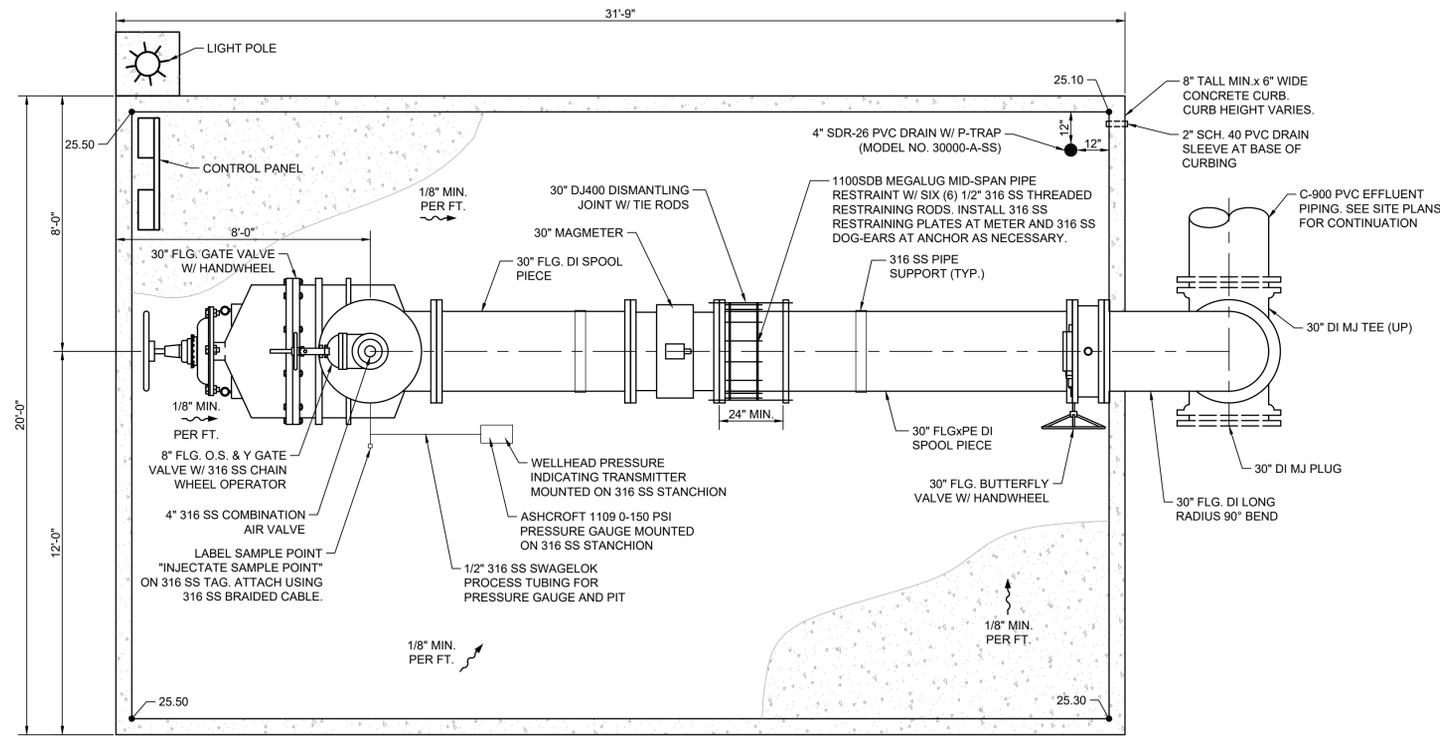
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CITY OF PORT ST. LUCIE  
 UTILITY SYSTEMS DEPARTMENT

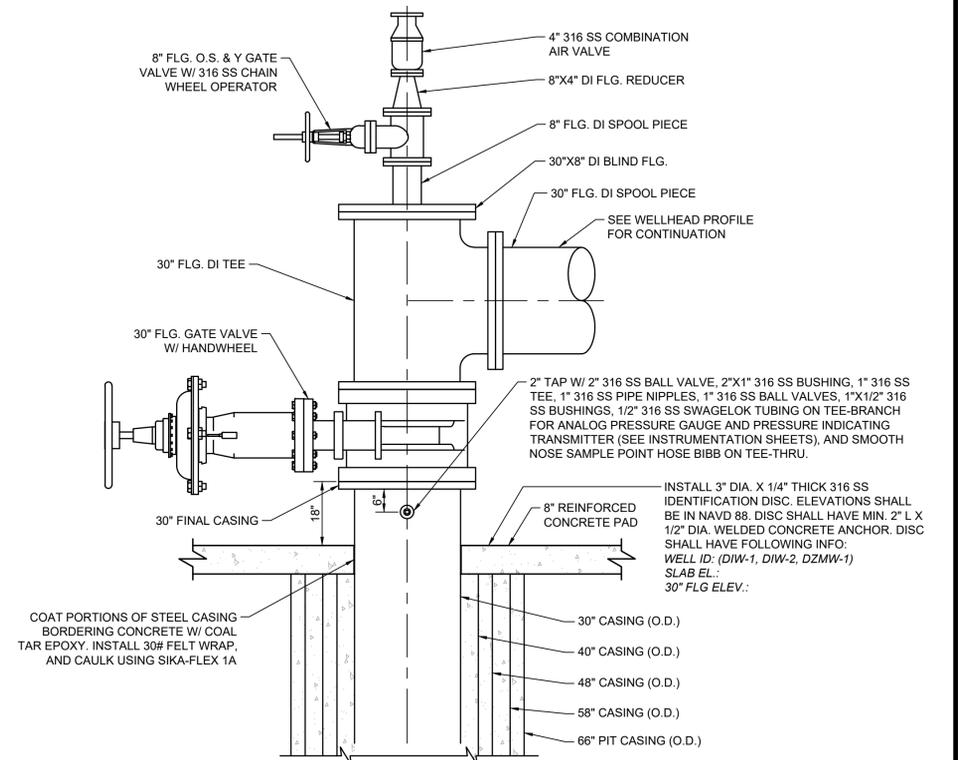
GLADES WASTEWATER TREATMENT FACILITY  
 INJECTION WELL IW-2

EXISTING WELL PROFILES AND  
 PROPOSED WELL CONSTRUCTION PROFILE

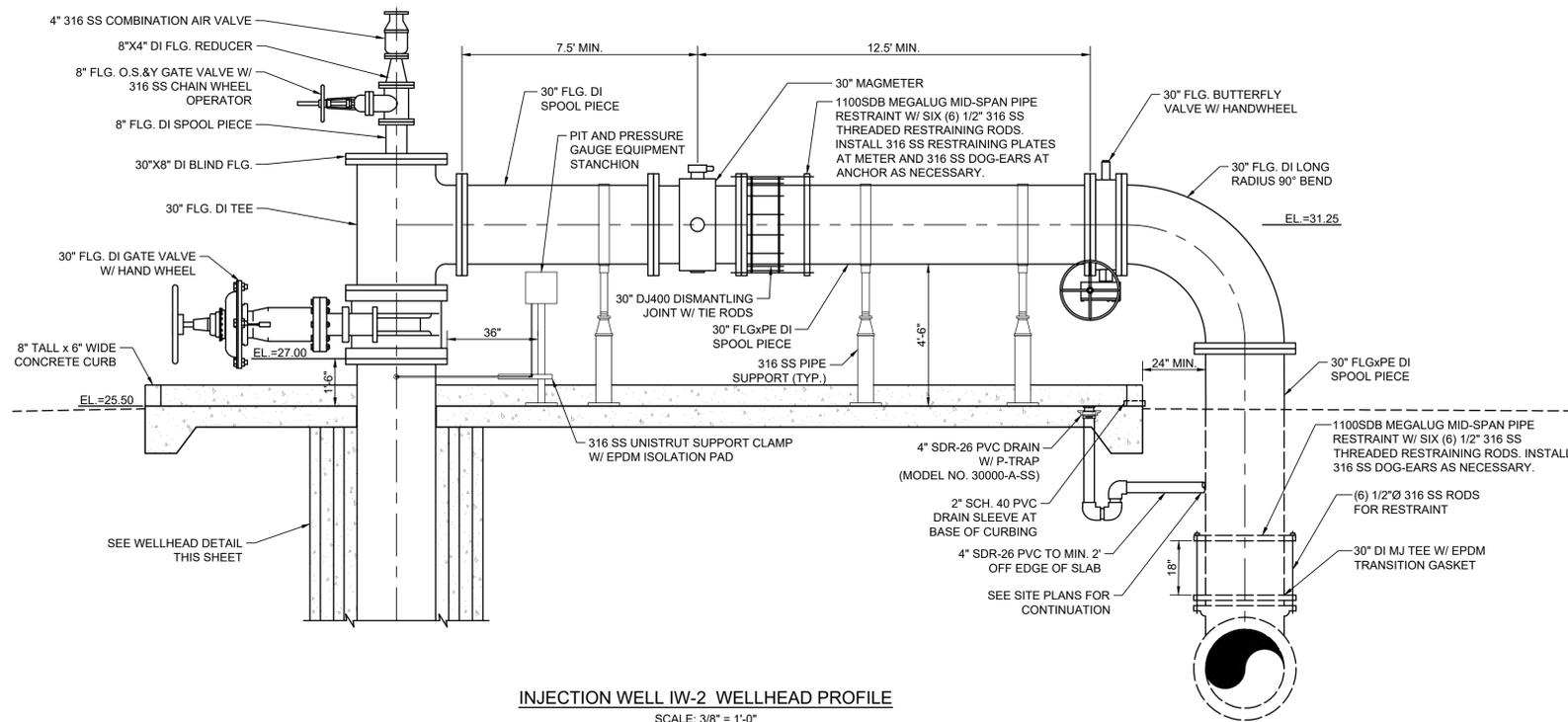
SHEET NUMBER  
**C-02**  
 PSLUD PROJECT: 63-0007



INJECTION WELL IW-2 WELLHEAD PLAN  
SCALE: 3/8" = 1'-0"



INJECTION WELL IW-2 WELLHEAD DETAIL  
SCALE: 1/2" = 1'-0"



INJECTION WELL IW-2 WELLHEAD PROFILE  
SCALE: 3/8" = 1'-0"

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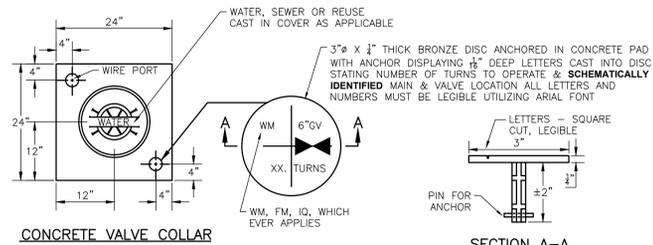
CURTIS D. ROBINSON, PE  
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CITY OF PORT ST. LUCIE  
 UTILITY SYSTEMS DEPARTMENT

GLADES WASTEWATER TREATMENT FACILITY  
 INJECTION WELL IW-2

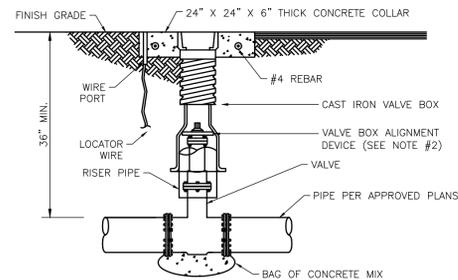
INJECTION WELL NO. IW-2  
 PLAN AND PROFILE

SHEET NUMBER  
**M-01**  
 PSLUD PROJECT: 63-0007



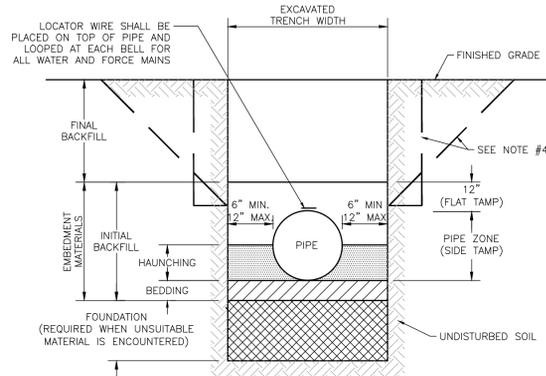
**CONCRETE VALVE COLLAR**

**SECTION A-A**



**TYPICAL VALVE BOX AND COLLAR IN UN-PAVED AREA**  
NOT TO SCALE

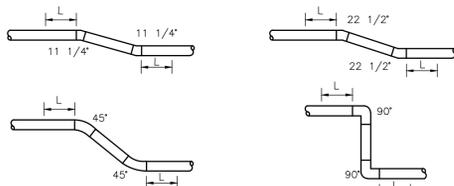
- NOTES:**
- WHEN TOP OF OPERATING NUT IS DEEPER THAN 30", A HIGH STRENGTH STEEL EXTENSION WILL BE REQUIRED TO BRING OPERATING NUT 24"-30" BELOW FINISHED GRADE. A STEEL CENTERING PLATE, WELDED TO THE EXTENSION, IS ALSO REQUIRED.
  - A VALVE BOX ALIGNMENT DEVICE SHALL BE PROVIDED TO ELIMINATE SHIFTING OF THE VALVE BOX AGAINST THE OPERATING NUT.
  - C900 OR SDR-26 P.V.C. RISER PIPE SHALL BE ADDED TO EXTEND THE VALVE BOX IF NEEDED.
  - RPM'S SHALL NOT BE INSTALLED IN CROSSWALKS OR PEDESTRIAN WALKWAYS.
  - THE TOP SIDE OF THE VALVE BOX COVER AND THE INSIDE OF TOP SECTION OF THE VALVE BOX SHALL BE PAINTED BLUE FOR WATER MAINS, GREEN FOR SEWER MAINS AND PURPLE FOR RECLAIMED WATER MAINS.



**STANDARD PIPE TRENCH CROSS SECTION**  
NOT TO SCALE

- NOTES:**
- FOR TRENCHES REQUIRING SHEETING, SHORING, STAY BRACING, TRENCH JACKS OR TRENCH BOX, DIMENSIONS SHALL BE TAKEN FROM THE INSIDE FACE OF THE SUPPORTS.
  - IF THE MAXIMUM TRENCH WIDTH MUST BE EXCEEDED, THE AREA OUTSIDE OF THE MAXIMUM EMBEDMENT SHALL BE COMPACTED TO FINAL BACKFILL REQUIREMENTS. IF THE PIPE IS INSTALLED IN A COMPACTED EMBANKMENT, THE EMBANKMENT SHALL BE IN PLACE AND COMPACTED TO 12" MIN. COVER BEFORE INSTALLATION OF PIPE.
  - IF BEDDING IS REQUIRED TO BRING TRENCH BOTTOM UP TO GRADE AND PROVIDE UNIFORM AND ADEQUATE LONGITUDINAL SUPPORT UNDER THE PIPE, THEN A MINIMUM COMPACTED DEPTH OF 4 TO 6 INCHES OF SELECT EMBEDMENT MATERIAL IS REQUIRED.
  - THE CONTRACTOR SHALL COMPLY WITH REQUIREMENTS OF THE FLORIDA TRENCH SAFETY ACT.
  - AN APPROVED LOCATOR WIRE SHALL BE USED.
  - EARTHWORK, EXCAVATION, BACKFILL AND COMPACTION SHALL BE IN ACCORDANCE WITH PLSUSD STANDARDS.

**VERTICAL BENDS**

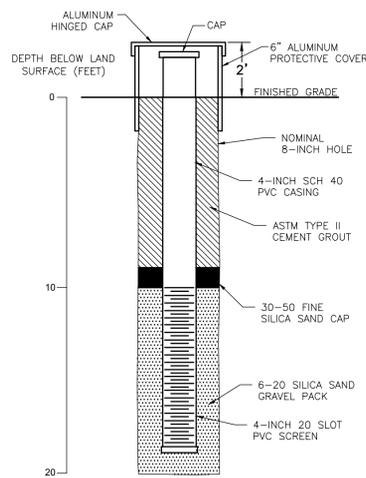


DIAMETER	VERTICAL OFFSET - L (FEET)							
	11-1/4"		22-1/2"		45"		90"	
	UPPER BEND	LOWER BEND	UPPER BEND	LOWER BEND	UPPER BEND	LOWER BEND	UPPER BEND	LOWER BEND
4"	4	2	8	3	17	5	39	11
6"	6	2	11	4	23	7	55	15
8"	8	2	15	4	30	9	72	20
10"	9	3	18	5	36	10	87	24
12"	11	3	21	6	43	12	102	28
14"	12	4	24	7	49	14	116	32
16"	13	4	27	8	55	16	131	36
18"	15	4	29	8	60	17	145	40
20"	16	5	32	9	66	19	158	44
24"	19	6	37	11	77	22	185	51
30"	22	7	45	13	92	26	222	62
36"	26	8	52	15	107	30	256	71
42"	29	8	58	16	120	34	289	80
48"	32	9	64	18	133	37	320	89

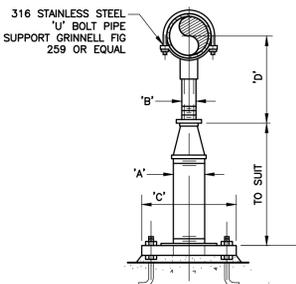
- NOTES:**
- THE REQUIREMENTS SET FORTH ABOVE WERE CALCULATED FOR PVC PIPE BASED UPON THE FOLLOWING ASSUMPTIONS:
    - SOIL CONDITIONS: SILTY SAND (SM)
    - TRENCH TYPE: 3 (PIPE BEDDED IN 4" MINIMUM OF LOOSE SOIL WITH BACKFILL LIGHTLY COMPACTED)
    - UPPER SIDE MINIMUM COVER: 3 FT
    - LOWER SIDE MINIMUM COVER: 5 FT
    - SAFETY FACTOR: 1.5
    - TEST PRESSURE: 150 PSI
  - WHEN CONDITIONS DIFFER FROM THE ABOVE, THE ENGINEER-OF-RECORD (EOR) SHALL SUBMIT CALCULATIONS FOR REVIEW AND APPROVAL OF PLSUSD.
  - ALL JOINTS BETWEEN UPPER AND LOWER BENDS SHALL BE RESTRAINED.

**PIPELINE RESTRAINT REQUIREMENTS (HORIZONTAL)**  
NOT TO SCALE

**PIPELINE RESTRAINT REQUIREMENTS (VERTICAL)**  
NOT TO SCALE



**PAD MONITOR WELL**  
NOT TO SCALE

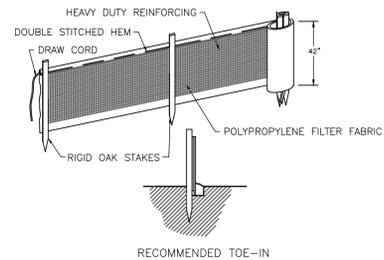


**316 STAINLESS STEEL 'U' BOLT PIPE SUPPORT GRINNELL FIG 259 OR EQUAL**

PIPE SIZE	316 SS ADJUSTABLE PIPE SUPPORTS APPROXIMATE DIMENSIONS IN INCHES							
	A	B	C	D MIN	D MAX			
2 1/2	2 1/2	1 1/2	9	8	11 1/2			
3	2 1/2	1 1/2	9	8 1/4	11 3/4			
3 1/2	2 1/2	1 1/2	9	8 1/2	12			
4	3	2 1/2	9	10 1/4	14			
6	3	2 1/2	9	11 5/8	15 1/4			
8	3	2 1/2	9	13 5/8	16 1/2			
10	3	2 1/2	9	14 5/8	18 1/4			
12	3	2 1/2	9	15 5/8	19 3/4			
14	4	3	11	18 5/8	20 3/4			
16	4	3	11	19 7/8	22 1/4			
18	6	3 1/2	13 1/2	21 1/4	24			
20	6	3 1/2	13 1/2	23 1/4	25 1/2			
24	6	4	13 1/2	26 1/2	28 1/4			
30	6	4	13 1/2	29 5/8	31 1/2			
32	6	4	13 1/2	30 5/8	32 3/4			
36	6	4	13 1/2	32 5/8	34 3/4			

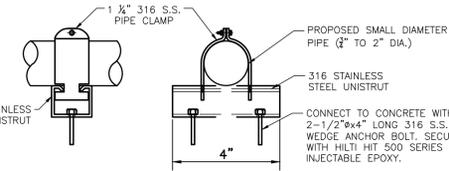
- NOTE:**  
UNDER VALVES, METERS OR OTHER SPECIAL APPURTENANCES A FABRICATED SUPPORT PEG MAY BE UTILIZED AS ACCEPTABLE TO ENGINEER

**ADJUSTABLE PIPE SUPPORT**  
NOT TO SCALE

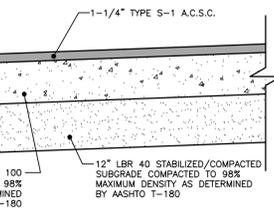


**SILT FENCE DETAIL**  
NOT TO SCALE

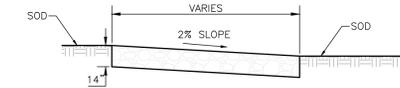
- NOTES:**
- SILT FENCE SHALL BE INSTALLED PER MANUFACTURERS SPECIFICATIONS PRIOR TO THE START OF CONSTRUCTION AND SHALL NOT BE REMOVED UNTIL CONSTRUCTION IS COMPLETE.
  - CONTRACTOR SHALL INSPECT AND REPAIR THE SILT FENCE AFTER EACH RAIN EVENT AND REMOVE SEDIMENT WHEN NECESSARY.
  - REMOVED SEDIMENT SHALL BE DEPOSITED IN AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFFSITE AND CAN BE PERMANENTLY STABILIZED.
  - THE SILT FENCE SHALL BE PLACED ON SLOPE CONTOUR TO MAXIMIZE ITS PONDING EFFICIENCY.
  - IF DITCH LEVEL IS DEEPER THAN 30", THEN A FLOATING SILT SCREEN SHALL BE USED.



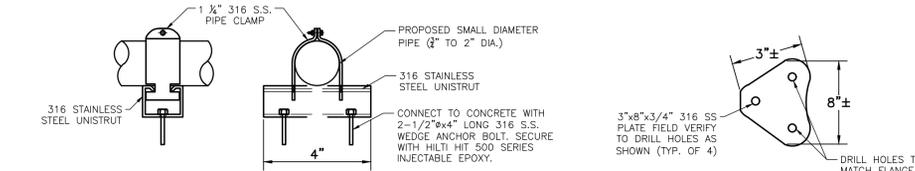
**SMALL DIAMETER PIPE SUPPORT DETAIL**  
NOT TO SCALE



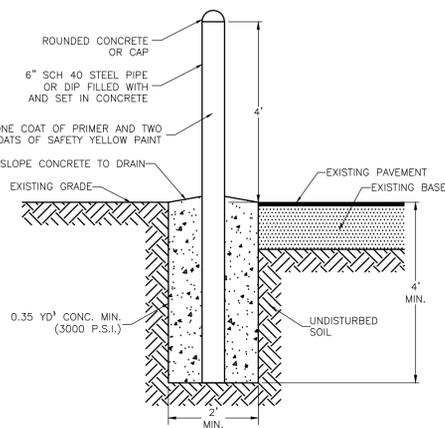
**ASPHALT PAVEMENT**  
NOT TO SCALE



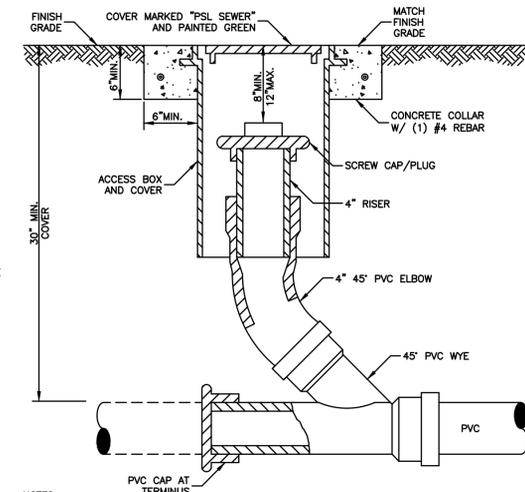
**TYPICAL 14" STABILIZED ROCK ROAD SECTION**  
NOT TO SCALE



**FLANGE RESTRAINT PLATE**  
NOT TO SCALE



**BOLLARD DETAIL**  
NOT TO SCALE



- NOTES:**
- AN ACCESS BOX AND COVER SHALL BE USED.
  - CLEANOUT ASSEMBLY SHALL BE INSTALLED AT A MAXIMUM 75' INTERVALS AND AT TERMINAL POINT OF THE PLSUSD RESPONSIBILITY. THE LOCATION SHALL BE IN ACCORDANCE WITH THE PLSUSD UTILITY STANDARDS.

**CLEANOUT DETAIL**  
NOT TO SCALE

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 UTILITY SYSTEMS DEPARTMENT

**GLADES WASTEWATER TREATMENT FACILITY**  
 INJECTION WELL IW-2

**DETAILS**

**D-01**

PLSUSD PROJECT: 63-0007

SHEET NUMBER

**D-01**

PLSUSD PROJECT: 63-0007

## GENERAL STRUCTURAL NOTES

APPLIES TO "S" SHEETS ONLY

### GENERAL CONDITIONS

- ALL MATERIAL AND CONSTRUCTION SHALL COMPLY WITH THE 2020 FLORIDA BUILDING CODE.
- ALL STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH THE MECHANICAL, CIVIL, AND ELECTRICAL DRAWINGS.
- 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.
- FOR ALL ITEMS EMBEDDED IN OR PASSING THROUGH CONCRETE OR MASONRY, THE CONTRACTOR SHALL INITIALLY REFER TO MECHANICAL AND ELECTRICAL DRAWINGS FOR TYPE, SIZE, LOCATION, AND SPECIAL INSTALLATION REQUIREMENTS FOR THESE ITEMS.
- 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.
- ANY EQUIPMENT THAT MAY INDUCE VIBRATION TO THE STRUCTURE SHALL BE ADEQUATELY ISOLATED FROM THE STRUCTURE.
- 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.
- STANDARD DETAILS APPLY TO ALL SIMILAR SITUATIONS ON THE PROJECT EXCEPT WHERE A DIFFERENT DETAIL IS SHOWN.
- ANY DISCREPANCIES ON THE DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO COMMENCING WORK.
- IN NO CASE SHALL WORKING DIMENSIONS BE SCALED FROM THE PLANS, SECTIONS OR DETAILS ON THE DRAWINGS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE PROPER DISPOSAL OF ALL MATERIALS AND DEBRIS REMOVED FROM THE PROJECT SITE. DISPOSAL OF THE MATERIALS AND DEBRIS SHALL CONFORM WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS.
- CONTRACTOR SHALL PROTECT EXISTING STRUCTURES, ROADWAYS, AND UTILITIES. RESTORE ALL EXISTING FACILITIES AND DISTURBED AREAS TO EQUAL OR BETTER CONDITION THAN THE ORIGINAL CONDITION.

### DESIGN CRITERIA

#### BUILDING CODES AND REFERENCES:

- 2023 FLORIDA BUILDING CODE (FBC), EIGHTH EDITION
- REINFORCED CONCRETE: ACI 318-19 "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE"
- LIVE LOADS:
 

EQUIPMENT SLAB-ON-GRADE	250 PSF
-------------------------	---------
- WIND DESIGN CRITERIA:
 

RISK CATEGORY	III
ULTIMATE DESIGN WIND SPEED, V <sub>ULT</sub>	170 MPH
NOMINAL DESIGN WIND SPEED, V <sub>ASD</sub>	132 MPH
EXPOSURE CATEGORY	C
ENCLOSURE CATEGORY	-
INTERNAL PRESSURE COEFFICIENT:	-

### FOUNDATIONS

#### GEOTECHNICAL REPORT:

SUBSURFACE SOIL EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION "DEEP INJECTION WELL EQUIPMENT PADS GLADES WWTP & RANGELINE WTP" PREPARED BY ANDERSEN ANDRE CONSULTING ENGINEERS, INC. (AAEC), AAEC FILE NO. 25-119, DATED AUGUST 13, 2025. ANY INTERPRETATION OF THE CONTENTS OF THE GEOTECHNICAL REPORT IS THE RESPONSIBILITY OF THE CONTRACTOR.

#### FOUNDATION DESIGN:

MAXIMUM ALLOWABLE SOIL NET BEARING PRESSURE USE FOR DESIGN IS 1,500 PSF OR LESS.

#### SUBGRADE COMPACTION REQUIREMENTS:

- ALL SLABS ARE TO BE CAST OVER WELL-COMPACTED SUBGRADE. THE UPPER 1FT OF THE GRANULAR MATERIAL SHALL BE COMPACTED TO 98 PERCENT OF THE MODIFIED PROCTOR MAXIMUM DRY DENSITY PER ASTM D1557. PROVIDE STRUCTURAL FILL AS REQUIRED TO ACHIEVE THE DESIRED FOUNDATION ELEVATION AND WHERE UNSUITABLE SOILS AND MATERIALS ARE ENCOUNTERED AND REQUIRE REMOVAL AND REPLACEMENT. SUITABILITY OF SOILS SHALL BE DETERMINED BY THE ONSITE GEOTECHNICAL REPRESENTATIVE. STRUCTURAL FILL SHALL BE CLEAN GRANULAR FILL FREE OF ANY ORGANICS AND DELETERIOUS MATERIAL HAVING LESS THAN 12 PERCENT MATERIAL PASSING THE NO. 200 MESH SIEVE AND CONTAINING LESS THAN 4 PERCENT ORGANIC MATERIAL. STRUCTURAL FILL SHALL BE PLACED IN LOOSE LIFTS NOT EXCEEDING 8 INCHES IN THICKNESS. STRUCTURAL FILL SHALL BE COMPACTED TO 98 PERCENT OF THE MODIFIED PROCTOR MAXIMUM DRY DENSITY PER ASTM D1557.
- IF SHALLOW GROUNDWATER LEVELS ARE ENCOUNTERED CONTRACTOR SHALL PROVIDE TEMPORARY DEWATERING AS REQUIRED TO MAINTAIN GROUNDWATER LEVEL AT LEAST 2 FEET BELOW THE BOTTOM OF COMPACTED SOIL SURFACE. DEWATERING SYSTEMS AND MEASURES SHALL BE DETERMINED BY THE CONTRACTOR.

### CONCRETE (CAST-IN-PLACE)

- ALL MATERIALS AND METHODS OF CONSTRUCTION SHALL BE IN ACCORDANCE WITH ACI 318 REQUIREMENTS.
- ALL CONCRETE SHALL BE AIR-ENTRAINED WITH A MINIMUM OF 4,000 PSI COMPRESSIVE STRENGTH AT 28 DAYS UNLESS OTHERWISE NOTED.
- MIX DESIGN REQUIREMENTS:
  - PORTLAND CEMENT: TYPE I/II OR TYPE III IN ACCORDANCE WITH ASTM C150.
  - WATER TO CEMENT RATIO : 0.45 MAX
  - FINE AGGREGATE: CLEAN AND NATURAL SAND IN ACCORDANCE WITH ASTM C33
  - COURSE AGGREGATE: #57 STONE IN ACCORDANCE WITH ASTM C33
  - FLY ASH: CLASS F OR CLASS N IN ACCORDANCE WITH ASTM C618, 25 PERCENT MAXIMUM CEMENT REPLACEMENT
  - AIR ENTRAINMENT: ENTRAPPED AIR
  - WATER REDUCER ADMIXTURE: TYPE A OR TYPE D IN ACCORDANCE WITH ASTM C494.
  - SLUMP RAGE: 3.5 IN TO 5IN
  - ALL ADMIXTURES SHALL BE FURNISHED BY THE SAME MANUFACTURER AND SHALL BE FREE OF CHLORIDES AND ALKALIS.
- WATER REDUCING AGENT SHALL BE IN ACCORDANCE WITH ASTM C494.
- ALL CONCRETE SURFACES EXPOSED TO AIR, UNLESS OTHERWISE NOTED IN THE SPECIFICATIONS, SHALL BE TREATED WITH AN APPROPRIATE CURING METHOD FOR A MINIMUM OF 7 DAYS AFTER PLACEMENT AS DESCRIBED BELOW AS SOON AS FINISHING IS COMPLETED OR FORMS ARE REMOVED.
  - WATER CURING: KEEP ENTIRE CONCRETE SURFACE WET BY PONDING, CONTINUOUS SPRINKLING OR COVER WITH SATURATED BURLAP, MAINTAIN 24 HOURS A DAY.
  - SHEET MATERIAL CURING: COVER ENTIRE SURFACE WITH APPROVED SHEET MATERIAL.
  - LIQUID MEMBRANE CURING: APPLY OVER ENTIRE CONCRETE SURFACE EXCEPT FOR SURFACES TO RECEIVE ADDITIONAL CONCRETE OR WHERE SEALER OR SURFACE COATINGS ARE TO BE USED. APPLY IN COMPLIANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- CURING SCHEDULE: STRUCTURAL SLABS: WATER CURE OR SHEET CURE
- FINISH SCHEDULE STRUCTURAL SLABS: FLOAT FINISH
- ALL EXPOSED CORNERS SHALL HAVE A MINIMUM CHAMFER OF 3/4" UNLESS OTHERWISE NOTED.

### REINFORCING STEEL

- REINFORCEMENT SHALL CONFORM TO ASTM A615, GRADE 60 REQUIREMENTS. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A315 REQUIREMENTS. ALL ACCESSORIES SHALL BE IN CONFORMANCE WITH ACI 315 REQUIREMENTS.
- REINFORCING STEEL SHALL HAVE THE FOLLOWING CLEAR COVER UNLESS OTHERWISE NOTED:
  - CONCRETE CAST AGAINST EARTH 3"
  - ALL OTHER FORMED SURFACES 2"
- LAP SPLICES SHALL BE AS SHOWN ON THE DRAWINGS. FOR LAP SPLICES NOT SHOWN ON THE DRAWINGS, THE CONTRACTOR SHALL OBTAIN ENGINEERS APPROVAL.
- THE CONTRACTOR SHALL PREPARE PLACING DRAWINGS AND SCHEDULES IN CONFORMANCE WITH ACI 315 REQUIREMENTS.

### STAINLESS STEEL

- STAINLESS STEEL PLATES, SHEETS AND STRUCTURAL SHAPES SHALL BE IN ACCORDANCE TO ASTM A240.
- STAINLESS STEEL MATERIALS SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE:
  - EXTERIOR AND SUBMERGED USE: TYPE 316, TYPE 316L (WHERE WELDED)
- ALL WELDING OF STRUCTURAL STAINLESS STEEL SHALL CONFORM TO "STRUCTURAL WELDING CODE - STAINLESS STEEL", ASW D1.6, LATEST EDITION.
- STAINLESS STEEL BOLTS, NUTS AND WASHERS SHALL BE TYPE 316 IN ACCORDANCE TO ASTM F593 UNLESS NOTED OTHERWISE.

### ADHESIVE ANCHORS

- ALL ANCHORS AND REINFORCEMENT DOWELS TO BE INSERTED INTO DRILLED HOLES FILLED WITH DEWALT PURE 110 PLUS EPOXY ADHESIVE IN ACCORDANCE WITH (ICC ESR-3298). INSTALLATION OF ADHESIVE ANCHORS SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS PROVIDED WITH THE PACKAGING OF THE ADHESIVE. CONTRACTOR SHALL VERIFY HOLE DIAMETER AND CLEAN-OUT REQUIREMENTS.

### SHOP DRAWING SUBMITTALS:

THE FOLLOWING SHOP DRAWING SUBMITTALS AT A MINIMUM ARE TO BE PROVIDED BY THE CONTRACTOR TO ENGINEER (WEKIVA ENGINEERING LLC) FOR REVIEW. SUBMITTALS MUST BE APPROVED BY PROJECT EOR PRIOR TO PROCURING OR INSTALLATION OF MATERIALS. SUBMITTALS SHALL BE IN ACCORDANCE WITH THE CONTRACTOR DOCUMENTS.

- CONCRETE MIX DESIGN
- CONCRETE REINFORCEMENT PLACEMENT SHOP DRAWINGS
- CONCRETE JOINT ACCESSORIES
- EPOXY ADHESIVE

## STRUCTURAL ABBREVIATIONS

&	AND	EXIST	EXISTING	PEMB	PRE-ENGINEERED
@	AT	EXP	EXPANSION	PERP	METAL BUILDING
#	NUMBER	FE	FIRE EXTINGUISHER	PL	PERPENDICULAR
ADDTL	ADDITIONAL	FF	FAR FACE, FINISHED	PLF	PLATE
AFF	ABOVE FINISHED	FG	FLOOR	PLF	POUND PER LINEAR
ALUM	FLOOR	FRP	FINISHED GRADE	PT	FOOT
AEVS	ALUMINUM	FRP	FIBER REINFORCED	PT	PRESSURE TREATED
	AUTOMATIC END		PLASTIC	PROJ	PROJECTION
ALT	WELDED STUD(S)	FT	FOOT	PSF	POUNDS PER SQUARE
APROX	ALTERNATE	FTG	FOOTING	PSI	FOOT
BLD	APPROXIMATE(LY)	FV	FIELD VERIFY		POUNDS PER SQUARE
BM	BUILDING	GA	GAGE		INCH
BOT	BEAM	GALV	GALVANIZED	PVC	POLYVINYL CHLORIDE
CJ	BOTTOM	HK	HOOK	R	RADIUS
CL	CONTROL JOINT	HORIZ	HORIZONTAL	REINF	REINFORCING
CLR	CENTER LINE	HSS	HOLLOW STRUCTURAL	REQD	REQUIRED
CMU	CLEAR		SECTION	RO	ROUGH OPENING
	CONCRETE MASONRY	HP	HIGH POINT	SCHED	SCHEDULE(D)
	UNIT	ID	INSIDE DIAMETER	SIM	SIMILAR
COL	COLUMN	JT	JOINT	SJ	SAWCUT JOINT
CONC	CONCRETE	LB(S)	POUND(S)	SMS	SHEET METAL SCREW
CONN	CONNECTION	LONG	LONGITUDINAL	SPECS	SPECIFICATIONS
CONST JT	CONSTRUCTION JOINT	LP	LOW POINT	SQ	SQUARE
CONT	CONTINUOUS	MANUF	MANUFACTURER	SS	STAINLESS STEEL
CTR	CENTER	MATL	MATERIAL	STD	STANDARD
DIA	DIAMETER	MAX	MAXIMUM	STL	STEEL
DIM	DIMENSION	MECH	MECHANICAL	T	TOP OF
DEG	DEGREE(S)	MFR	MANUFACTURER	TB	TIE BEAM
DO	DITTO	MIN	MINIMUM	T&B	TOP AND BOTTOM
DWG	DRAWING	MISC	MISCELLANEOUS	THK	THICK
DWL	DOWEL(S)	MO	MASONRY OPENING	THRU	THROUGH
(E)	EXISTING	MTL	METAL	TOC	TOP OF CONCRETE
EA	EACH	NO	NUMBER	TOS	TOP OF STEEL
EF	EACH FACE	NTS	NOT TO SCALE	TYP	TYPICAL
EJ	EXPANSION JOINT	OC	ON CENTER	UNO	UNLESS NOTED
EL	ELEVATION	OD	OUTSIDE DIAMETER		OTHERWISE
ELEC	ELECTRICAL	OH	OPPOSITE HAND	VERT	VERTICAL
EMBED	EMBEDMENT	OPNG	OPENING	WT	WEIGHT
EQ	EQUAL	PCS	PIECES	WWF	WELDED WIRE FABRIC
EW	EACH WAY				

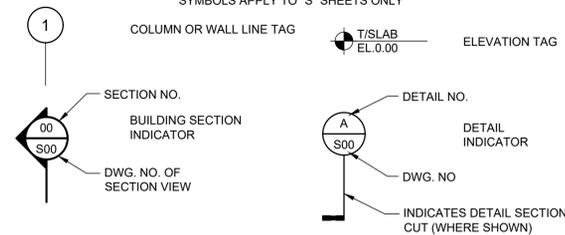
## LEGEND

STRUCTURAL LEGEND APPLIES TO "S" SHEETS ONLY

EARTH FILL UNDISTURBED EARTH COMPACTED GRANULAR FILL GROUT OR SAND (AS NOTED) GRATING	CONCRETE EXISTING CONCRETE DEMOLITION STEEL PRECAST CONCRETE
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## SYMBOLS

SYMBOLS APPLY TO "S" SHEETS ONLY



CITY OF PORT ST. LUCIE  
UTILITY SYSTEMS DEPARTMENT

GLADES WASTEWATER TREATMENT PLANT  
INJECTION WELL SYSTEM

GENERAL STRUCTURAL NOTES,  
ABBREVIATIONS AND SYMBOLS

SHEET NUMBER

S-1

PSLUD PROJECT: 63-0007

REV	DATE	REVISIONS	BY

DATE: 10/3/25	DESIGN BY: DSM
DRAWN BY: JAW	CHECK BY: DSM
VERIFY SCALE	
BAR IS EQUAL TO ONE INCH ON ORIGINAL DRAWING	
0 1	
ADJUST ALL SCALED DIMENSIONS ACCORDINGLY	

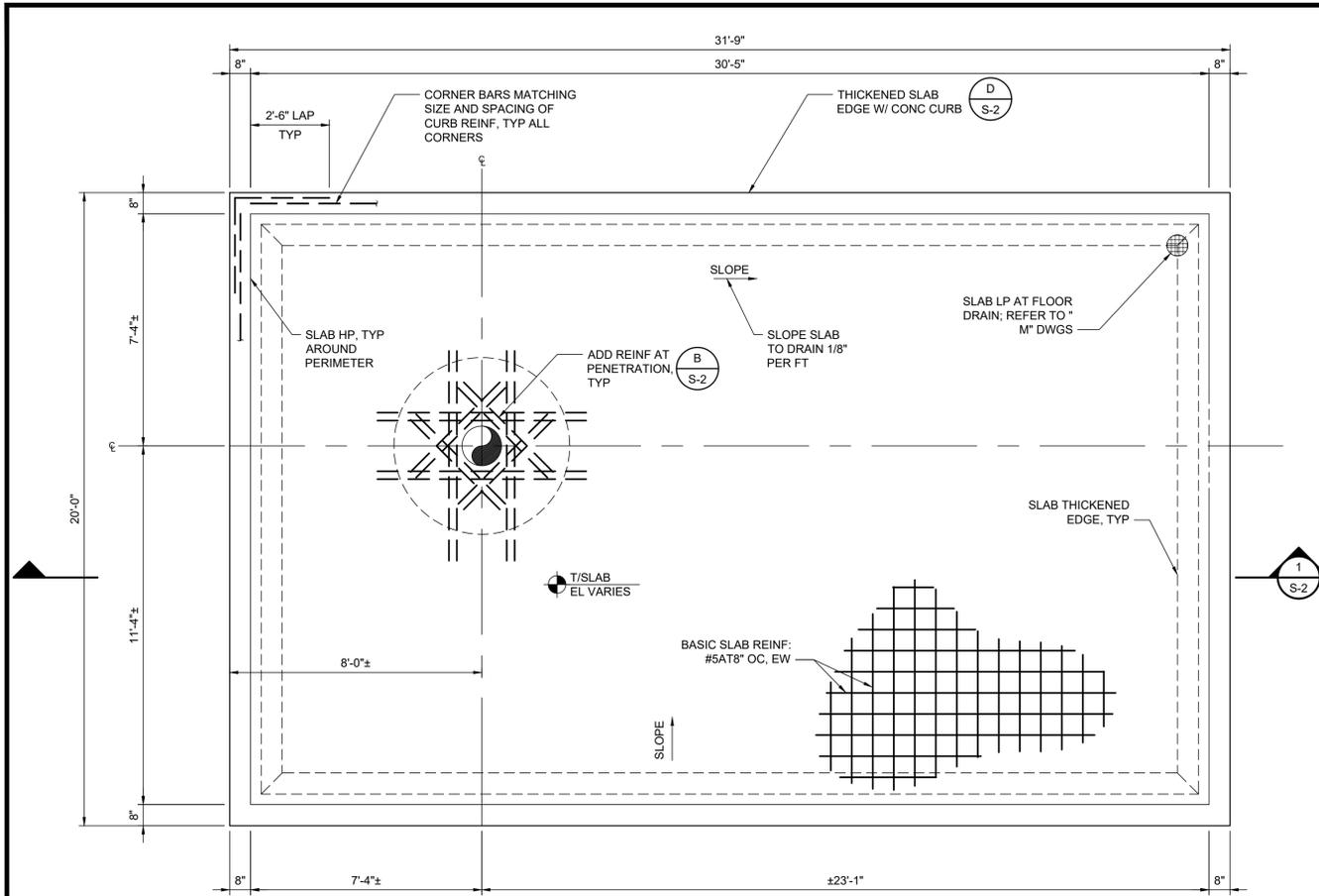
**HOLTZ CONSULTING ENGINEERS, INC.**  
 270 SOUTH CENTRAL BLVD., SUITE 207  
 JUPITER, FLORIDA 33458  
 PH. (561) 575-2005  
 CERTIFICATE OF AUTH. No. 26960

DAVID S. MORRIS, PE  
 LICENSE NO: 74717

WE

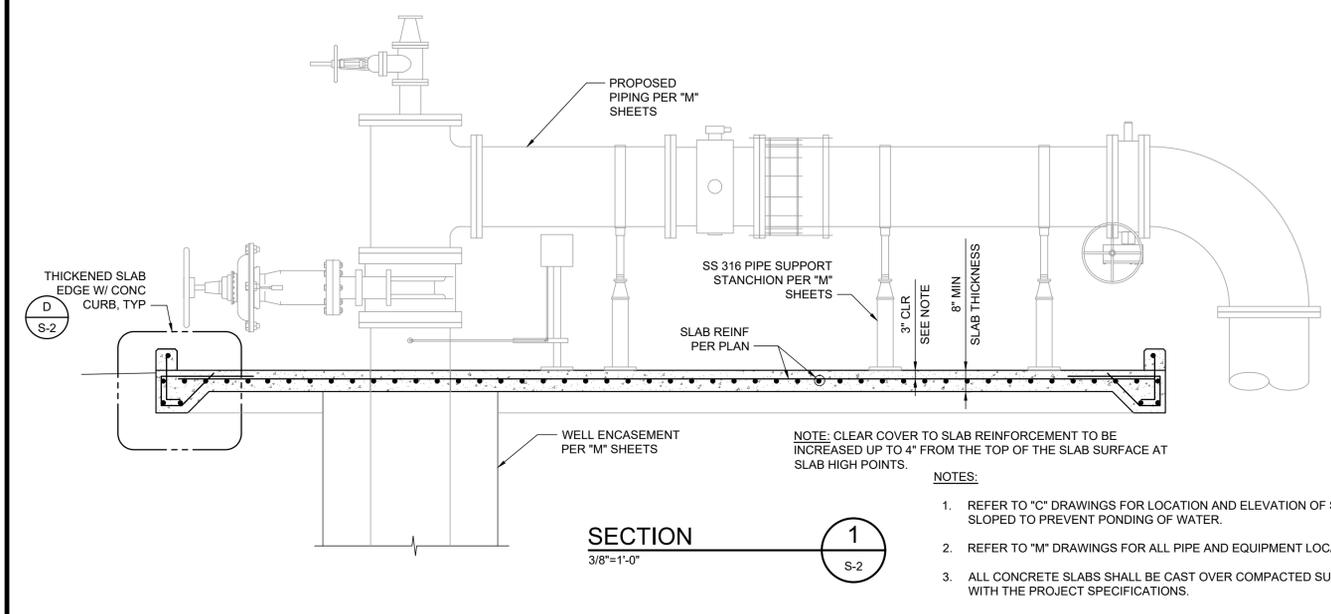
WEKIVA  
ENGINEERING

1320 WILFRED DRIVE  
ORLANDO, FL 32803  
PH: 407.219.4454  
WEKIVA PROJ. NO. 25-110  
FL ENG BUSINESS NO. 31920



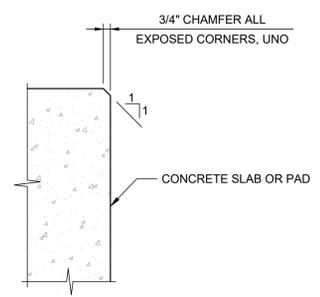
**WELLHEAD SLAB PLAN**  
**PLAN**  
 3/8"=1'-0"

\*VERIFY PIPE SUPPORT LOCATIONS DURING SHOP DRAWING REVIEW

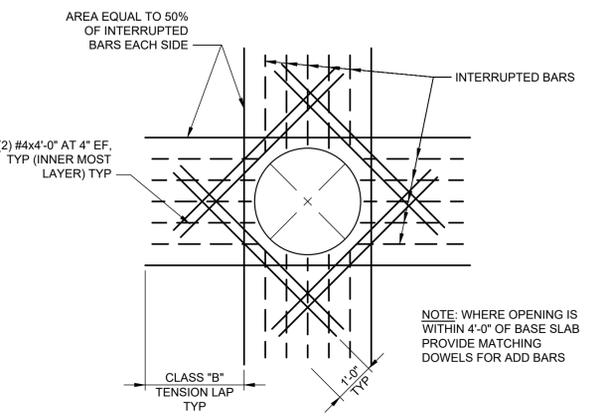


**SECTION**  
 3/8"=1'-0"

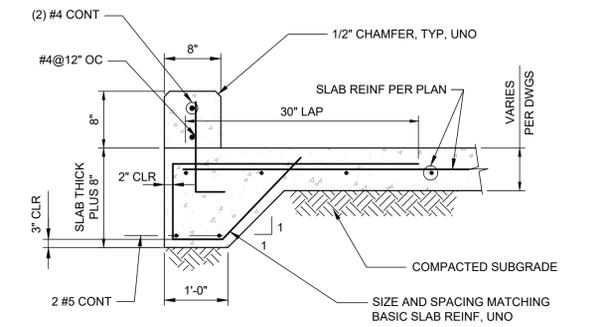
- NOTES:**
- REFER TO "C" DRAWINGS FOR LOCATION AND ELEVATION OF SLABS. ALL SLABS SHALL BE SLOPED TO PREVENT PONDING OF WATER.
  - REFER TO "M" DRAWINGS FOR ALL PIPE AND EQUIPMENT LOCATIONS.
  - ALL CONCRETE SLABS SHALL BE CAST OVER COMPACTED SUBGRADE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.



**DETAIL A**  
 NTS  
 TYP



**DETAIL B**  
 NTS  
 TYP

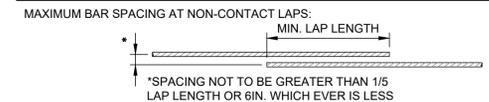


**DETAIL D**  
 NTS  
 TYP

**REBAR MINIMUM TENSION DEVELOPMENT & LAP LENGTHS**  
 CONCRETE STRENGTH  $f_c = 4,000$  PSI OR GREATER

BAR SIZE	DEVELOPMENT LENGTH, $l_d$		LAP LENGTH (CLASS B SPLICE)		BAR SIZE
	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	
#3	1'-7"	1'-3"	2'-0"	1'-7"	#3
#4	2'-1"	1'-7"	2'-8"	2'-0"	#4
#5	2'-7"	2'-0"	3'-4"	2'-7"	#5
#6	3'-1"	2'-4"	4'-0"	3'-1"	#6
#7	4'-6"	3'-6"	5'-10"	4'-6"	#7
#8	5'-2"	3'-11"	6'-8"	5'-2"	#8
#9	5'-10"	4'-6"	7'-6"	5'-10"	#9
#10	6'-6"	5'-0"	8'-6"	6'-6"	#10
#11	7'-3"	5'-7"	9'-6"	7'-3"	#11

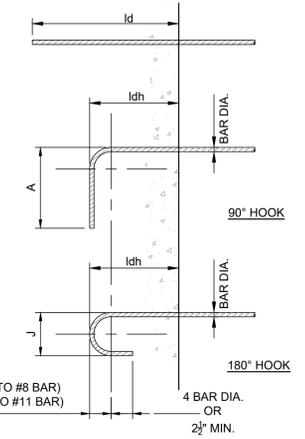
- NOTES:**
- GRADE 60 UNCOATED REINFORCEMENT
  - SPLICE LENGTHS GIVEN ABOVE ARE TO BE USED UNLESS NOTED OTHERWISE ON DESIGN DRAWINGS.



**STANDARD HOOK DEVELOPMENT LENGTH**

BAR SIZE	90° STD HOOK "A"	180° STD HOOK "J"	DEVELOPMENT LENGTH, $l_{dh}$
#3	6"	3"	6"
#4	8"	4"	7"
#5	10"	5"	9"
#6	1'-0"	6"	10"
#7	1'-2"	7"	1'-0"
#8	1'-4"	8"	1'-2"
#9	1'-7"	11 1/2"	1'-3"
#10	1'-10"	1'-12 1/2"	1'-5"
#11	2'-0"	1'-23 1/2"	1'-7"

\*FOR STD HOOK BAR GEOMETRY NOT SHOWN REFER TO MINIMUM ACI REQUIREMENTS



**STANDARD REINFORCEMENT DETAILS**  
**DETAIL C**  
 NTS  
 TYP



REV	DATE	REVISIONS	BY

DATE: 10/3/25  
 DESIGN BY: DSM  
 DRAWN BY: JAW  
 CHECK BY: DSM

**HOLTZ CONSULTING ENGINEERS, INC.**  
 270 SOUTH CENTRAL BLVD., SUITE 207  
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 CERTIFICATE OF AUTH. No. 26960

DAVID S. MORRIS, PE  
 LICENSE NO: 74717

**CITY OF PORT ST. LUCIE**  
**UTILITY SYSTEMS DEPARTMENT**

**GLADES WASTEWATER TREATMENT PLANT**  
**INJECTION WELL SYSTEM**

**SLAB PLAN, SECTION,**  
**AND STRUCTURAL DETAILS**

SHEET NUMBER  
**S-2**  
 PSLUD PROJECT: 63-0007

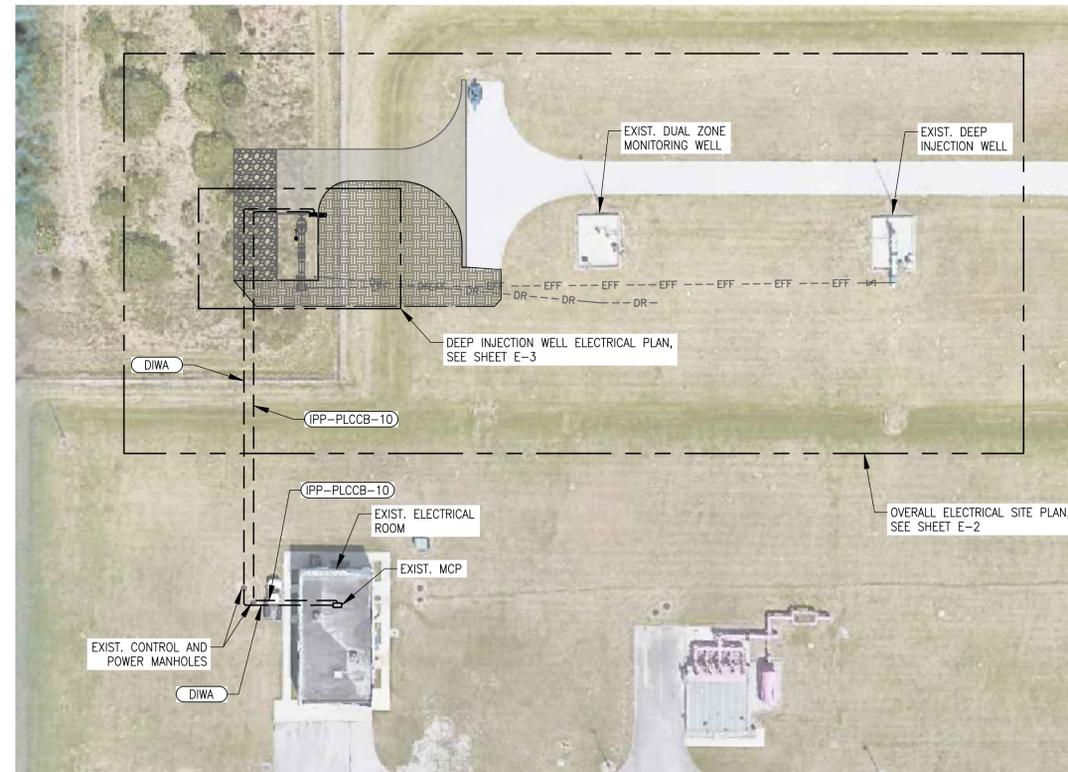
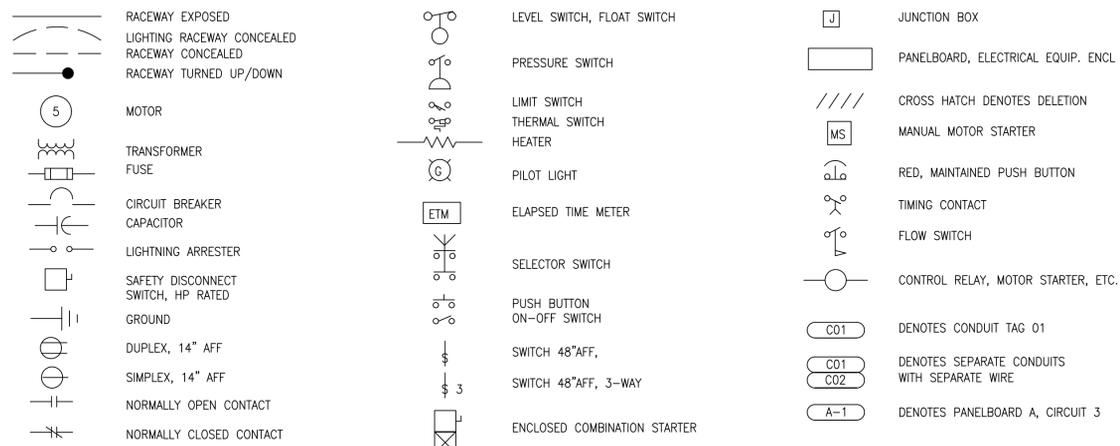
**GENERAL ELECTRICAL NOTES:**

- 1. GENERAL**
  - A. THE CONTRACTOR SHALL PROVIDE ALL MATERIAL AND LABOR FOR A COMPLETE ELECTRICAL SYSTEM AS INDICATED ON THE DRAWINGS INCLUDING ITEMS NOT SHOWN BUT OBVIOUSLY NECESSARY FOR A COMPLETE SYSTEM.
  - B. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS, INSPECTIONS AND APPROVALS.
  - C. ALL WORK SHALL CONFORM TO THE NATIONAL ELECTRICAL CODE, NFPA, THE LOCAL BUILDING CODES AND PBCWUD LIFT STATION STANDARDS (LATEST REVISION). ALL COMPONENTS SHALL BE U.L. APPROVED.
  - D. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL CONCEALED FACILITIES BEFORE ANY WORK BEGINS.
- 2. SCOPE OF WORK**
  - A. ELECTRICAL INSTALLATION.
  - B. COORDINATION WITH OWNER FOR ANY SHUT DOWNS, INSTALL OF NEW EQUIPMENT.
  - C. STARTUP, TESTING, & TRAINING OF STAFF.
- 3. CONDUIT**
  - A. CONDUIT SIZES AS SHOWN ON THE DRAWINGS ARE A MINIMUM. THE CONTRACTOR MAY INCREASE AS REQUIRED FOR EASE OF PULLING.
  - B. ALL EXPOSED CONDUIT SHALL BE NEATLY INSTALLED AND RUN PARALLEL OR PERPENDICULAR TO STRUCTURAL ELEMENTS. SUPPORTS AND MOUNTING HARDWARE SHALL BE HOT DIPPED GALVANIZED STEEL. CONDUITS SHALL HAVE BURRS REMOVED WITH A REAMER. CONDUITS ENTERING CABINETS SHALL HAVE LOCK NUTS INSIDE AND OUT UNLESS ENTRANCE IS THREADED. NYLON INSULATED BUSHINGS SHALL BE USED ON ALL CONDUIT TERMINATIONS.
  - C. ALL UNDERGROUND CONDUITS SHALL BE INSTALLED 24" BELOW FINAL GRADE.
  - D. PROVIDE CONDUIT SWEEPS TO WETWELL AND OTHER LOCATIONS WHENEVER POSSIBLE, AVOID 90° BENDS.
- 4. JUNCTION BOXES**
  - A. PROVIDE ADDITIONAL BOXES AS MAY BE REQUIRED. PROVIDE NEMA 4X OUTSIDE.
- 5. CONDUCTORS**
  - A. CONDUCTORS SHALL BE COPPER STRANDED TYPE XHHW WITH 75°C RISE INSULATION.
- 6. GROUNDING**
  - A. PROVIDE GROUND SYSTEM AS INDICATED ON THE DRAWINGS AND AS REQUIRED BY THE NATIONAL ELECTRIC CODE.
  - B. ALL POWER RACEWAYS REQUIRE GROUNDING CONDUCTORS, BONDING CONDUCTORS THROUGH THE RACEWAY SYSTEMS SHALL BE CONTINUOUS FROM MAIN SWITCH GROUND BUSES TO PANEL GROUND BARS, AND FROM PANEL GROUNDING BARS TO BRANCH CIRCUIT OUTLETS, MOTORS, LIGHTS, ETC. THESE GROUND CONDUCTORS ARE REQUIRED THROUGHOUT THE PROJECT REGARDLESS OF WHETHER CONDUIT RUNS SHOW GROUND CONDUCTORS ON THE DRAWINGS.
- 7. RESTORATION**
  - G. CONTRACTOR SHALL RESTORE TO ORIGINAL CONDITIONS ALL FACILITIES HE DISTURBS. CONTRACTOR SHALL PROVIDE CLEANUP TO ORIGINAL CONDITIONS.
- 9. WARRANTY**
  - A. CONTRACTOR SHALL WARRANT LABOR AND MATERIALS PER THE TERMS IN THE CONTRACT, SEE OTHER SPECIFICATIONS..
- 10. MATERIALS**
  - A. EXCEPT AS INDICATED OR NOTED, ALL MATERIAL SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR.
- 11. PROGRAMMING**
  - A. ALL SCADA PROGRAMING SHALL BE PROVIDED BY I&C CONTRACTOR.
- 12. SCHEMATIC NATURE**
  - A. PLANS ARE SCHEMATIC IN NATURE AND MEANT TO SHOW THE SCHEMATIC ARRANGEMENT OF EQUIPMENT AND CONDUIT.
- 13. CLEARANCES**
  - A. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO MEET N.E.C. CLEARANCES ABOUT EQUIPMENT. THE SAME APPLIES TO RACEWAY SUPPORTS.
- 14. ROUTING**
  - A. CONDUIT ROUTING IS SCHEMATIC IN NATURE. CONDUIT ROUTING IS SHOWN FOR CLARITY ON THE CONTRACT DRAWINGS. ROUTE CONDUITS AS MAY BE REQUIRED.
- 15. SEPARATION**
  - A. MAINTAIN 12" MIN SEPARATION BETWEEN 4-20MADC SIGNAL AND ALL OTHER RACEWAYS.
- 16. PUMP STATION OPERATION**
  - A. CONTRACTOR SHALL INSTALL THIRD PUMP, VFD EQUIPMENT, AND MAKE CONTROL PANEL MODIFICATIONS AS REQUIRED TO ADD THIRD PUMP WHILE MAINTAINING EXISTING PUMPS AND CONTROLS FULLY OPERATIONAL. ANY SHUTDOWNS SHALL BE COORDINATED WITH STAFF AND BE KEPT TO A MINIMUM.
- 17. STUB-UPS**
  - A. CONDUITS NOT TERMINATING IN PULL BOXES SHALL BE STUB-UPS, CAPPED AND TAGGED.
- 16. RESPONSIBILITIES**
  - A. BIDDERS, SUPPLIERS, EQUIPMENT VENDORS, GENERAL CONTRACTOR, SUB CONTRACTORS AND OTHER SIMILAR ENTITIES ARE REQUIRED TO READ ALL THE CONTRACT DOCUMENTS INCLUDING DRAWINGS AND SPECIFICATIONS.
  - B. THE CONTRACTOR IS RESPONSIBLE TO INSTALL ALL EQUIPMENT IN ACCORDANCE WITH THE NEC AND ITS APPLICATION TO THE INSTALLATION ENVIRONMENT.
- 17. HOMERUNS**
  - A. CONTRACTOR SHALL COORDINATE HOME RUNS BETWEEN PLAN VIEWS. WHERE ANY CONDUIT IS SHOWN IN ANY PLAN VIEW IT SHALL BE INSTALLED THE ENTIRE LENGTH AS MAY BE REQUIRED.
- 18. READ THE SPECIFICATIONS**
  - A. REFER TO THE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS. THERE ARE REQUIREMENTS NOTED IN THE SPECIFICATIONS WHICH ARE NOT INDICATED ON THE DRAWINGS.
- 19. APPROVED SHOP DRAWINGS**
  - A. USE APPROVED SHOP DRAWINGS FOR LAY OUT OF EQUIPMENT. THE CONTRACT DOCUMENTS WILL VARY FROM THE SHOP DRAWINGS. INFORM THE ENGINEER IMMEDIATELY IF THERE ARE LAY OUT ISSUES OR INADEQUATE SPACE FOR EQUIPMENT OR CLEARANCES. LAND CONDUITS IN OPENINGS OF ENCLOSURES PER THE APPROVED SHOP DRAWINGS, DO NOT USE THE CONTRACT DRAWINGS.
- 20. FUTURE FACILITIES**
  - A. WHERE FUTURE FACILITIES ARE INDICATED. CONDUIT ROUTING SHALL ACCOUNT FOR SUCH FACILITIES.

**ELECTRICAL ABBREVIATIONS**

CR	CONTROL RELAY	FO	FIBER OPTIC	OHC	OPEN-HOLD-CLOSE	SS	SELECTOR SWITCH OR 316 STAINLESS STEEL
CP	CONTROL PANEL	FSA	FIELD SURGE ARRESTOR	OHU	OVER HEAD ELEC UTILITIES		SWITCH BOARD
CPB	CONTROL PULL BOX	GFI	GROUND FAULT INTERRUPTER	OL	OVER LOAD RELAY	SWBD	SWITCH BOARD
CS	CONTROL STATION	HOA	HAND-OFF-AUTO	PB	PUSH BUTTON	TC	TIME CLOCK
CTB	CONTROL TERM. BOX	HOR	HAND-OFF-REMOTE	PDP	POWER DIST. PANEL	TOT	TOTALIZER
DISC	DISCONNECT SWITCH	LA	LIGHTNING ARRESTER	PM	POWER MONITOR	TS	TEST SWITCH
DMM	DIGITAL MULTIMETER	LOR	LOCAL-OFF-REMOTE	PNLBD	PANELBOARD	VCP	VENDOR CP
DS	DOOR SWITCH	M	MOTOR STARTER	PSA	PANEL SURGE ARRESTOR	VFD	VARIABLE FREQUENCY DRIVE
DTB	DISCRETE TERMINAL BOX	MCC	MOTOR CONTROL CENTER	R,G,A	RED, GREEN, AMBER PILOT LIGHT	WP	WEATHER PROOF
EN	ETHERNET	MLO	MAIN LUG ONLY	RGS	RIGID GALV. STEEL	WW	WIRE WAY
ETM	ELAPSED TIME METER	NF	NON FUSED OR	RO	READ OUT	ZSL	POSITION SWITCH CLOSED
F	FUSE		NANO FILTRATION	SA	SURGE ARRESTER	ZSO	POSITION SWITCH OPEN

**ELECTRICAL LEGEND**



**AERIAL SITE PLAN**

SCALE: 1" = 40'

**MATERIAL SCHEDULE**

LOCATION	CONDUIT	MISC ENCLOSURE MATERIALS	MISC ENCLOSURE NEMA RATING	FASTENERS, STRUT, THREADED ROD, ETC.
<b>EXTERIOR</b>				
BELOW GRADE	PVC SCHED. 40	CONCRETE BOXES	N/A	316 SS
ABOVE GRADE	ALUMINUM	316 SS	4X	316 SS
<b>INTERIOR</b>				
ABOVE GRADE	ALUMINUM	PVC/ALUMINUM	1	316 SS

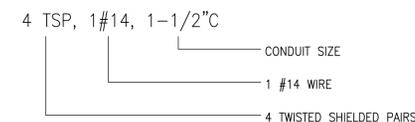
**GENERAL NOTES**

1. THE SCHEDULE SHALL ESTABLISH THE MINIMUM LEVEL OF QUALITY FOR MATERIALS. UNLESS OTHERWISE INDICATED ON THE DRAWINGS OR IN THE SPECIFICATIONS
2. THE SCHEDULE SHALL NOT APPLY TO POWER TRANSFORMERS, LIGHT FIXTURES AND THE LIKE, THOSE ELEMENTS ARE NOTED OR INDICATED ELSEWHERE

**LEGEND**

N/A	NOT APPLICABLE
316 SS	316 STAINLESS STEEL

**CONDUIT LEGEND**



**100% SUBMITTAL**

**C&W engineering**  
 ELECTRICAL CONSULTANTS  
 6803 VISTA PARKWAY NORTH, SUITE 10  
 WEST PALM BEACH, FL 33411  
 (561) 642-5333  
**REGISTRATION NUMBERS**  
 C & W ENGINEERING INC. CA# 33315  
 MICHAEL A. GUIDA, P.E. 60755

REV	DATE	REVISIONS	BY

DATE: OCTOBER 2025  
 DESIGN BY: JLR  
 DRAWN BY: YGC  
 CHECK BY: MAG  
 VERIFY SCALE  
 BAR IS EQUAL TO ONE  
 INCH ON ORIGINAL DRAWING  
 0 1  
 ADJUST ALL SCALED  
 DIMENSIONS ACCORDINGLY

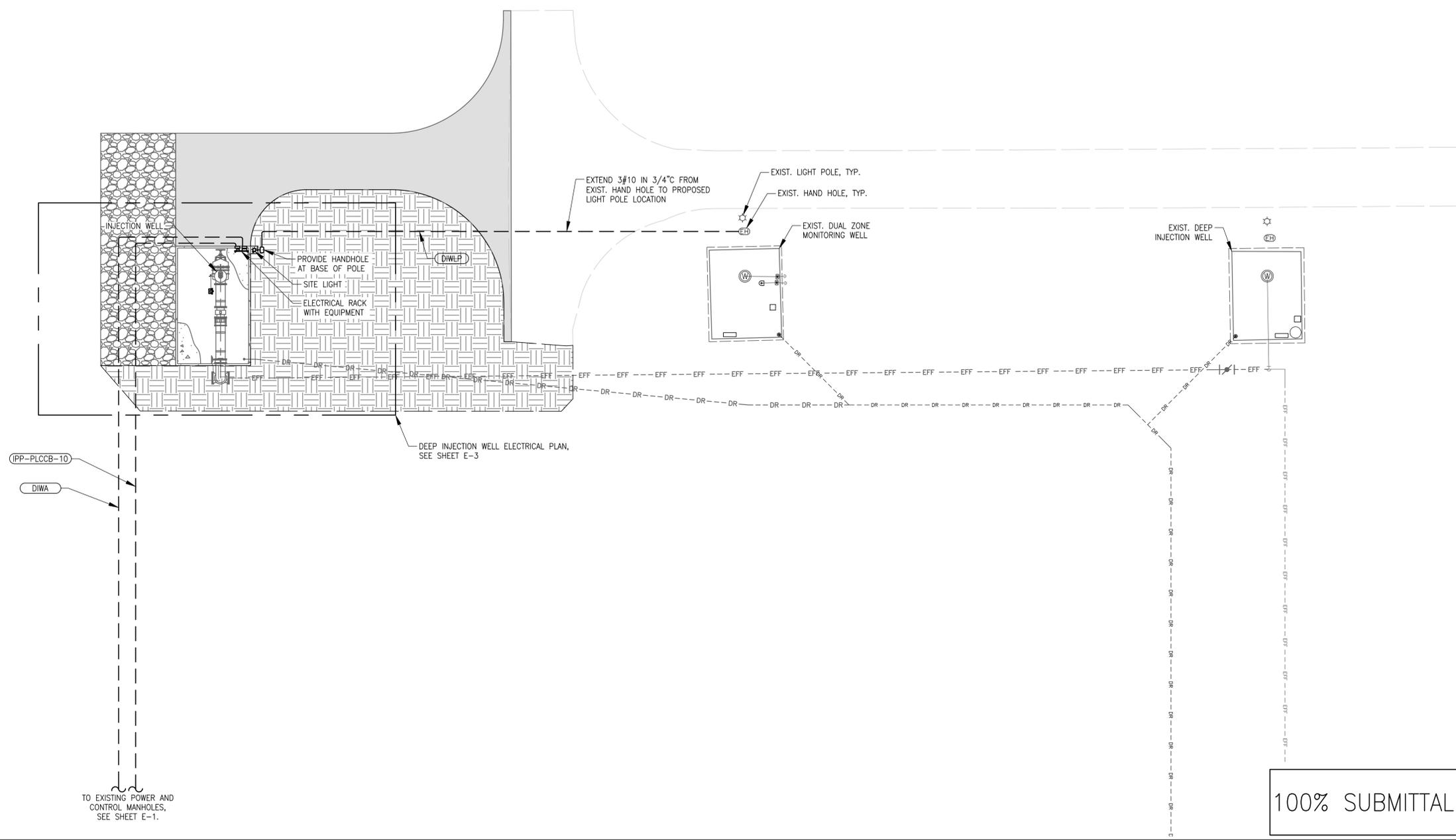
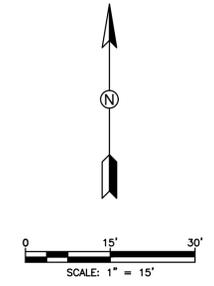
**HOLTZ CONSULTING ENGINEERS, INC.**  
 607 SW ST. LUCIE CRESCENT, SUITE 103  
 STUART, FLORIDA 34994  
 PH. (772) 919-4905  
 CERTIFICATE OF AUTH. No. 26960  
**MMHC** McNABB-MILLER HYDROGEOLOGIC CONSULTING, INC.

MICHAEL A. GUIDA, PE  
 LICENSE NO: 60755

**CITY OF PORT ST. LUCIE  
 UTILITY SYSTEMS DEPARTMENT**  
**GLADES WASTEWATER TREATMENT PLANT  
 DEEP INJECTION WELL SYSTEM**

**ELECTRICAL NOTES & LEGEND**

SHEET NUMBER  
**E-1**  
 PSLUD PROJECT: 63-0007



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 6803 VISTA PARKWAY NORTH, SUITE 10  
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 (561) 642-5333  
 REGISTRATION NUMBERS  
 C & W ENGINEERING INC. CA# 33315  
 MICHAEL A. GUIDA, P.E. 60755

REV	DATE	REVISIONS	BY

DATE: OCTOBER 2025  
 DESIGN BY: JLR  
 DRAWN BY: YGC  
 CHECK BY: MAG  
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GLADES WASTEWATER TREATMENT PLANT  
 DEEP INJECTION WELL SYSTEM

OVERALL ELECTRICAL SITE PLAN

SHEET NUMBER  
**E-2**  
 PSLUD PROJECT: 63-0007

**GENERAL NOTES**

1. INSTALL CONDUITS BELOW GRADE UNDER SLAB AND STUB UP NEAR EQUIPMENT.

**GROUNDING SYSTEM NOTES**

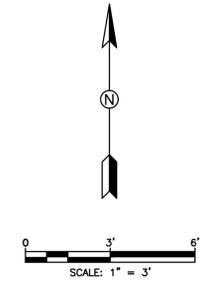
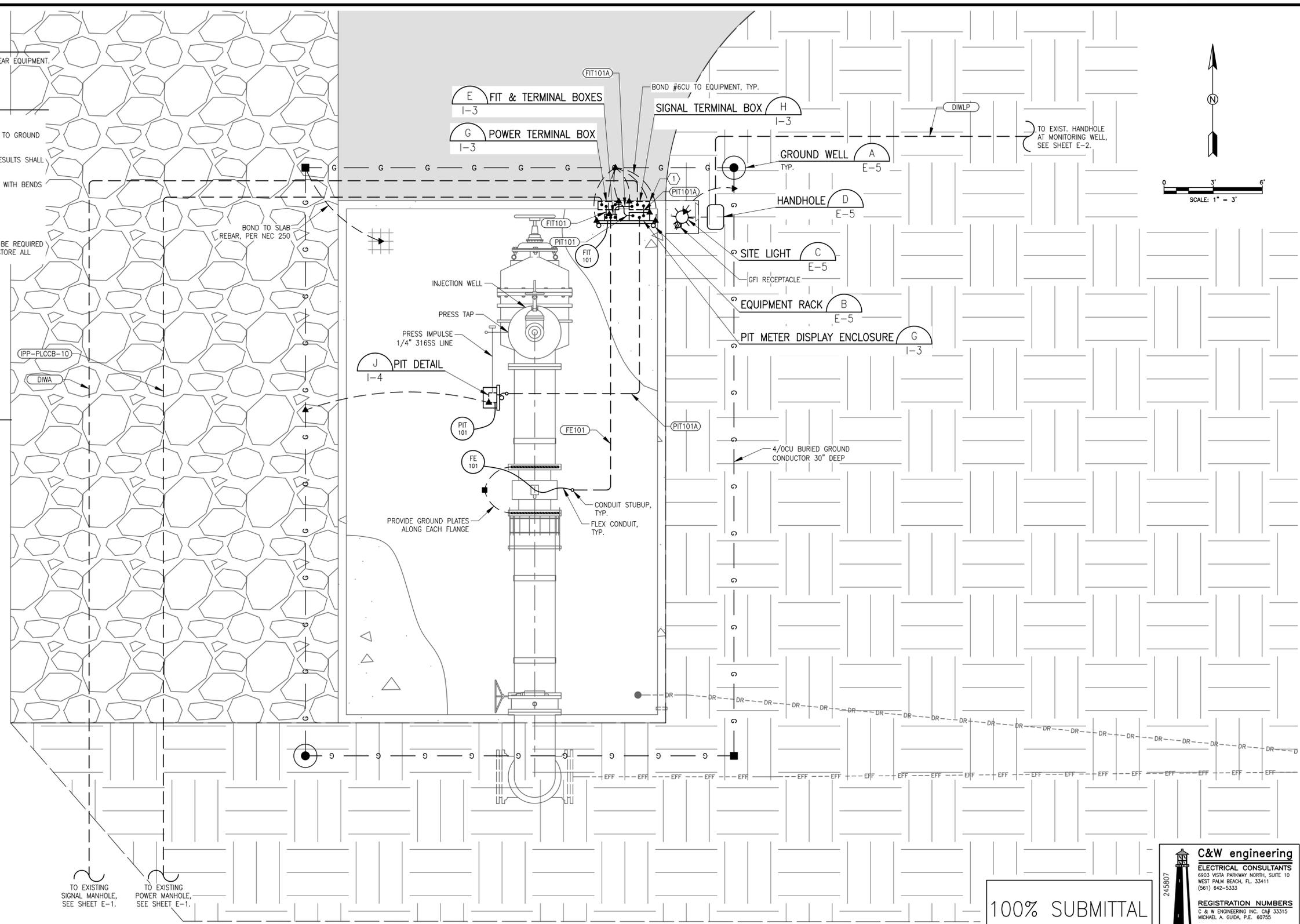
1. PROVIDE A BURIED GROUND CONDUCTOR BELOW GRADE.
2. BOND PIPE STANDS, LIGHT POLES, EQUIP. RACKS AND THE LIKE TO GROUND RING USING AN EXOTHERMIC WELD.
3. ELECTRICAL SUPPLIER SHALL TEST THE GROUND SYSTEM. THE RESULTS SHALL NOT BE GREATER THAN 5 OHMS.
4. ALL CONNECTIONS TO GROUND SYSTEM SHALL BE MADE IN LINE WITH BENDS NOMINAL 12" RADIUS IN THE DIRECTION OF CURRENT FLOW.
5. ALL BENDS IN GROUND WIRES SHALL BE NOMINAL 12" RADIUS.
6. SUPPLIER SHALL CONCEAL ALL CONDUCTORS.
7. SUPPLIER SHALL CUT AND PATCH ALL HARD SURFACES AS MAY BE REQUIRED FOR INSTALLATION OF GROUNDING SYSTEM. SUPPLIER SHALL RESTORE ALL DISTURBED AREAS TO THEIR ORIGINAL CONDITION.

**GROUNDING LEGEND**

- 5/8" x 10' BURIED GROUND RODS
- ▲ CADWELD BOND
- GROUND WELL

**SPECIFIC ELECTRICAL NOTES**

① SIGNAL TERMINAL BOX MOUNTED BELOW PIT METER DISPLAY ENCLOSURE, SEE INSTALLATION DETAIL ON SHEET ###.



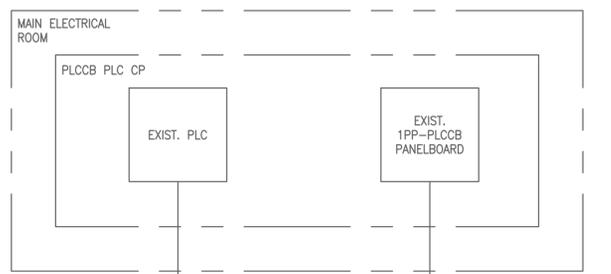
TO EXISTING SIGNAL MANHOLE, SEE SHEET E-1.

TO EXISTING POWER MANHOLE, SEE SHEET E-1.

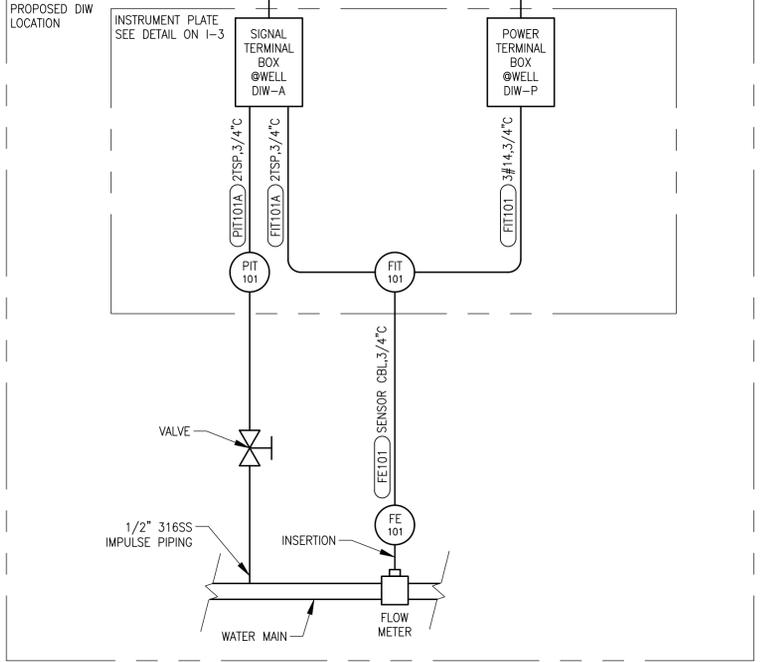
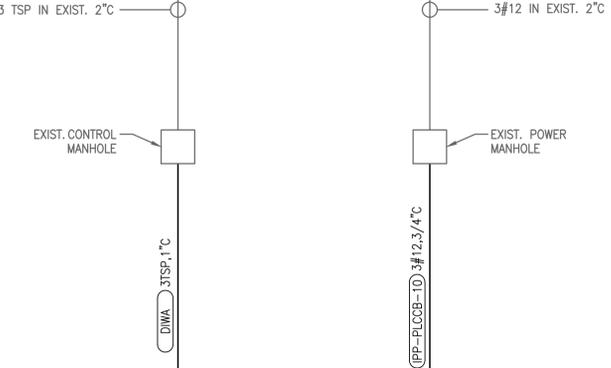
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<p>DATE: OCTOBER 2025</p> <p>DESIGN BY: JLR</p> <p>DRAWN BY: YGC</p> <p>CHECK BY: MAG</p> <p>VERIFY SCALE                  BAR IS EQUAL TO ONE INCH ON ORIGINAL DRAWING                  0 1                  ADJUST ALL SCALED DIMENSIONS ACCORDINGLY</p>	<p><b>HOLT CONSULTING ENGINEERS, INC.</b>                  607 SW ST. LUCIE CRESCENT, SUITE 103                  STUART, FLORIDA 34994                  PH. (772) 919-4905                  CERTIFICATE OF AUTH. No. 26960</p> <p><b>MMHC</b> McNABB-MILLER HYDROGEOLOGIC CONSULTING, INC.</p>	<p>MICHAEL A. GUIDA, PE</p> <p>LICENSE NO: 60755</p>	<p>CITY OF PORT ST. LUCIE                  UTILITY SYSTEMS DEPARTMENT</p> <p>GLADES WASTEWATER TREATMENT PLANT                  DEEP INJECTION WELL SYSTEM</p>	<p>DEEP INJECTION WELL ELECTRICAL PLAN</p>	<p>SHEET NUMBER</p> <p><b>E-3</b></p> <p>PSLUD PROJECT: 63-0007</p>
--	--	--	--	--	---



NOTES:  
 1. FOR TSP CABLE USE BELDEN #1031A, 18 GA. SHIELDED TWISTED PAIR.



DIW ONELINE DIAGRAM

EXISTING PANELBOARD IPP-PLCCB SCHEDULE

WIRE SIZE	COND SIZE	BUS AMPS			LOAD	POLES	AMPS	BUS			AMPS	POLES	LOAD	BUS AMPS			WIRE SIZE	COND SIZE
		A	B	C				A	B	C				A	B	C		
EX.	EX.				24DCSL1	1	20	1	2		20	1	PLCCB1				EX.	EX.
EX.	EX.				CBOML1	1	20	3	4		10	1	SECURITY OUTLET				EX.	EX.
EX.	EX.				WIT7101/4	1	10	5	6		20	1	GSP RECEPTACLE				EX.	EX.
EX.	EX.				FIT5101	1	10	7	8		15	1	SPARE				EX.	EX.
EX.	EX.				LIT/AIT 5101	1	10	9	10		20	1	DIW		7	3#12	EX.2"	
EX.	EX.				CH 7101	1	10	11	12									
EX.	EX.				CH 7102	1	10	13	14									
EX.	EX.				CHLORINE LEAK DETECTOR 7	1	10	15	16									
EX.	EX.				FIT 8101	1	10	17	18									
EX.	EX.				LIT 8101	1	10	19	20									
EX.	EX.				AIT 7101	1	10	21	22									
EX.	EX.				AIT 7102	1	10	23	24									
EX.	EX.				AIT 7103	1	10	25	26									
EX.	EX.				WIT 7105/8	1	10	27	28									
EX.	EX.				FIT 10101	1	10	29	30									
EX.	EX.				TURBIDITY (B)	1	20	31	32									
EX.	EX.				PH (B)	1	20	33	34									
EX.	EX.				CL17 (B)	1	20	35	36									
EX.	EX.				MCCCB02A DEVICENET	1	20	37	38									
EX.	EX.				MCCCB01 DEVICENET	1	20	39	40									
EX.	EX.				MCCCB02 / CBMDP DEVICENET	1	20	41	42									

RATED VOLTAGE: <input checked="" type="checkbox"/> 120/208 <input type="checkbox"/> 480	<input type="checkbox"/> 3Ø, 4 WIRE	BRANCH POLES: <input type="checkbox"/> 12 <input type="checkbox"/> 20 <input type="checkbox"/> 30 <input checked="" type="checkbox"/> 42	APPROVED MF'RS. CUTLER HAMMER, SQD OR GE ONLY
RATED AMPS: <input checked="" type="checkbox"/> 100 <input type="checkbox"/> 225 <input type="checkbox"/> 400 <input type="checkbox"/> _____		CABINET: <input checked="" type="checkbox"/> SURFACE <input type="checkbox"/> FLUSH	NEMA <input type="checkbox"/> 1 <input type="checkbox"/> 3R <input checked="" type="checkbox"/> 4X
<input type="checkbox"/> MAIN LUGS ONLY <input type="checkbox"/> MAIN 70 AMPS	<input checked="" type="checkbox"/> BREAKER <input type="checkbox"/> FUSED SWITCH	<input checked="" type="checkbox"/> HINGED DOOR	<input checked="" type="checkbox"/> KEYED DOOR LATCH
<input type="checkbox"/> FUSED <input checked="" type="checkbox"/> CIRCUIT BREAKER (BOLT-IN) BRANCH DEVICES	<input type="checkbox"/> _____ TO BE GFI BREAKERS	<input type="checkbox"/> FULL NEUTRAL BUS	<input type="checkbox"/> GROUND BUS

ALL BREAKERS MUST BE RATED TO INTERRUPT A SHORT CIRCUIT ISC OF 25,000 AMPS SYMMETRICAL.

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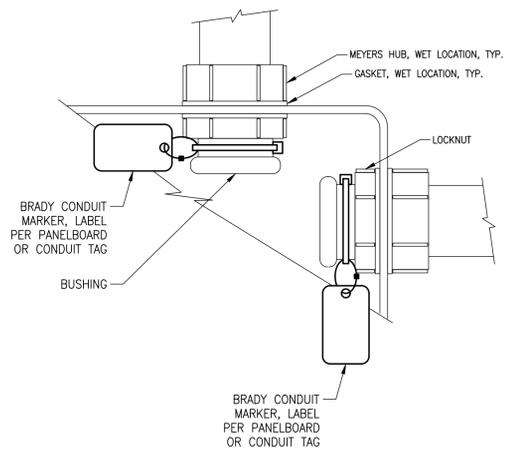
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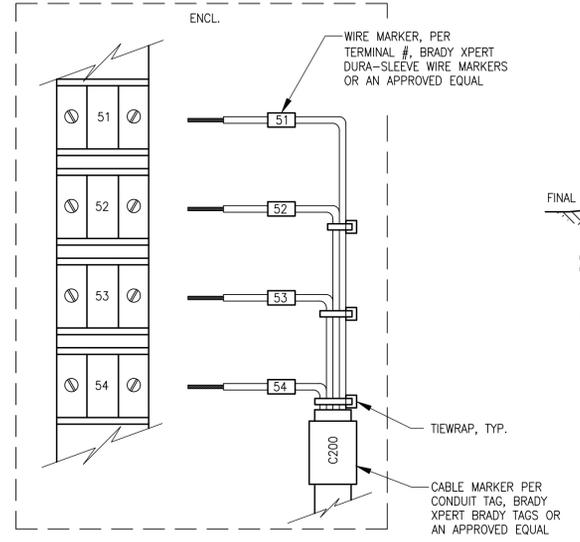
ELECTRICAL ONELINE  
 PSLUD PROJECT: 63-0007

SHEET NUMBER  
**E-4**



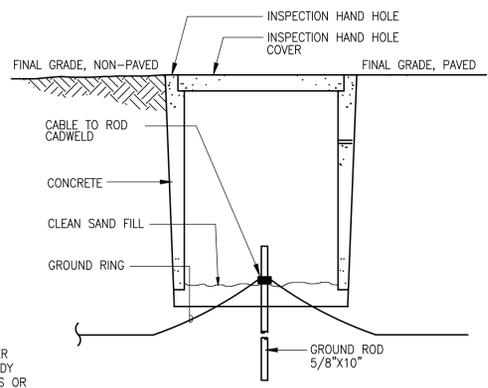
CONDUIT TERMINATION DETAIL

NTS



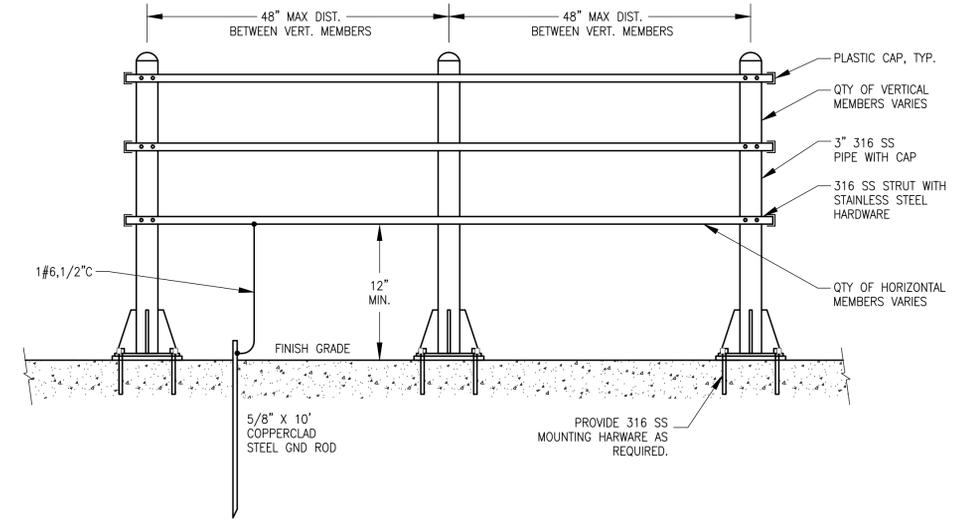
TERMINATION EXAMPLE DETAIL

NTS



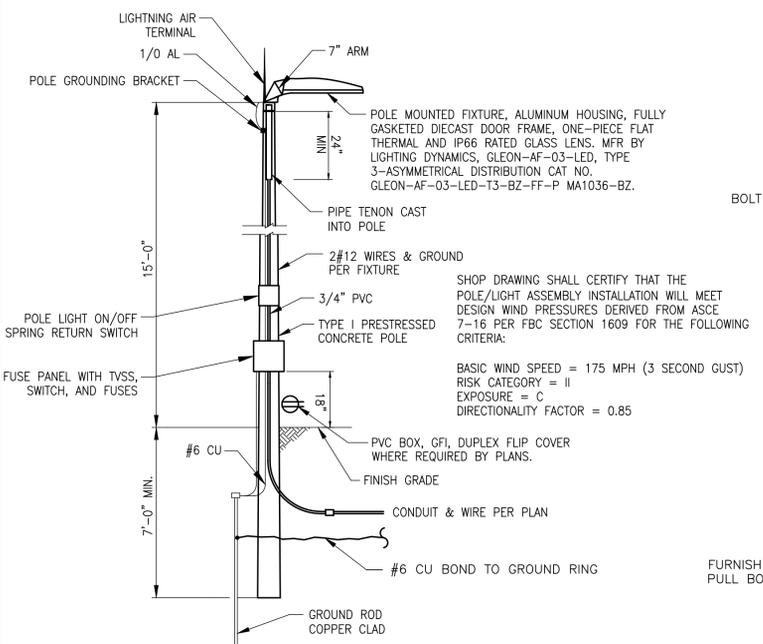
GROUND WELL

NTS



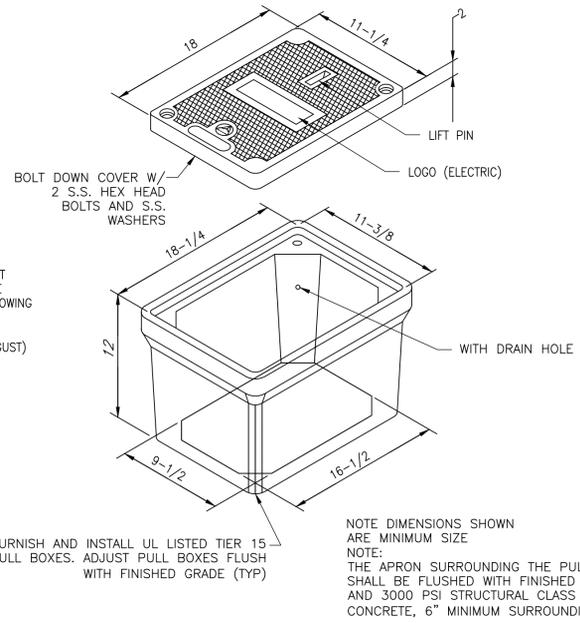
EQUIPMENT RACK DETAIL

NTS



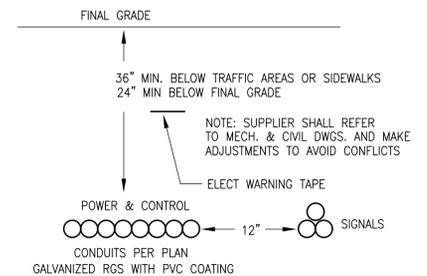
LIGHTPOLE

NTS



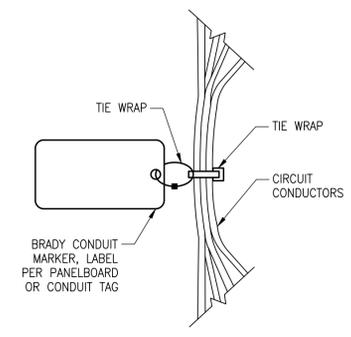
HANDHOLE DETAIL

NTS



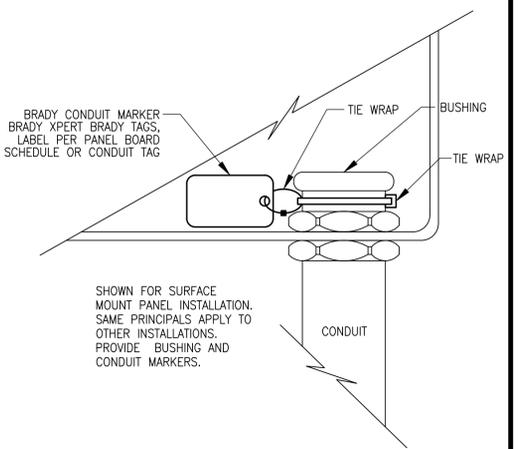
DIRECT BURIED CONDUIT

NTS



CIRCUIT MARKER DETAIL

NTS



CONDUIT DETAIL

NTS

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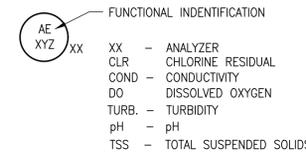
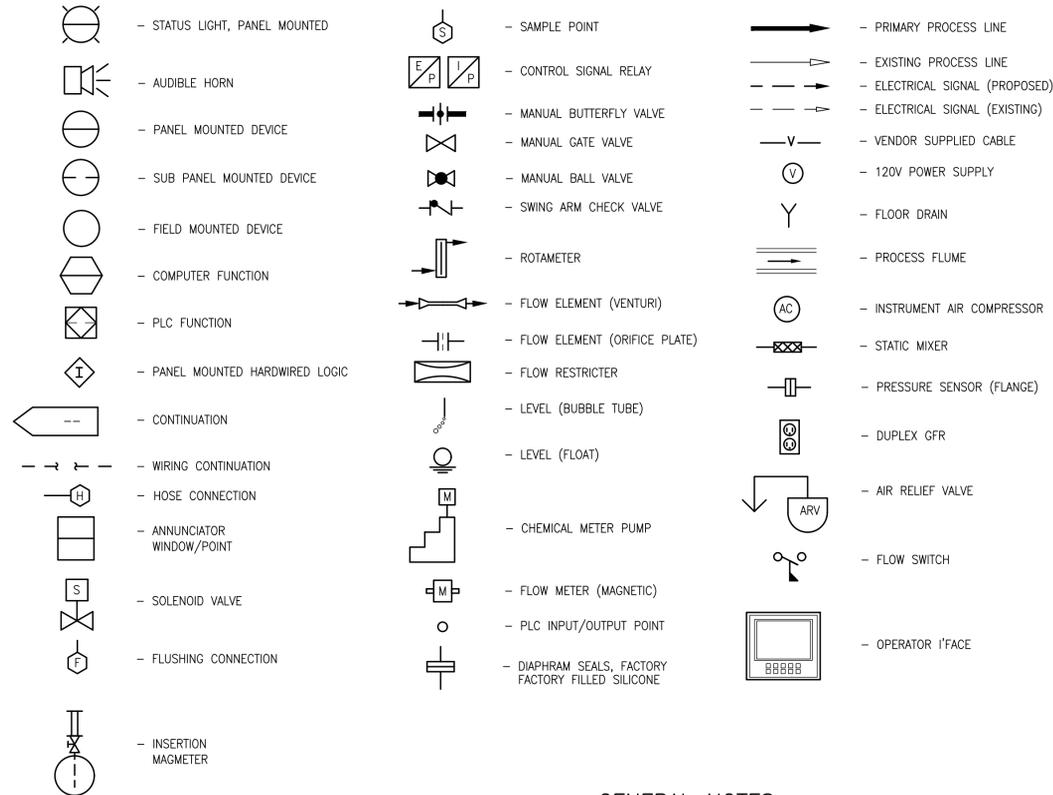
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LICENSE NO: 60755

CITY OF PORT ST. LUCIE  
UTILITY SYSTEMS DEPARTMENT  
GLADES WASTEWATER TREATMENT PLANT  
DEEP INJECTION WELL SYSTEM

ELECTRICAL DETAILS

SHEET NUMBER  
**E-5**  
PSLUD PROJECT: 63-0007

### PROCESS & INSTRUMENTATION LEGEND



### GENERAL NOTES

1. THE I SHEETS SHALL BE USED FOR GENERAL ARRANGEMENT OF INSTRUMENTS, FIELD CONTROL PANELS, VENDOR CONTROL PANELS AND THE LIKE AND TO SHOW PLC AND OPERATOR INTERFACE REQUIREMENTS. IT IS NOT MEANT TO SHOW MECHANICAL EQUIPMENT REQUIREMENTS, SIZES AND THE LIKE. IF CONTRADICTIONS OCCUR BETWEEN THE I SHEETS AND MECHANICAL SHEETS, PROCESS PIPING, YARD PIPING AND THE LIKE, THE OTHER SHEETS SHALL HAVE PRECEDENCE.

### MEANINGS OF IDENTIFICATION LETTERS

FIRST LETTER	MEASURED OR INITIATING VARIABLE	MODIFIER	SUCCEEDING LETTERS		
			READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
C	CONDUCTIVITY (ELECTRICAL)			CONTROL	
D	DENSITY (MASS) OR SPECIFIC GRAVITY	DIFFERENTIAL			
E	VOLTAGE (EMF)		PRIMARY ELEMENT		
F	FLOW RATE	RATIO (FRACTION)			
G	GAUGING (DIMENSIONAL)		GLASS		
H	HAND (MANUALLY INITIATED)		AUDIBLE HORN		HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME OR TIME SCHEDULE			CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOISTURE OR HUMIDITY				MIDDLE OR INTERMEDIATE
N	AMPLITUDE		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
O	USER'S CHOICE		ORIFICE (RESTORATION)		
P	PRESSURE OR VACUUM		POINT (TEST CONN.)		
Q	QUANTITY OR EVENT	INTEGRATE OR TOTALIZE			
R	RUN		RELAY		
S	SPEED OR FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VISCOSITY			VALVE, DAMPER OR LOUVER	
W	WEIGHT OR FORCE		WELL		
X	FAILURE				
Y	USER'S CHOICE			RELAY OR COMPUTE	
Z	POSITION			DRIVE, ACTUATE OR UNCLASSIFIED FINAL CONTROL ELEMENT	

### ABBREVIATIONS

AI	ANALOG INPUT	HOR	HAND OR OFF OR REMOTE
AO	ANALOG OUTPUT	LA	LOCAL OR AUTO
AM	AUTOMATIC OR MANUAL	LR	LOCAL OR REMOTE
ATB	ANALOG TERMINAL BOX	LOR	LOCAL OFF REMOTE
CL	CHLORINE	MB	MOD BUS
CP	CONTROL PANEL	MB+	MOD BUS PLUS
CTM	CURRENT TRIP MODULE	MCC	MOTOR CONTROL CENTER
DI	DISCRETE INPUT	MCP	MAIN CONTROL PANEL
DN	DEVICE NET	MOA	MANUAL OR OFF OR AUTOMATIC
DO	DISCRETE OUTPUT	MOD	MODULATING
DTB	DISCRETE TERMINAL BOX	OC	OPEN OR CLOSE
EN	ETHERNET	OAC	OPEN AUTO CLOSE
ES	ELECTRICAL SUPPLY	OHC	OPEN OR HOLD OR CLOSE
ETM	ELAPSED TIME METER	PB	PUSH BUTTON
F	FLUORIDE	PCP	POSITION CONTROL PROCESSOR
FCD	FLOW CONTROL DAMPER	PLC	PROGRAMMABLE LOGIC CONTROLLER
FCV	FLOW CONTROL VLV, OPEN-CLOSE	RCT	REPEAT CYCLE TIMER
FMD	FLOW MODULATING DAMPER	RTM	RUN TIME METER
FMV	FLOW MODULATING VALVE	RO	READ OUT, DIGITAL
FOC	FIBER OPTIC CABLE	SDI	SILT DENSITY INDEX
FP	FIELD PANEL	SI	SIGNAL ISOLATOR
HO	HAND OR OFF	S.P.	SAMPLE POINT
HOA	HAND OR OFF OR AUTOMATIC	TCLR	TOTAL CHLORINE
		VFD	VARIABLE FREQUENCY DRIVE
		YN	YES OR NO

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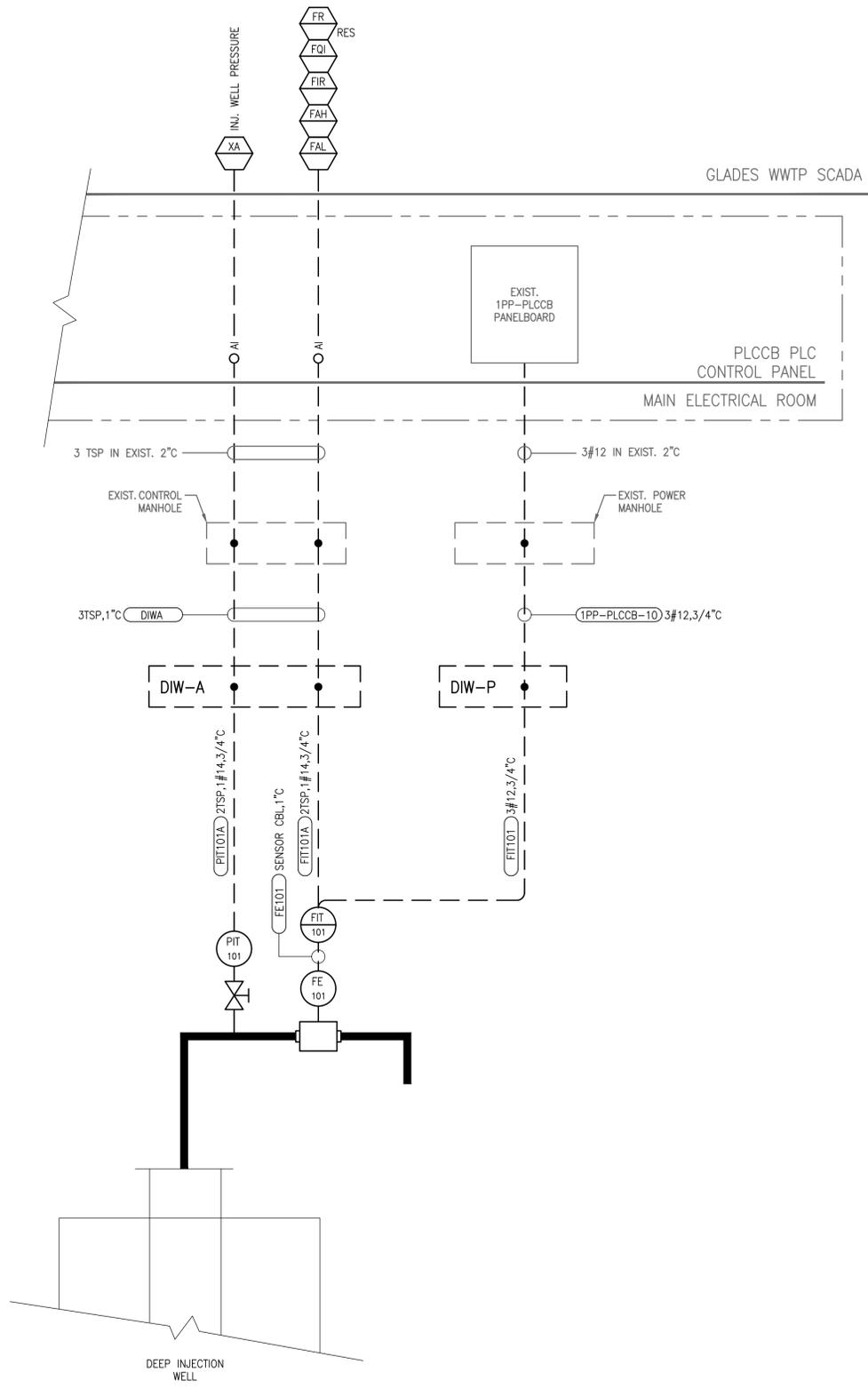
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I&C LEGEND

SHEET NUMBER  
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 PSLUD PROJECT: 63-0007



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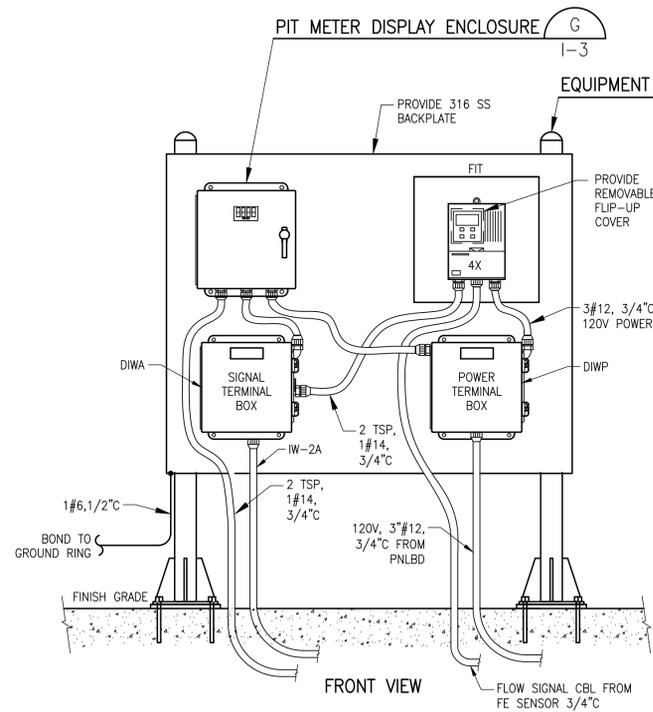
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PROPOSED IW I&C DIAGRAM

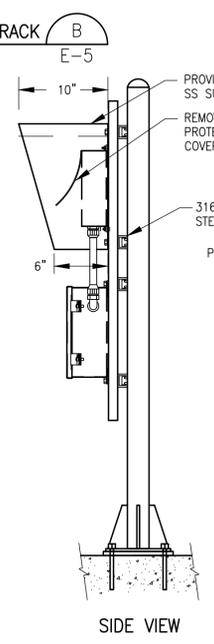
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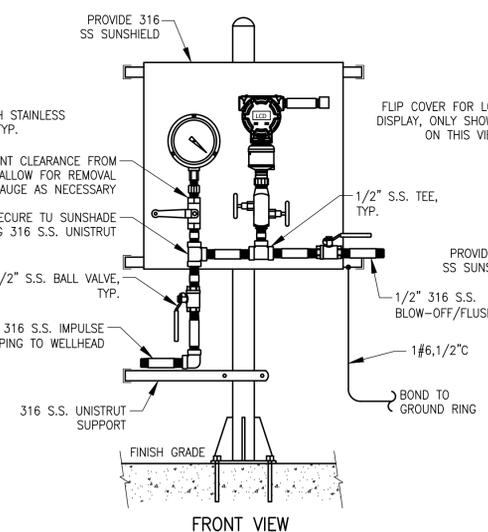
FIT & TERMINAL BOXES DETAIL

NTS, TYPICAL

E



SIDE VIEW

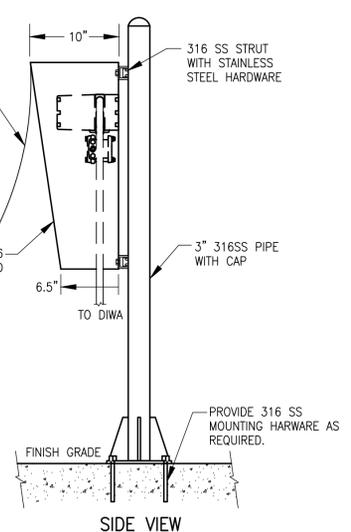


FRONT VIEW

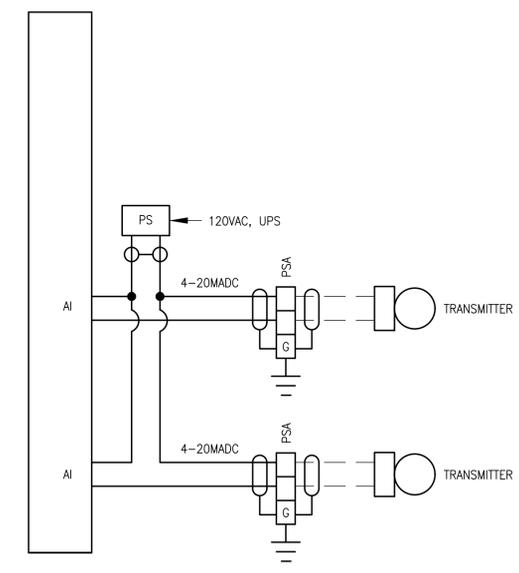
PIT MOUNTING DETAIL

NTS, TYPICAL

F

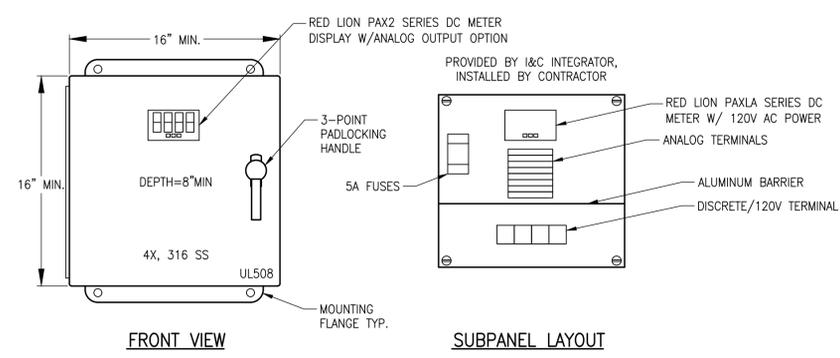


SIDE VIEW



TYPICAL AI LOOP DIAGRAM

NTS



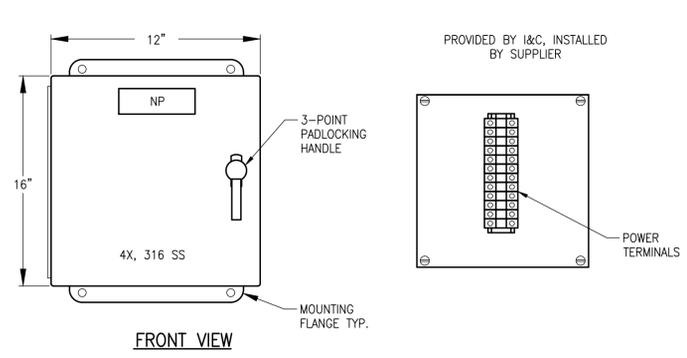
FRONT VIEW

SUBPANEL LAYOUT

PIT METER DISPLAY ENCLOSURE

NTS

G



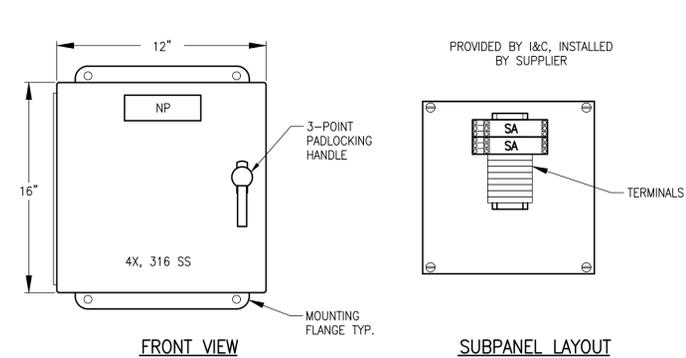
FRONT VIEW

SUBPANEL LAYOUT

POWER TERMINAL BOX

NTS

H



FRONT VIEW

SUBPANEL LAYOUT

SIGNAL TERMINAL BOX DETAIL

NTS

I

100% SUBMITTAL

**C&W engineering**  
 ELECTRICAL CONSULTANTS  
 6803 VISTA PARKWAY NORTH, SUITE 10  
 WEST PALM BEACH, FL 33411  
 (561) 642-5333  
 REGISTRATION NUMBERS  
 C & W ENGINEERING INC. CA# 33315  
 MICHAEL A. GUIDA, P.E. 60753

REV	DATE	REVISIONS	BY

DATE: OCTOBER 2025  
 DESIGN BY: JLR  
 DRAWN BY: YGC  
 CHECK BY: MAG

**HOLTZ CONSULTING ENGINEERS, INC.**  
 607 SW ST. LUCIE CRESCENT, SUITE 103  
 STUART, FLORIDA 34994  
 PH. (772) 919-4905  
 CERTIFICATE OF AUTH. No. 26960

**MMHC** McNABB-MILLER HYDROGEOLOGIC CONSULTING, INC.

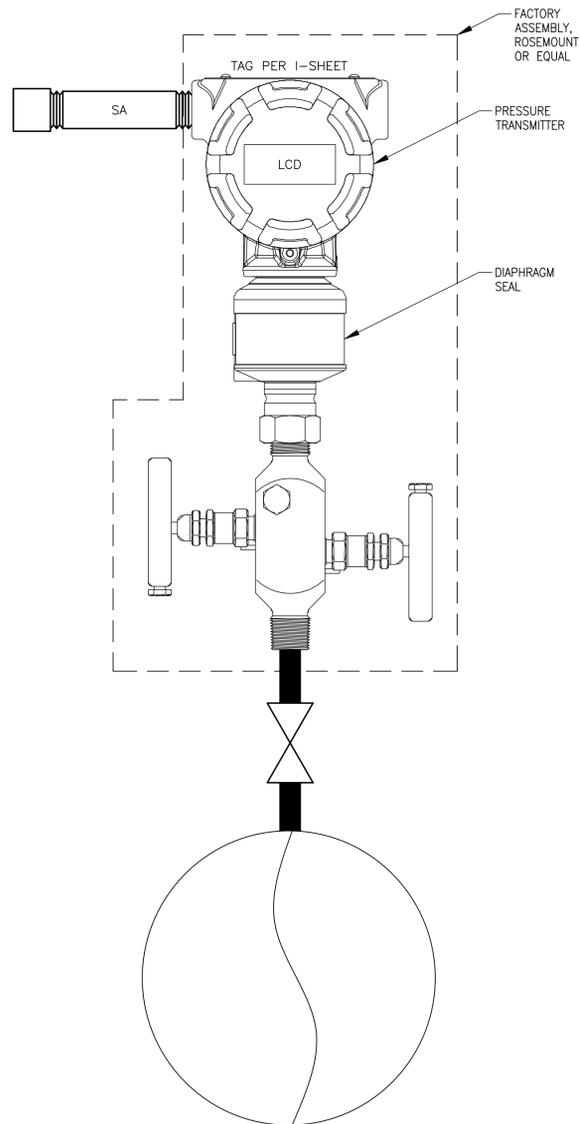
MICHAEL A. GUIDA, PE  
 LICENSE NO: 60755

CITY OF PORT ST. LUCIE  
 UTILITY SYSTEMS DEPARTMENT

GLADES WASTEWATER TREATMENT PLANT  
 DEEP INJECTION WELL SYSTEM

I&C DETAILS, SHEET 1

SHEET NUMBER  
 I-3  
 PSLUD PROJECT: 63-0007



- NOTES:**
1. PRESSURE INSTRUMENT SHALL BE FACTORY MOUNTED TO THE DIAPHRAGM SEAL, AS SPECIFIED.
  2. PRESSURE INSTRUMENT/DIAPHRAGM SHALL BE FACTORY CALIBRATED AND TESTED TO THE SPECIFIED INSTRUMENT RANGE.
  3. TAP EXISTING PIPE WITH 3/4" FNPT. CONFIRM SIZE WITH INSTRUMENT SUPPLIER.
  4. SEE OTHER DRAWINGS FOR CONDUIT & WIRE
  5. FINAL INSTALLATION REQUIREMENTS PER APPROVED SHOP DRAWINGS.
  6. ALL PIPING, VALVES, AND FITTINGS SHALL BE 316SS
  7. PIT SHALL BE MOUNTED TO PIPE WITH 316SS DOUBLE-STRAP SUPPORT.

PIT DETAIL  
NTS

J

100% SUBMITTAL

**C&W engineering**  
ELECTRICAL CONSULTANTS  
6803 VISTA PARKWAY NORTH, SUITE 10  
WEST PALM BEACH, FL 33411  
(561) 642-5333  
REGISTRATION NUMBERS  
C & W ENGINEERING INC. CA# 33315  
MICHAEL A. GUIDA, P.E. 60755

REV	DATE	REVISIONS	BY

DATE: OCTOBER 2025  
DESIGN BY: JLR  
DRAWN BY: YGC  
CHECK BY: MAG  
VERIFY SCALE  
BAR IS EQUAL TO ONE INCH ON ORIGINAL DRAWING  
0 1  
ADJUST ALL SCALED DIMENSIONS ACCORDINGLY

**HOLTZ CONSULTING ENGINEERS, INC.**  
607 SW ST. LUCIE CRESCENT, SUITE 103  
STUART, FLORIDA 34994  
PH. (772) 919-4905  
CERTIFICATE OF AUTH. No. 26960

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MICHAEL A. GUIDA, PE  
LICENSE NO: 60755

CITY OF PORT ST. LUCIE  
UTILITY SYSTEMS DEPARTMENT  
GLADES WASTEWATER TREATMENT PLANT  
DEEP INJECTION WELL SYSTEM

I&C DETAILS, SHEET 2

SHEET NUMBER  
I-4  
PSLUD PROJECT: 63-0007

# 10 Day Bid Bond Notice

E-Bid # 20260079

Glades Wastewater Treatment Facility

Date: January 13, 2026

All original Bid Bonds must be received, and time stamped in the Procurement Management Department no later than 10 business days from today's date. Bond must be received by January 27, 2026 , or your bid **may** be deemed nonresponsive. All Bid Bonds are mandatory even if you may not be the apparent low bidder.

There will be no exceptions made.

Thank you



**Glades Wastewater Treatment Facility Deep Injection Well NO.2**

RFP # 20260079

Proposal Submission Deadline: January 12, 2026 – 3:00 P.M EST.

Proposals Submitted: 1

<b>Vendor</b>	<b>Status</b>	<b>Submission Date</b>	<b>No Bid Reason</b>
Youngquist Brothers, LLC	Submitted	January 12, 2026	N/A
Florida Design Drilling, LLC	No Bid Submitted	January 12, 2026	<i>Unfortunately FDD's current rig schedule would not allow us to responsibly meet the timeline of this project. N/A</i>
			N/A



**ADDENDA REPORT**  
**IFB No. 20260079**  
**Glades Wastewater Treatment Facility Deep Injection Well No. 2**

RESPONSE DEADLINE: January 12, 2026 at 3:00 pm

Friday, February 27, 2026

**Addenda Issued:**

**Addendum #1**

*Nov 20, 2025 10:37 AM*

Please use the [See What Changed](#) link to view all the changes made by this addendum. Please be advised that the question submittal deadline and the bid submittal deadline have both been extended.

**Addendum #2**

*Dec 8, 2025 11:06 AM*

Measurement and Payment - Hose Bibb

*Attachments:*

· [Addendum #2](#)

**Addendum #3**

*Dec 22, 2025 3:09 PM*

Please use the [See What Changed](#) link to view all the changes made by this addendum.

**Addendum #4**

*Dec 26, 2025 9:43 AM*

Please use the [See What Changed](#) link to view all the changes made by this addendum. **The submission has been extended to January 12, 2026, and in Section 7 — Cost Table, lines 27 and 28, the quantities have been revised.**

**Addenda Acknowledgements:**

**Addendum #1**

Proposal	Confirmed	Confirmed At	Confirmed By
Youngquist Brothers, LLC	X	Jan 12, 2026 12:47 PM	Matt Young

**Addendum #2**

Proposal	Confirmed	Confirmed At	Confirmed By
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ADDENDA REPORT

IFB No. 20260079

Glades Wastewater Treatment Facility Deep Injection Well No. 2

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Youngquist Brothers, LLC	X	Jan 12, 2026 12:47 PM	Matt Young
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Addendum #3

Proposal	Confirmed	Confirmed At	Confirmed By
Youngquist Brothers, LLC	X	Jan 12, 2026 12:47 PM	Matt Young

Addendum #4

Proposal	Confirmed	Confirmed At	Confirmed By
Youngquist Brothers, LLC	X	Jan 12, 2026 12:47 PM	Matt Young



QUESTION & ANSWER REPORT  
IFB No. 20260079  
Glades Wastewater Treatment Facility Deep Injection Well No. 2

RESPONSE DEADLINE: January 12, 2026 at 3:00 pm

Friday, February 27, 2026

## Approved, Unanswered Questions

## Approved, Answers Provided

### 1. No subject

*Nov 18, 2025 3:46 PM*

**Question:** Can a sub-contractor carry the well drilling license for the prime bidding contractor

*Nov 18, 2025 3:46 PM*

**Answered by India Barr:** That is a good question, unfortunately they cannot.

*Nov 20, 2025 10:27 AM*

### 2. Question Deadline

*Nov 19, 2025 10:14 AM*

**Question:** Due to the Thanksgiving holiday, can the deadline for questions please be extended until December 5th to allow the Contractor ample time to review all bid documents?

*Nov 19, 2025 10:14 AM*

**Answered by India Barr:** Yes , the question and bid submittal deadlines have both been extended.

*Nov 20, 2025 10:38 AM*

### 3. IFB Section 1.7 (Potential Funding Source & Requirements)

*Nov 22, 2025 12:04 PM*

## QUESTION & ANSWER REPORT

IFB No. 20260079

Glades Wastewater Treatment Facility Deep Injection Well No. 2

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**Question:** This reference discusses the possibility of utilizing state or federal funding, although no current funding exists, and further states "...the City may unilaterally amend terms of this Contract by notice to Contractor to comply with the requirements of law or any grant agreement that the City determines it may wish to utilize to compensate Contractor. Contractor's agreement to comply with these requirements is a material part of the Contract, and Contractor's failure to so comply shall be a breach of this Contract." State or federal funding requirements would fundamentally change how the Contractor's bid is prepared, and imposing these funding requirements post-bid materially changes procurement, labor and compliance obligations. We request removal of IFB Section 1.7 titled "Potential Funding Source and Requirements" and to please confirm as soon as possible that there are no AIS, DBRA, BABA or similar requirements that would carry premium wage or domestic material requirements.

*Nov 22, 2025 12:04 PM*

**Answered by Colleen Jacobsen:** The contract language cannot be removed due to existing federal funding applications which are pending award. Removal of the language could disqualify the City from receiving the requested funding. All bidders are instructed to bid the project as BABA and Davis Bacon.

*Dec 1, 2025 9:53 AM*

## 4. Electric

*Dec 5, 2025 4:37 PM*

**Question:** Please provide pictures of the panels inside the electrical room where tie-ins for new work will occur.

*Dec 5, 2025 4:37 PM*

**Answered by India Barr:** An onsite pre-proposal meeting was held November 24, 2025. Potential proposers had the opportunity at that time to request to photograph panels inside the electrical room. Pictures are not available at this time.

*Dec 9, 2025 11:44 AM*

## 5. IFB, Section 9, 9.2 Best Value Analysis

*Dec 5, 2025 4:37 PM*

**Question:** This section titled "Best Value Analysis" discusses criteria that "will be used to select the bid that will provide the best value to the City." Does the city have a pre-determined or publicly available ranking system to share with the bidders?

*Dec 5, 2025 4:37 PM*

**Answered by India Barr:** The City does not have a pre-determined or publicly available ranking system to share with the proposers.

*Dec 9, 2025 11:45 AM*

## 6. IFB, Section 1, 1.6.1 Hours of Service

*Dec 5, 2025 4:38 PM*

**Question:** Please confirm non-drilling related activities may occur 7 days a week, and drilling activities may occur on a 24/7 schedule.

*Dec 5, 2025 4:38 PM*

**Answered by India Barr:** Non-drilling related activities predominantly may occur 7 days a week during daylight hours, and drilling activities predominantly may occur on a 24/7 schedule. There are certain activities that may require a more limited schedule. One example is an activity that requires inspection by FDEP. The City reserves the right to implement a more limited schedule for specific circumstances.

*Dec 9, 2025 11:45 AM*

## 7. General

*Dec 5, 2025 4:38 PM*

**Question:** What is the Engineer's estimate for this project?

*Dec 5, 2025 4:38 PM*

**Answered by India Barr:** An engineer's estimate is not publicly available.

*Dec 9, 2025 11:46 AM*

## 8. Notice to Proceed

*Dec 5, 2025 4:38 PM*

**Question:** Will the City consider issuing a Limited Notice to Proceed to the successful bidder for the purpose of material procurement, with the full NTP negotiated after?

*Dec 5, 2025 4:38 PM*

**Answered by India Barr:** For purposes of preparing and submitting a proposal, the Proposer should assume that the City will not consider issuing a Limited Notice to Proceed for the purpose of material procurement with the full NTP negotiated after.

*Dec 9, 2025 11:47 AM*

## 9. IFB, Section 2, 2.1 Experience Requirements

*Dec 5, 2025 4:39 PM*

**Question:** This section states bidders "must have successfully completed two large-diameter UIC Class I deep injection wells in Florida within the past five years" and that "each well must have a final casing diameter of at least 24 inches and a setting depth of at least 2,000 feet below pad level." Should the depth and 24" diameter requirement be increased to a depth/size more comparable for this project?

## QUESTION & ANSWER REPORT

IFB No. 20260079

Glades Wastewater Treatment Facility Deep Injection Well No. 2

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*Dec 5, 2025 4:39 PM*

**Answered by India Barr:** No changes will be made.

*Dec 10, 2025 10:00 AM*

### 10. IW-1 Pressure Test & Injection Test

*Dec 5, 2025 4:50 PM*

**Question:** The scope of work includes performing a pressure test and injection test on IW-1 to re-rate the allowable wellhead pressure and the maximum injection capacity of the well. During the pre-bid it was discussed the pressure test was needed to account for the potential increase in pressure at the wellhead during the injection test due to downhole conditions. We request adding language that the Contractor is not responsible for any damage to the existing wellhead that may occur as a result of the potential increased pressure.

*Dec 5, 2025 4:50 PM*

**Answered by India Barr:** No additional language will be included in reference to testing on IW-1.

*Dec 9, 2025 11:54 AM*

### 11. Section 02770, 3.4, G.

*Dec 5, 2025 4:58 PM*

**Question:** This reference states in part, "The injection test of IW-1 shall be run at a pumping rate of approximately 2,000 gpm for two hours, 4,500 gpm for two hours and approximately, but not less than, 18,350 gpm for four hours as directed by the CONSULTANT." Based on the ID of the FRP, we estimate the max pumping rate to be approximately 23 feet/second. Has the FRP manufacturer been consulted on this pumping rate? We request adding language that the Contractor is not responsible for any damage to the FRP or other well components that may occur as a result of this injection test.

*Dec 5, 2025 4:58 PM*

**Answered by India Barr:** As noted in the specifications, pressure testing shall be performed in the annulus of IW-1 as specified prior to performing the injection test. If during injection testing, a wellhead pressure is reached that is 2/3 the pressure observed during the pressure test, the injection rate that results in the 2/3 tested wellhead pressure shall be used as the maximum injection rate. Information concerning consultation with the FRP manufacturer is not available. No additional language will be included in the specifications in reference to the Contractor's responsibilities in regards to damage to the FRP or other well components from injection testing.

*Dec 9, 2025 11:55 AM*

### 12. No subject

QUESTION & ANSWER REPORT

IFB No. 20260079

Glades Wastewater Treatment Facility Deep Injection Well No. 2

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*Dec 8, 2025 4:18 PM*

**Question:** Table, line items 13-18, the unit of measure for cement is listed by the Linear Foot. This places ALL the cementing risk on the Contractor and will carry a fairly significant cost increase to the project having to budget for unlimited cementing risk. We request changing the Unit of Measure on all cementing items to Cubic Feet and establishing reasonable quantities for each item (for example, theoretical volume + 15%). This will help prevent inflating the contract price as a result of unnecessary cementing risk.

*Dec 8, 2025 4:18 PM*

**Answered by India Barr:** The unit of measurement on cementing items will remain "Linear Foot". It should be noted that the means and methods of drilling impact the geometry of the borehole which in turn impacts the cement quantities installed. It should also be noted that the means and methods of cement operations impact the amount of cement losses encountered. The City is reliant on the Bidder's expertise, skill, and knowledge with the construction of deep injection wells to determine a fair estimate of cementing costs. The Bidder may conditionally utilize gravel within discreet intervals as specified in Section 01025, Measurement and Payment.

*Dec 8, 2025 4:29 PM*