COLUMBIA COUNTY BOARD OF COUNTY COMMISSIONERS
ELLISVILLE WASTEWATER TREATMENT PLANT
BID NO. 2016-10
ADDENDUM 3

This addendum consists of four (4) 8-1/2 by 11-inch sheets and four (4) attachment as follows:

- Attachment 1 - REV A Specifications
  - Section 00 41 13 – Bid Form
  - Section 00 43 14 – Bid Bond
  - Section 00 45 13 – Bidder Qualification Statement
  - Section 00 45 19 – Non-Collusion Affidavit
  - Section 00 52 13 – Agreement
  - Section 00 61 13.13 – Performance Bond
  - Section 33 05 05 - Buried Piping Installation
  - Section 40 05 53 – Process Valves Four-inch Diameter and Larger
- Attachment 2 – REV A Drawings
  - Sheet C-03, Wastewater Treatment Plant – Site Plan
  - Sheet C-09, Force Main Plan
- Attachment 3 – Columbia County Civil Details
- Attachment 4 – Geotechnical Report

The following changes, additions, and/or deletions are hereby made a part of the Request for Bid for the Ellisville Wastewater Treatment Plant, Bid No.: 2016-010, as fully and completely as if the same were fully set forth therein:

QUESTION 1: Can ACADD drawings be provided to aid in determining cut/fill quantities?

RESPONSE 1: AutoCAD drawings will not be provided. Cut/fill quantities shall be calculated with scaled drawings provided.

QUESTION 2: Is the existing soil stockpile at the new packaged plant location available for use on this project?

RESPONSE 2: The existing soil stockpile at the new packaged plant is not available for use on this project.

QUESTION 3: Please furnish a copy of the agreement that explains liquidated damages.

RESPONSE 3: Specification section 00 52 13 - Agreement is attached to this Addendum which explains liquidated damages in Article 4 - Contract Times, 4.03.A.

QUESTION 4: I'm trying to request a bid bond but I need to know estimate cost, days for completion, and amount for damages.

RESPONSE 4: The estimated total cost for the project is approximately $1,190,000. Attached Specification section 00 41 13 – Bid Form Article 5 - Time of Completion, 5.01 indicates the project shall be substantially complete within 270 calendar days after the date when the Contract Times commence to run and ready for final payment after 300 calendar days. Attached Section 00 52 13 – Agreement stipulates the amount of liquidated damages. CONTRACTOR shall pay OWNER $500.00 for each day that expires after the time specified in Paragraph 4.02.A above for Substantial Completion (adjusted for changes thereof, if any, made in accordance with Article 12 of the General Conditions) until the Work is substantially complete.

QUESTION 5: Proposing precast concrete vessels in lieu of steel vessels.

RESPONSE 5: Base Bid shall be tabulated based upon the requirement that bidders furnish equipment of the specified manufacturers. If bidder offers major equipment of other manufacturers as "Or Equals", the proposed "Or Equal" equipment schedule shall not be part of the total Base Bid. The lowest responsive bidder will be based solely on the total Based Bid and "Or Equals" will have no influence on awarding the project. Once a lowest responsive bidder is determined, the OWNER will evaluate any of that bidder's "Or Equals" and if any "Or Equals" are accepted, the total of the accepted "Or Equal" Deducts on the Proposed "Or Equal" Major Equipment Schedule will be subtracted from the Total Base Bid to determine the total award amount. Refer to attached Section 00 41 13 - Bid Form Article 4 for additional "Or Equal" requirements.

QUESTION 6: Ref G-02, Sequence of Construction, note 7: This note stipulates that grit is to be removed and disposed of in an appropriate manner, as approved by Owner. Is the grit to be hauled off and to become the responsibility of the Contractor; or is there an area provided by the owner in which it can be disposed of?

RESPONSE 6: Contractor is responsible for the removal and disposal of grit material.

QUESTION 7: Ref G-02, Sequence of Construction, note 7: What is the amount of grit and solids in the existing WWTP?

RESPONSE 7: Assume 4-inches of grit and solids accumulated in the plant's tanks for removal and disposal.

QUESTION 8: Ref 31.20.00.1.1.C.1: Is the Geotechnical Report dated 07.18.13 available?

RESPONSE 8: Geotechnical report is attached to this addendum. Refer to Attachment 4 – Geotechnical Reports

QUESTION 9: Ref 00.73.01.4.02.C.1.a: We request copies of the Geotechnical Reports named in this section of the Supplementary Conditions.

RESPONSE 9: Geotechnical Reports are attached to this addendum. Refer to Attachment 4 – Geotechnical Reports

QUESTION 10: SHEET No. C-03 – 6-inch effluent to basins from plant: Should the PVC header pipe all around the basins be 8-inch diameter. Detail No. E-C-03 shows 8-inch x 6-inch tee.

RESPONSE 10: Header pipe between the two future WWTP shall be 8-inch diameter. Details A-C-03 and E-C-3 and have been updated accordingly. Refer to updated drawing C-03, Wastewater Treatment Plant – Site Plan attached to this addendum.

QUESTION 11: Bid form calls for the HDPE to be DR-13.5 Iron pipe size. Spec section 40 05 33-5 calls for DR-17 iron pipe size. Please clarify.

RESPONSE 11: HDPE pipe rating shall be DR 13.5. Table 33 05 05-A, Buried Piping Schedule in specification section 33 05 05 - Buried Piping Installation has been updated. Refer to Attachment 1.

QUESTION 12: Division No. 46 WWTP spec calls for the plant manufacturer to supply all SST air pipe, fittings, valves & blowers. SHT # M-03 call for the contractor to provide……Please clarify.

RESPONSE 12: Field piping connections from blower motor units to plant air manifold will not be provided by plant manufacturer. Contractor shall be responsible to provide this SS piping as specified in drawing M-03.

QUESTION 13: Is this a Domestic material project? I could not find any specs telling me import would be allowed. Thanks.

RESPONSE 13: Import materials are allowed on this project.

QUESTION 14: REF General Instructions to Bidders, note 1: Is special consideration given to contractors who have performed work for Columbia County?

RESPONSE 14: As it is stipulated in the General Instruction to Bidders, 1.D., The performance on previous contracts with Columbia County is one of the criteria used to determine the low responsible bidder. However, combination of all the criteria listed will be considered in determining the low responsible bidder.

QUESTION 15: REF General Instructions to Bidders, note 27: Please confirm that the project will be awarded to one contractor, and not to separate contractors as stated in this note.

RESPONSE 15: Project will be awarded to a single Contractor.

QUESTION 16: REF 00.72.13.6.19: What is the Contractor's warranty period for this project?

RESPONSE 16: The Contractor's warranty period shall be one (1) Year after substantial completion. Refer to Specification section 00 72 13.13.07.A. Correction Period for more details in regards Contractor's warranty period.

QUESTION 17: REF 00.41.13.5.03: Are there Liquidated Damages for this project? If so, please communicate the values and details.

RESPONSE 17: Refer to Question and Response No. 4 above

QUESTION 18: REF Sheet C-03: Is there a concrete electrical pad next to the new Generator? If so, what are the dimensions and reinforcing requirements.

RESPONSE 18: The equipment rack next to the concrete slab for the generator shall be installed on grade. Refer to detail B on sheet E-12 - Electrical Details.

QUESTION 19: REF 33.05.05.3.3.A: This section and section 40.05.31.2.2.B.4.d require restrained joints as indicated or shown. It is not clearly indicated or shown. Please clarify how the 4" force main is to be restrained.

RESPONSE 19: Refer to Sheet C-15 - Civil Details III for restraining requirements.

QUESTION 20: REF 40.05.53.3.2.C.2: What type and brand of flexible coupling is to be used next to each buried valve?

RESPONSE 20: Flexible coupling next to each buried valve is not required. Specification section 40 05 53.3.2.C.2 has been updated and is attached to this addendum.

QUESTION 21: I am trying to order a bid bond, but can't without the number of days for competition and damages. I have looked through the specifications and can't find this information.

RESPONSE 22: Refer to Question and Response No. 4 above.

QUESTION 23: REF M-02: Please confirm that the aluminum access covers for the lift station and valve vaults are to be H-20 rated, and not the standard 300lb.

RESPONSE 23: Hatches for both lift stations and valve vaults shall be rated H-02 as specified in drawing M-02

QUESTION 24: Please confirm that a generic Bid Bond Form is sufficient, and that a specific Columbia County Form is not required.

RESPONSE 24: Contractor shall use the attached Bid Bond Form provided in this addendum. Refer to Attachment, Specification Section 00 43 14 – Bid Bond.

QUESTION 25: Civil details shown in drawing C-13 are difficult to read.

RESPONSE 25: County details are included in this addendum as a separate document. Refer to Attachment 3 for civil details.

END OF ADDENDUM NO. 3

00 41 13

BID FORM

COLUMBIA COUNTY CATYLIST SITE
WATER TREATMENT PLANT CONSTRUCTION

TABLE OF ARTICLES

1. Bid Recipient
2. Bidder's Acknowledgements
3. Bidder's Representations
4. Basis of Bid
5. Time of Completion
6. Attachments to this Bid
7. Defined Terms
8. Bid Submittal

ARTICLE 1 - BID RECIPIENT

1.01 Sealed Bids shall be submitted to:

Ray Hill
Purchasing Director
Columbia County Purchasing
135 NE Hernando Avenue, Suite 203
Lake City, FL 32056

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an AGREEMENT with OWNER in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the price(s) and within the times indicated in this Bid and in accordance with the Bidding Documents.

ARTICLE 2 - BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 120 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of OWNER. Bidder will sign the AGREEMENT and

will furnish the required contract security, and other required documents within the time periods set forth in the Bidding Documents.

ARTICLE 3 - BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

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

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

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

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

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in Paragraph 4.02 of the General Conditions, and (2) reports and drawings of Hazardous Environmental Conditions identified at the Site, if any, which that have been identified in the Supplementary Conditions as provided in Paragraph 4.06 of the General Conditions.

E. Bidder has obtained and carefully studied (or accepts the consequences for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may effect cost, progress or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.

F. Bidder does not consider that any further examinations, investigations, explorations, tests, studies or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.

G. Bidder is aware of the general nature of work (if any) to be performed by OWNER and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies and data with the Bidding Documents.

I. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.

J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

3.02 Bidder further represents that:

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

B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any individual or entity to refrain from bidding;

C. Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER; and

D. No person or persons acting in any official capacity for the OWNER are directly or indirectly interested in this Bid, or in any portion of the profit thereof.

ARTICLE 4 - BASIS OF BID

4.01 The Total Base Bid shall be tabulated based upon:

A. The Total Base Bid shall be tabulated based upon the requirement that bidders furnish equipment of the specified manufacturers. Equipment of other manufacturers offered as "Or Equals" named on the Proposed "Or Equal" Major Equipment Schedule shall not be part of the Total Base Bid. The OWNER will determine the lowest responsive bidder based solely on the Total Base Bid. "Or Equals" will have no influence on the selection of the lowest responsive bidder.

B. Once a lowest responsive bidder is determined, the OWNER will evaluate any of that bidder's "Or Equals" and if any "Or Equals" are accepted, the total of the accepted "Or Equal" Deducts on the Proposed "Or Equal" Major Equipment Schedule will be subtracted from the Total Base Bid to determine the total award amount. If no "Or Equals" are accepted by the OWNER, the bidder shall furnish and install, in accordance with the contract documents, all equipment specified in the Major Equipment Schedule and the equipment required under each section of the specifications shall be furnished and installed in strict compliance with the requirements of the Contract Documents for the amount stated by the bidder in the Total Base Bid.

C. Allowance of an "Or Equal" manufacturer does not constitute a waiver of the requirements of the Contract Documents.

4.02 All items on the Major Equipment Schedule shall be bid in accordance with the following:

A. The Major Equipment Schedule designates major equipment items that shall be included in the Total Base Bid. Named manufacturers are defined as those listed in the Major Equipment Schedule. The bidder shall **circle** the names of the manufacturers that will be provided for the work and return the completed Major Equipment Schedule with the bid documents.

B. "Or Equal" manufacturers are defined as those proposed and written in by the bidder in the Proposed "Or Equal" Major Equipment Schedule. If the bidder desires to propose an "Or Equal" for any named manufacturer of a specified item, the bidder shall complete the Proposed "Or Equal" Major Equipment Schedule and return the Proposed "Or Equal" Major Equipment Schedule with the bid. The bidder shall provide the names of the offered "Or Equal" manufacturers and price deduction for the OWNER, should the OWNER accept use of each "Or Equal" manufacturer. Only one "Or Equal" Major Equipment manufacturer is allowed per specification section. Should the "Or Equal" manufacturer be determined not equal in the OWNER’s discretion, the bidder, if awarded, shall provide the **circled** named manufacturer in the Major Equipment Schedule. "Or Equal" manufacturers shall be offered for the OWNER's consideration in accordance with Specification Section 01 25 00.

B. The bidder shall provide with the bid package returned to the OWNER on the

designated bid receipt day and time, a qualifications package for all proposed "Or Equal" manufacturers proposed by bidder. The qualification packages will be used solely by the OWNER to evaluate the proposed "Or Equal" manufacturer.

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

COLUMBIA COUNTY ELLISVILLE
WASTEWATER TREATMENT PLANT CONSTRUCTION
CONTRACT NO. 1G – GENERAL

NAME OF BIDDER:_____

Item	Description	Quantity	Unit	Total Price (In Numbers)
1	Mobilization/demobilization.	1	Lump Sum	
2	Site civil improvements	1	Lump Sum	
3	Furnish and install 105 gpm package Lift Station #1.	1	Lump Sum	
4	Furnish and install 105 gpm package Lift Station #2.	1	Lump Sum	
5	Furnish and install 11,000 LF of 4” DR 18 PVC force main.	1	Lump Sum	
6	Furnish and install 320 LF of 4” DR 13.5 HDPE force main.	1	Lump Sum	
7	Furnish and install 300 LF of 8” DR 35 PVC gravity sewer.	1	Lump Sum	
8	Furnish and Install 25,000 gpd packaged wastewater treatment plant, associated pumps, blowers, mixers, piping, valves, appurtenances, structural, electrical, instrumentation, control panels, and site improvements, complete in place.	1	Lump Sum	
9	Furnish and install three (3) rapid infiltration basins, associated piping, valves and appurtenances.	1	Lump Sum	
10	Demolition of existing structures and filling of existing rapid infiltration basins.	1	Lump Sum	
11	Dream Inn WWTF: Decommissioning of existing wastewater treatment facility including structures, mechanical equipment, tanks, electrical conduits, piping and stairway as shown and specified. Filling of existing ponds, existing underground tanks and grade the site to match existing as shown and specified.	1	Lump Sum	

COLUMBIA COUNTY ELLISVILLE
WASTEWATER TREATMENT PLANT CONSTRUCTION
CONTRACT NO. 1G – GENERAL

NAME OF BIDDER: _____

12	Owner's contingency allowance for additional civil, mechanical, electrical, instrumentation, and structural work, as authorized by OWNER.	1	Additional	$50,000
13	Allowance for required permitting fees, as authorized by OWNER.	1	Additional	$2,000

Total Base Bid (Sum of Items 1 through 13, inclusive) **$** _____.

(in numbers)

Total Base Bid in Words (Sum of Items 1 through 13, inclusive)

$ _____.

COLUMBIA COUNTY
ELLISVILLE WASTEWATER TREATMENT PLANT
CONTRACT NO. 1G – GENERAL

NAME OF BIDDER:_____

SCHEDULE OF DEDUCTIVE ALTERNATES

Item	Description	Quantity	Unit	Amount of Decrease to Base Bid
5	Furnish and install 11,000 LF of 4" DR 18 PVC force main.	1	Lump Sum	Subtract $_____
9	Furnish and install three (3) rapid infiltration basins, associated piping, valves and appurtenances.	1	Lump Sum	Subtract $_____
10	Demolition of existing structures and filling of existing rapid infiltration basins .	1	Lump Sum	Subtract $_____
11	Dream Inn WWTF: Decommissioning of existing wastewater treatment facility including structures, mechanical equipment, tanks, electrical conduits, piping and stairway as shown and specified. Filling of existing ponds, existing underground tanks and grade the site to match existing as shown and specified.	1	Lump Sum	Subtract $_____

SCHEDULE OF ADDITIVE ALTERNATES

AA-1	Furnish and install second 25,000 gpd packaged wastewater treatment plant, associated pumps, blowers, mixers, piping, valves, appurtenances, electrical, control	1	Lump Sum	Add $_____

	panels and site improvements, complete in place.			
AA-2	Furnish and install three (3) additional rapid infiltration basins, associated piping, valves and appurtenances.	1	Lump Sum	Add $_____

The OWNER reserves the right to award project based on the Total Base Bid and any combination of Deductive Alternate Bid Items or Additive Alternate Bid Items.

COLUMBIA COUNTY ELLISVILLE
WASTEWATER TREATMENT PLANT CONSTRUCTION
CONTRACT NO. 1G – GENERAL

MAJOR EQUIPMENT SCHEDULE (Circle One)

Equipment	Specification Section	Named Manufacturers (Circle One)
1. Packaged Package Wastewater Treatment Plant	46 07 53	RWL Water USA
2. Emergency Generator/ATS	26 32 13/26 36 23	Cummins/ONAN, Caterpillar
3. Package Lift Station Pumps	Plan Sheet M-01	Flygt, Hydromatic, ABS, EMU

Bidder agrees to furnish and install equipment from the above circled manufacturers in accordance with the provisions and terms of the Contract Documents. The contractor shall base his bid on the circle items above.

NAME OF BIDDER:_____

BIDDER'S SIGNATURE:_____

DATE:_____

COLUMBIA COUNTY ELLISVILLE
WASTEWATER TREATMENT PLANT CONSTRUCTION
CONTRACT NO. 1G – GENERAL

PROPOSED "OR EQUAL" MAJOR EQUIPMENT SCHEDULE

Number	Specification Section	Manufacturer's Name and Model Number	Amount of Deduct from Bid
1.			$
2.			$
3.			$
4.			$
5.			$
6.			$
7.			$

The above listed "Or Equal" items are hereby guaranteed to perform in all respects the functions of the items or specified manufacturers and in accordance with the Contract Documents. It is fully understood that approval of such items is contingent upon this guarantee and at the sole discretion of the OWNER.

NAME OF BIDDER:_____

BIDDER'S SIGNATURE:_____

DATE:_____

4.04 Combined Bids: (Not Used)

4.05 Unit prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

4.06 Bidder acknowledges that estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids, and final payment for all Unit Price items will be based on actual quantities of Unit Price Work determined as provided in the Contract Documents.

4.07 All specified cash allowances are included in the price(s) set forth above and have been completed in accordance with Paragraph 11.02 of the General Conditions.

ARTICLE 5 - TIME OF COMPLETION

5.01 Bidder agrees that the Work will be substantially complete within 270 calendar days after the date when the Contract Times commence to run as provided in Paragraph 2.03 of the General Conditions, and will be completed and ready for final payment in accordance with paragraph 14.07.B of the General Conditions within 300 calendar days after the date when the Contract Times commence to run, which days will be entered by OWNER into the AGREEMENT as the Contract Times.

5.02 The existing Ellisville Utility WWTF is currently under a FDEP Domestic Wastewater Facility Permit that expires on June 09, 2017. The existing Utility WWTF shall be off-line prior the expiration of this permit to be in compliance with the FDEP permit. Therefore, proposed Lift Station No.1, the 4" force main from Lift Station No.1 to the new WWTP package plant and the proposed WWTP package plant shall be substantially completed no later than June 09, 2017.

5.03 Bidder accepts the provisions of the AGREEMENT as to liquidated and special damages, if any, in the event of failure to complete the Work within the Contract Times.

ARTICLE 6 - ATTACHMENTS TO THIS BID

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

A. Required Bid security.

B. Required Bidder Qualifications Statement with supporting data.

ARTICLE 7 - DEFINED TERMS

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

ARTICLE 8 - BID SUBMITTAL

8.01 This Bid submitted on _____, 20___ by:

If Bidder is:

Individual

Name (Typed or Printed): _____

By_____
(Individual's Signature)

Doing business as_____

License or Registration Number:_____

Business Address:_____

_____

Phone No.:_____Facsimile:_____

A Partnership

Partnership Name: _____

By:_____
(Signature of General Partner - Attach evidence of authority to sign)

(Name (Typed or Printed): _____

License or Registration Number:_____

Business Address:_____

_____

Phone No.:_____Facsimile:_____

A Corporation

Corporation Name: _____

_____
(State of Incorporation)

By_____
(Signature - Attach evidence of authority to sign)

Name and Title (Typed or Printed): _____

(CORPORATE SEAL)

Attest:_____
(Secretary)

License or Registration Number:_____

Business Address:_____

_____

Phone No.:_____Facsimile:_____

Limited Liability Company

By:_____
(Firm Name)

_____
(State of Formation)

By:_____
(Signature of Member/Authorized to Sign)

_____
(Printed or Typed Name and Title of Member Authorized to Sign)
(Attach evidence of authority to sign.)

License or Registration Number:_____

Business Address:_____

_____

Phone No.:_____Facsimile:_____

A Joint Venture

Name of Joint Venture:_____

First Joint Venturer Name: _____

By:_____
(Signature of First Joint Venturer - Attach evidence of authority to sign)

Name (Typed or Printed): _____ _____
(Title)

Title:_____

Second Joint Venturer Name: _____

By:_____
(Signature of Second Joint Venturer - Attach evidence of authority to sign)

Name (Typed or Printed): _____ _____
(Title)

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

Business Address: _____

Phone and FAX number and address for receipt of communications to joint venture:

Phone: _____ Facsimile:_____

+ + END OF BID FORM + +

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SECTION 00 43 14

BID BOND

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

BIDDER *(Name and Address)*:

SURETY *(Name and Address of Principal Place of Business)*:

OWNER *(Columbia County Utilities, 607 NW Quinten Street, Lake City, Florida, 32055)*:

BID

Bid Due Date:

Description: Ellisville Wastewater Treatment Plant

BOND

Bond Number:

Date (Not earlier than Bid due date):

Penal sum _____ $ _____

(Words) (Figures)

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

BIDDER	**SURETY**
_____ (Seal)	_____ (Seal)
Bidder's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature	Signature (Attach Power of Attorney)
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	Attest: _____
Signature	Signature
_____	_____
Title	Title

Note: Above addresses are to be used for giving any required notice. Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder any difference between the total amount of Bidder's Bid and the total amount of the Bid of the next lowest, responsible Bidder who submitted a responsive Bid as determined by Owner for the work required by the Contract Documents, provided that:

1.1 If there is no such next Bidder, and Owner does not abandon the Project, then Bidder and Surety shall pay to Owner the penal sum set forth on the face of this Bond, and
1.2 In no event shall Bidder's and Surety's obligation hereunder exceed the penal sum set forth on the face of this Bond.
1.3 Recovery under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
3.2 All Bids are rejected by Owner, or
3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

SECTION 00 45 13

BIDDER QUALIFICATIONS STATEMENT
(Completion of this statement is required in advance of consideration for award of Contract.)

SUBMITTED TO:

COLUMBIA COUNTY UTILITIES
607 NW QUINTEN STREET
LAKE CITY, FL 32055

SUBMITTED FOR:

COLUMBIA COUNTY UTILITIES
ELLISVILLE WASTEWATER TREATMENT PLANT

SUBMITTED BY:

Name of Organization: _____
(Print or Type Name of Bidder)

Name of Individual: _____

Title: _____

Business Address: _____

_____

Telephone No.: _____

Fax No.: _____

Gentlemen:

The undersigned certifies under oath the truth and correctness of all statements and of all answers to questions made hereinafter.

(Note: Attach additional sheets as required.)

1.0 Bidder's General Business Information

1.1 Check if:

☐ Corporation ☐ Partnership ☐ Joint Venture ☐ Sole Proprietorship

☐ Limited Liability Company

If Corporation:

A. Date and State of Incorporation:

_____
_____

B. List of Executive Officers:

Name	Title

If Partnership:

A. Date and State of Organization:

_____
_____

B. Names of Current General Partners:

_____
_____

C. Type of Partnership

☐ General ☐ Publicly Traded

☐ Limited ☐ Other (described): _____

If Joint Venture:

A. Date and State of Organization:

_____
_____

B. Name, Address and Form of Organization of Joint Venture Partners: (Indicate managing partner by an asterisk *):

_____
_____
_____
_____
_____

If Sole Proprietorship:

A. Date and State of Organization:

_____
_____

B. Name and Address of Owner or Owners:

_____
_____
_____
_____

If Limited Liability Company:

A. Date and State of Organization:

_____
_____

B. Name and Address of Owner or Owners:

_____
_____
_____
_____

2.0 How many years has your organization been in business as a general or electrical (circle all that apply) contractor? _____

3.0 If your organizational structure has changed within the past five years, provide data as listed above in Item 1.0 for your previous organization.

4.0 Do you plan to subcontract any part of this project? _____ If so, give details.

5.0 Has any construction contract to which you have been a party been terminated by the owner; have you ever terminated work on a project prior to its completion for any reason; has any surety which issued a performance bond on your behalf ever completed the work in its own name or financed such completion on your behalf; has any surety expended any monies in connection with a contract for which they furnished a bond on your behalf? If the answer to any portion of this question is "yes", furnish details of all such occurrences including name of owner, architect or engineer, and surety, and name and date of project.

6.0 Has any officer or partner of your organization ever been an officer or partner of another organization that had any construction contract terminated by the owner; terminated work on a project prior to its completion for any reason; had any surety which issued a performance bond complete the work in its own name or financed such completion; or had any surety expend any monies in connection with a contract for which they furnished a bond? If the answer to any portion of this question is "yes", furnish details of all such occurrences including name of owner, architect or engineer, and surety, and name and date of project.

7.0 In the last five years, has your organization, or any predecessor organization, failed to substantially complete a project in a timely manner? If the answer to this question is “yes”, furnish details of all such occurrences including name of owner, architect or engineer, and surety, and name and date of project.

8.0 On Schedule A, attached, list name, location and description of project, owner, architect or engineer, contract price, percent complete and scheduled completion of the major construction projects your organization has in progress on this date. Provide name, address and telephone number of a reference for each project listed.

9.0 On Schedule B, attached, list name, location and description of project, owner, architect or engineer, contract price, date of completion and percent of work with your own forces of major projects of the same general nature as this project which your organization has completed in the past five years. Provide name, address and telephone number of a reference for each project listed.

10.0 On Schedule C, attached, list name and construction experience of the principal individuals of your organization directly involved in construction operations.

11.0 List the states and categories of construction in which your organization is legally qualified to do business.

12.0 Provide the following for your surety:

12.1 Surety Company: _____

12.2 Agent: _____

A. Address: _____

B. Telephone No.: _____

13.0 Provide the following with respect to an accredited banking institution familiar with your organization.

13.1 Name of Bank: _____

13.2 Address: _____

13.3 Account Manager: _____

13.4 Telephone No.: _____

14.0 Provide the name, address and telephone number of an individual who represents a major equipment/material supplier whom the Owner may contact for a financial reference:

_____

_____

_____

15.0 Dated at _____, this _____ day of _____, 20__.

Bidder: _____
(Print or Type Name of Bidder)

By:_____

_____

Title:_____

Attachments A, B and C

(Seal, if corporation)

----------(Affidavit for Sole Proprietorship)----------

_____ being duly sworn, deposes and says that all of the foregoing qualification information is true, complete, and accurate.

----------(Affidavit for Partnership or Joint Venture)----------

_____ being duly sworn, deposes and says that he/she is a member of the partnership of _____;
and all of the foregoing qualification information is true, complete, and accurate.

----------(Affidavit for Corporation)----------

_____ being duly sworn, deposes and says that he/she is _____ of _____;
(Full name of Corporation)
and that all of the foregoing qualification information is true, complete, and accurate.

----------(Affidavit for Limited Liability Company)----------

_____ being duly sworn, deposes and says that all of the foregoing qualification information is true, complete, and accurate.

----------(Acknowledgment)----------

_____ being duly sworn, deposes and says
that he/she is _____ of _____;
(Name of Bidder)
that he/she is duly authorized to make the foregoing affidavit and that he/she makes it on behalf of
( ) said sole proprietorship; ( ) said partnership; ( ) said corporation;

( ) said joint venture; ( ) said limited liability company.

Sworn to before me this _____ day of _____, 20__, in the County of _____, State of _____.

_____
(Notary Public)

My commission expires _____

(Seal)

++ END OF BIDDER QUALIFICATIONS STATEMENT ++

ATTACHMENT A

SCHEDULE A
PROJECTS IN PROGRESS

Name, Location and Description of Project	Owner	Architect or Engineer	Contract Price	Percent Complete	Scheduled Completion	Reference/Contract Include Address and Phone

ATTACHMENT B

SCHEDULE B
PROJECTS COMPLETED

Name, Location and Description of Project	Owner	Architect or Engineer	Date Completed	Contract Price	Percent with Own Forces	Reference/Contract Include Address and Phone

ATTACHMENT C

SCHEDULE C
PERSONNEL

Name	Position	Date Started With This Organization	Date Started In Construction	Prior Positions and Experience In Construction

SECTION 00 45 19

NON-COLLUSION AFFIDAVIT

The following Non-collusion Affidavit will be completed only by the *successful* bidder to whom the OWNER proposed to award the Contract.

The Owner reserves the right to require the successful bidder to submit such an affidavit, dated and executed after the opening of the bids, as a condition precedent to its award of the Contract.

AFFIDAVIT OF PRINCIPAL CONTRACTOR

STATE OF _____: SS

_____ being first duly sworn, deposes and says that he is

_____ of _____
(Sole Owner/Partner/President/Secretary/Other Title) (Name of Bidder)

who on _____, 20____, submitted to the Board of County Commissioners,
(Date Bid Was Submitted)

Columbia County, Florida, a bid as set forth in the attached copy; that all statements of fact in such bid are true; that such bid was not made in the interest of or on behalf of any undisclosed person, partnership, company, association, organization, or corporation; that such bid is genuine and not collusive or sham; that said bidder has nor directly or indirectly, by agreement, communication or conference with anyone attempting to induce action prejudicial to the interests of the public body which is to award the contract, or of any other bidder or anyone else interested in the proposed contract; and further, that prior to the public opening and reading of bids, said bidder,

a. did not directly or indirectly, induce, or solicit anyone else to submit a false or sham bid;

b. did not directly or indirectly, collude, conspire, connive, or agree with anyone else that said bidder or anyone else would submit a false or sham bid, or that anyone should refrain from bidding and withdraw his bid;

c. did not, in any manner, directly or indirectly, seek by agreement, communication or conference with anyone to raise or fix the bid price of said bidder or of anyone else, or to raise or fix any overhead, profit or cost element of his bid price, or that of anyone else;

d. did not, directly or indirectly, submit his bid price or breakdown thereof, or the contents thereof, or divulge information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, or to any individuals, except to the awarding authority or to any person or persons who have a partnership of other financial interest with said bidder in his business; and

e. did not include in his bid price any fees, dues, charges, or assessments because required to do so by reason of his membership in or affiliation with any association, organization, corporation, partnership, company, individual, or group of individuals, or because of any agreement of understanding with anyone that he would do so.

Signed: _____

_____
Typed or Neatly Printed Name of Above Signer

Title: _____

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

(SEAL)

_____
Notary Public

My Commission Expires: _____

The Owner reserves the right to require, as a condition precedent to its approval of proposed subcontractors, that the principal contractor shall submit to the Owner the name of each of the proposed subcontractors and upon notice of approval of said subcontractors by the Owner, the principal contractor shall furnish satisfactory non-collusion affidavits in the following form executed by each accepted subcontractor.

AFFIDAVIT OF SUBCONTRACTOR

STATE OF _____: SS

_____ being first duly sworn, deposes and says that he is

_____ of _____
(Sole Owner/Partner/President/Secretary/Other Title) (Name of Proposed Subcontractor)

who on _____, 20____, submitted to _____
(Date Bid Was Submitted) (Name of Principal Contractor)

bid as set forth in the attached copy, for a subcontract; that all statements of fact contained in such bid are true; that such bid was not made in the interest of or on behalf of any undisclosed person, partnership, company, association, organization, or corporation; that such bid is genuine and not collusive or sham; and further, that prior to the execution of this affidavit, said bidder,

a. has not, directly or indirectly, induced, or solicited anyone else to submit a false or sham bid to said principal contractor or to anyone else;

b. has not, directly or indirectly, colluded, conspired, connived, or agreed with anyone else that said bidder or anyone else would submit a false or sham bid, or that anyone should refrain from bidding and withdraw his bid;

c. has not, in any manner, directly or indirectly, sought by agreement, communication or conference with anyone to raise or fix the bid price of said bidder or of anyone else, or to raise or fix any overhead, profit or cost element of his bid price, or that of anyone else;

d. did not, directly or indirectly, submit his bid price or any breakdown thereof, or the contents thereof, or divulge information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, or to any individuals, except to the awarding authority or to any person or persons who have a partnership of other financial interest with said bidder in his business; and

e. did not include in his bid price any fees, dues, charges, or assessments because required to do so by reason of his membership in or affiliation with any association, organization, corporation, partnership, company, individual, or group of individuals, or because of any agreement of understanding with anyone that he would do so.

Signed: _____

_____
Typed or Neatly Printed Name of Above Signer

Title: _____

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

(SEAL)

_____
Notary Public

My Commission Expires: _____

++ END OF SECTION ++

SECTION 00 52 13

AGREEMENT

THIS AGREEMENT is by and between Columbia County (hereinafter called OWNER) and

_____

(hereinafter called CONTRACTOR).

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

ARTICLE 1 – WORK

1.01 CONTRACTOR shall at its own cost and expense furnish all labor, services, tools, materials, equipment, and incidentals necessary to complete all Work as specified or indicated in the Contract Documents to construct the water treatment plant.

ARTICLE 2 – PROJECT

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

Furnishing of all labor, equipment, materials, tools and services required to construct, test, and startup the proposed Ellisville Wastewater Treatment Plant, including, but not limited to associated site work, yard piping, valves, support systems, lift stations and appurtenances, structural, painting, electrical, instrumentation, tie-ins to existing systems, training, and testing.

ARTICLE 3 – ENGINEER

3.01 The Project has been designed by ARCADIS (hereinafter called ENGINEER), which is to act as OWNER's representative, assume all duties and responsibilities and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

4.01 Time of the Essence

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

4.02 Days to Achieve Substantial Completion and Final Payment

A. The Work shall be substantially completed within 270 calendar days after the date when the Contract Times commence to run as provided in Paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions within 300 calendar days from the date when the Contract Times commence to run.

4.03 Liquidated Damages

A. OWNER and CONTRACTOR recognize that time is of the essence as stated in Paragraph 4.01 above and that OWNER will suffer financial loss, apart from the costs described in Paragraph 4.04.A, if the Work is not substantially completed within the time specified in Paragraph 4.02.A for Substantial Completion, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. OWNER and CONTRACTOR also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not substantially completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER $500.00 for each day that expires after the time specified in Paragraph 4.02.A above for Substantial Completion (adjusted for changes thereof, if any, made in accordance with Article 12 of the General Conditions) until the Work is substantially complete.

4.04 Special Damages

A. In addition to the amount provided for liquidated damages, CONTRACTOR shall pay OWNER the actual costs reasonably incurred by OWNER for engineering and inspection forces employed by OWNER relative to the Work for each day that expires after the number of days specified in Paragraph.4.02.A for Substantial Completion (adjusted for changes thereof, if any, made in accordance with Article 12 of the General Conditions) until the Work is substantially complete.

B. After Substantial Completion, if CONTRACTOR shall neglect, refuse or fail to complete the remaining Work within the Contract Time or proper extension thereof, if any, granted by OWNER, CONTRACTOR shall pay OWNER the actual costs

reasonably incurred by OWNER for engineering and inspection forces employed by OWNER relative to the Work for each day that expires after the time specified in Paragraph 4.02.A for Work to be completed and ready for final payment (adjusted for extensions thereof, if any, made in accordance with Article 12 of the General Conditions) until the Work is completed and ready for final payment.

4.05 OWNER may deduct liquidated damages and special damages as determined by the provisions of this Article 4 from progress payments due CONTRACTOR under this Agreement.

ARTICLE 5 – CONTRACT PRICE

5.01 OWNER shall pay CONTRACTOR, in current funds, for completion of the Work in accordance with the Contract Documents the lump sum of _____ Dollars ($). All specific cash allowances are included in the above price and have been computed in accordance with Paragraph 11.02 of the General Conditions.

5.01 OWNER shall pay CONTRACTOR, in current funds, for completion of the Work in accordance with the Contract Documents the prices stated in CONTRACTOR's Bid, which Bid is attached hereto and identified as Exhibit 1 of this Agreement.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

A. CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed as provided in the General Conditions.

6.02 Progress Payments; Retainage

A. OWNER shall make monthly progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment as recommended by ENGINEER. CONTRACTOR's Applications for Payment will be due on the last business day of each month during performance of the Work as provided in Paragraph 6.02.A.1. All progress payments will be on the basis of the progress of the Work measured by the Schedule of Values provided for in Paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work, based on the number of units completed) or, in the event there is no Schedule of Values, as provided in the General Requirements. A progress payment will not be made whenever the value of the Work completed since the last previous progress payment is less than $5,000.

1. Prior to Substantial Completion:

a. Progress payments will be in the amount of 90 percent of the Work completed (with the balance being retainage), less the aggregate of payments previously made and less such amounts as ENGINEER shall determine, or OWNER may withhold, in accordance with Paragraph 14.02 of the General Conditions. If the Work has been 50 percent completed as determined by the ENGINEER, and if the character and progress of the Work have been satisfactory to OWNER and ENGINEER, OWNER may determine that as long as the character and progress remain satisfactory, the retainage can be reduced to 5 percent for the Work subsequently completed, in which case the remaining progress payments prior to Substantial Completion will be an amount equal to 95 percent of the value of the Work completed, less the aggregate of payments previously made and less such amounts as ENGINEER shall determine, or OWNER may withhold, in accordance with Paragraph 14.02 of the General Conditions; and

b. 90 percent of the cost of materials and equipment not incorporated in the Work but suitably stored (with the balance being retainage).

2. Upon Substantial Completion, OWNER shall pay an amount sufficient to increase total payments to CONTRACTOR to 100 percent of the Work completed, less such amounts as ENGINEER shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions and less 200 percent of ENGINEER's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

6.03 Final Payment:

A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said Paragraph 14.07.

ARTICLE 7 – INTEREST

7.01 All moneys not paid when due and stated in the Agreement shall be deposited in a joint escrow account with the OWNER and the CONTRACTOR required to co-sign for any withdrawals. The savings institution shall be selected by the OWNER. The savings institutions shall be a Florida Banking Association organized and existing under the laws of the State of Florida and acceptable to the CONTRACTOR. The type of account shall be selected by the CONTRACTOR. All interest and principal arising from moneys due to the CONTRACTOR shall be paid to him upon completion of the Work.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

8.01 As part of the inducement for OWNER to enter into this Agreement, CONTRACTOR makes the following representations:

A. CONTRACTOR has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

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

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

D. CONTRACTOR has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); if any, that have been identified in Paragraph SC-4.02 of the Supplementary Conditions as containing reliable "technical data", and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph SC-4.06 of the Supplementary Conditions as containing reliable "technical data".

E. CONTRACTOR has considered the information known to CONTRACTOR; information commonly known to CONTRACTORs doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on:

1. the cost, progress, and performance of the Work;

2. the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents, and;

3. CONTRACTOR's safety precautions and programs.

F. Based on the information and observations referred to in Paragraph 8.01.E above, CONTRACTOR does not consider that further examinations, investigations,

explorations, tests, studies or data are necessary for the performance of the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents.

G. CONTRACTOR is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Contract Documents.

H. CONTRACTOR has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that CONTRACTOR has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 The Contract Documents consist of the following:

A. This Agreement.

B. Performance Bond.

C. Payment Bond.

D. General Conditions.

E. Supplementary Conditions.

F. Specifications, as listed in the table of contents of the Project Manual.

G. The Drawings comprising a set entitled Ellisville Wastewater Treatment Plant, dated October 2016

H. Addenda consisting of Numbers____ to ____, inclusive.

I. Exhibits to this Agreement enumerated as follows:

1. Exhibit 1, CONTRACTOR's Bid (pages _____ to ___, inclusive).

J. The following, which may be delivered or issued on or after the Effective Date of the Agreement, and are not attached hereto:

1. Notice to Proceed.

2. Work Change Directive(s).

3. Change Order(s).

9.02 The documents listed in Paragraph 9.01 above are attached to this Agreement (except as expressly noted otherwise above). Documents not attached are incorporated by reference. There are no Contract Documents other than those listed in this Article 9.

9.03 The Contract Documents may only be amended or supplemented as provided in Paragraph 3.04 of the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 Terms

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

10.02 Assignment of Contract

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

10.03 Successors and Assigns

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

10.04 Severability

A. Any provision or part of the Contract Documents, held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions

shall continue to be valid and binding upon OWNER and CONTRACTOR, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 Waiver

A. The waiver by the OWNER of any breach or violation of any term, covenant, or condition of this Agreement or of any Law or Regulation shall not be deemed to be a waiver of any other term, covenant, condition, or Law or Regulation, or of any subsequent breach or violation of the same or of any other term, covenant, condition, or Law or Regulation. The subsequent payment of any monies or fee by the OWNER which may become due hereunder shall not be deemed to be a waiver of any preceding breach or violation by CONTRACTOR of any term, covenant, condition of this Agreement or of any applicable Law or Regulation.

10.06 CONTRACTOR's Certifications

A. CONTRACTOR certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.06:

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

2. "fraudulent practice" means an intentional misrepresentation of facts made to:

   a. influence the bidding process or the execution of the Contract to the detriment of OWNER,

   b. establish Bid or Contract prices at artificial non-competitive levels, or

   c deprive OWNER of the benefits of free and open competition.

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

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

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement. Counterparts have been delivered to OWNER and CONTRACTOR. All portions of the Contract Documents have been identified by OWNER and CONTRACTOR or on their behalf.

This Agreement will be effective on _____, 20_____ (which is the Effective Date of the Agreement).

OWNER: _____ Contractor: _____

By: _____ By: _____

Title: _____ Title: _____

Attest _____ Attest _____

Title: _____ Title: _____

Address for giving notices Address for giving notices

Columbia County
607 NW Quinten Street
Lake City, Florida 32055

_____

_____

_____

(If OWNER is a corporation, partnership, or limited liability company, attach evidence of authority to sign) (If OWNER is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of Agreement.)

License No. _____
(where applicable)

Agent for service of process:_____

_____

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

Designated Representative: Designated Representative:

Name: Chad Williams

_____

Title: Columbia County Engineer

_____

Address: 607 NW Quinten Street
Lake City, Florida 32055

_____

Phone No.:

_____

Fax No.:

_____

Email:

Name: _____

Title: _____

Address: _____

Phone No.: _____

Fax No.: _____

+ + END OF AGREEMENT + +

Section 00 61 13.13

PERFORMANCE BOND

CONTRACTOR *(name and address)*:

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

OWNER: Columbia County Utilities
607 NW Quinten Street
Lake City, FL 32055

CONSTRUCTION CONTRACT
Effective Date of the Agreement:
Amount:
Description: Ellisville Wastewater Treatment Plant

BOND
Bond Number:
Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:
Amount:
Modifications to this Bond Form: ☐ None ☐ See Paragraph 16

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

CONTRACTOR AS PRINCIPAL	**SURETY**
_____ *(seal)*	_____ *(seal)*
Contractor's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	**By:** _____
Signature	Signature *(attach power of attorney)*
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	**Attest:** _____
Signature	Signature
_____	_____
Title	Title

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

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

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

14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

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

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

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

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

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

16. Modifications to this Bond are as follows:

SECTION 33 05 05

BURIED PIPING INSTALLATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:
   1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to install and test all buried piping, fittings, and specials. The Work includes the following:
      a. All types and sizes of buried piping, except where buried piping installations are specified under other Sections.
      b. Unless otherwise shown or specified, this Section includes all buried piping Work required, beginning at the outside face of structures or structure foundations, including piping beneath structures, and extending away from structures.
      c. Installation of all jointing and gasket materials, specials, flexible couplings, mechanical couplings, harnessed and flanged adapters, sleeves, tie rods, cathodic protection, and other Work required for a complete, buried piping installation.
      d. Supports, restraints, and thrust blocks.
      e. Pipe encasements, with the exception of piping embedded in concrete within a structure or foundation specified under Section 40 05 05, Exposed Piping Installation.
      f. Field quality control, including testing.
      g. Cleaning.
      h. Incorporation of valves, meters, and special items shown or specified into piping systems in accordance with the Contract Documents and as required.

B. Coordination:
   1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before buried piping Work.
   2. Coordinate with appropriate piping Sections of Division 40, Process Integration.

C. Related Sections:
   1. Section 31 20 00, Earth Moving.
   2. Section 03 30 05, Concrete.
   3. Section 09 91 00, Painting.
   4. Section 40 05 31, Thermoplastic Process Pipe.
   5. Section 40 05 33, High Density Polyethylene Process Pipe.

6. Section 40 05 19, Ductile Iron Process Pipe

1.2 REFERENCES

A. Standards referenced in this Section are:
   1. ASME B31.3, Process Piping.
   2. American Society for Non-Destructive Testing (ASNT), ASNT-TC-1A, Recommended Practice, Personnel Qualification, and Certification in Non-destructive Testing.
   3. ASTM B32, Specification for Solder Metal.
   4. ASTM D2321, Practice for Underground Installation of Thermoplastic Pipe for Sewers and other Gravity-Flow Applications.
   5. ASTM D2774, Practice for Underground Installation of Thermoplastic Pressure Piping.
   6. ASTM F1417, Test Method for Installation Acceptance of Plastic Gravity Sewer Lines using Low-Pressure Air.
   7. ASTM F2164, Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure.
   8. ANSI/AWWA C105, Polyethylene Encasement for Ductile-Iron Pipe Systems.
   9. ANSI/AWWA C111, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
   10. ANSI/AWWA C605, Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
   11. AWWA M23, PVC Pipe - Design and Installation.
   12. AWWA M55, PE Pipe - Design and Installation.
   13. ASCE 37, Design and Construction of Sanitary and Storm Sewers.
   14. Chlorine Institute, Inc., Piping Systems for Dry Chlorine, Pamphlet No. 6.
   15. Recommended Standards for Wastewater Facilities, latest edition (10 States Stnadards)

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Comply with requirements and recommendations of authorities having jurisdiction.
   2. Obtain required permits for Work in roads, rights-of-way, railroads, and other areas of the Work.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:
   1. Shop Drawings:
      a. Details of piping, specials, joints, harnessing and thrust blocks, and connections to piping, structures, equipment, and appurtenances.
   2. Product Data:

a. Manufacturer's literature and specifications, as applicable, for products specified in this Section.

3. Testing Procedures:
   a. Submit proposed testing procedures, methods, apparatus, and sequencing. Obtain ENGINEER's approval prior to commencing testing.

B. Informational Submittals: Submit the following:
   1. Certificates:
      1. Certificate signed by manufacturer of each product certifying that product conforms to applicable referenced standards.
   2. Field Quality Control Submittals:
      a. Results of each specified field quality control test.

C. Closeout Submittals: Submit the following:
   1. Record Documentation:
      a. Maintain accurate and up-to-date record documents showing modifications made in the field, in accordance with approved submittals, and other Contract modifications relative to buried piping Work. Submittal shall show actual location of all piping Work and appurtenances at same scale as the Drawings.
      b. Show piping with elevations referenced to Project datum and dimensions from permanent structures. For each horizontal bend in piping, include dimensions to at least three permanent structures, when possible. For straight runs of piping provide offset dimensions as required to document piping location.
      c. Include profile drawings with buried piping record documents when the Contract Documents include piping profile drawings.
      d. Conform to Section 01 78 39, Project Record Documents.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery:
   1. Deliver materials to the Site to ensure uninterrupted progress of the Work.
   2. Upon delivery inspect pipe and appurtenances for cracking, gouging, chipping, denting, and other damage and immediately remove from Site and replace with acceptable material.

B. Storage:
   1. Store materials to allow convenient access for inspection and identification. Store material off ground using pallets, platforms, or other supports. Protect packaged materials from corrosion and deterioration.
   2. Pipe and fittings other than PVC and CPVC may be stored outdoors without cover. Cover PVC and CPVC pipe and fittings stored outdoors.

C. Handling:

1. Handle pipe, fittings, specials, and accessories carefully in accordance with pipe manufacturer's recommendations. Do not drop or roll material off trucks. Do not drop, roll or skid piping.
2. Avoid unnecessary handling of pipe.
3. Keep pipe interiors free from dirt and foreign matter.
4. Protect interior linings and exterior coatings of pipe and fittings from damage. Replace pipe and fittings with damaged lining regardless of cause of damage.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Piping materials are specified in the Buried Piping Schedule at the end of this Section. Piping materials shall conform to Specifications for each type of pipe and piping appurtenances in applicable Sections of Division 40, Process Integration.

B. General:
   1. Pipe Markings:
      a. Manufacturer shall cast or paint on each length of pipe and each fitting pipe material, diameter, and pressure or thickness class.
   2. Bolts & Nuts:
      a. Provide graphite-free anti-seize compound for stainless steel nuts and bolts to prevent galling. Strength of bolted joints shall not be affected by use of anti-seize compound.

2.2 BURIED PIPING IDENTIFICATION

A. Detectable Underground Warning Tape for Non-Metallic Pipelines:
   1. Identification tape shall be manufactured of polyethylene with a minimum thickness of four mils and shall have a one mil thick metallic foil core. The tape shall be highly resistant to alkalies, acids and other destructive agents found in soil. Tape width shall be six inches. Tape shall be suitable for direct burial.
   2. Message shall read, "CAUTION: WASTEWATER FORCE MAIN BURIED BELOW" with bold letters approximately two inches high imprinted with black letters. Messages shall be printed at maximum intervals of two feet. Tape shall be custom colored the same as the pipeline colors as specified for the associated pipe service in Section 09 91 00, Painting.
   3. Manufacturer: Provide products of one of the following:
      a. Brady Corporation
      b. Seton Identification Products
      c. Marking Services, Inc.
      d. Reef Industries, Inc.
      e. Or equal.

B. Tracer Wire for Non-Metallic Pipelines:
   1. Install 14-guage copper UF (Underground Feeder per National Electric Code Article 339) solid tracer wire and joint seal (Kearney Aquaseal, Bishop, or approved equal) along all non-metallic pipes. The wire shall be taped below the spring line of the pipe and shall be stubbed up at all valves. At each valve the wire shall be installed along the outside of the valve box. Sections of wire shall be spliced together using a Buchanon tool or wirenut. Splicing by twisting the wire together is not acceptable.
   2. Each segment of tracer wire shall be demonstrated to be electrically continuous between turn-ups after backfilling and before the pipe is accepted as complete.
   3. Tracer wire shall be color-coded to match pipe service.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
   1. Install piping as shown, specified, and as recommended by pipe and fittings manufacturer.
   2. In event of conflict between manufacturer's recommendations and the Contract Documents, request interpretation from ENGINEER before proceeding.
   3. ENGINEER will observe excavations and bedding prior to laying pipe by CONTRACTOR. Notify ENGINEER in advance of excavating, bedding, pipe laying, and backfilling operations.
   4. Minimum cover over buried piping shall be 3 feet, unless otherwise shown or approved by ENGINEER.
   5. Earthwork is specified in Section 31 20 00, Earth Moving.
   6. Excavation in excess of that required or shown, and that is not authorized by ENGINEER shall be filled at CONTRACTOR's expense with granular material furnished, placed, and compacted in accordance with Section 31 20 00, Earth Moving.

B. Separation of Sewers and Potable Water Piping:
   1. Horizontal Separation:
      a. Where possible, existing and proposed potable water mains and service lines, and sanitary, combined, and storm sewers shall be separated horizontally by clear distance of at least ten feet.
      b. If local conditions preclude the specified clear horizontal separation, installation will be allowed if potable water main is in separate trench or on undistributed earth shelf on one side of sewer and with bottom of potable water main at least 18 inches above top of sewer.
      c. Exception:
         1) Where it is not possible to provide minimum horizontal

separation described above, construct potable water main of cement-lined ductile iron pipe with restrained push-on joint or restrained mechanical joint pipe complying with public water supply design standards of authority having jurisdiction. Hydrostatically test water main and sewer as specified in this Section prior to backfilling. Hydrostatic test pressure at crossing shall be at least 150 psi.

2. Vertical Separation:
    a. Provide minimum vertical distance of 18 inches between outside of potable water main and outside of sewer when sewer crosses over potable water main.
    b. Center a section of potable water main pipe at least 17.5 feet long over sewer so that sewer joints are equidistant from potable water main joints.
    c. Provide adequate structural support where potable water main crosses under sewer. At minimum, provide compacted select backfill for ten feet on each side of crossing.
    d. Exceptions:
        1) Where it is not possible to provide minimum vertical separation described above, construct potable water main of cement-lined ductile iron pipe with restrained push-on joint or restrained mechanical joint pipe. Hydrostatically test water main and sewer as specified in this Section, prior to backfilling. Hydrostatic test pressure at crossing shall be at least 150 psi.
        2) Encase either potable water main or sewer in watertight carrier pipe extending ten feet on each side of crossing, measured perpendicular to potable water main.

C. Plugs:
    1. Temporarily plug installed pipe at end of each day of work or other interruption of pipe installation to prevent entry of animals, liquids, and persons into pipe, and entrance or insertion of deleterious materials into pipe.
    2. Install standard plugs in bells at dead ends, tees, and crosses. Cap spigot and plain ends.
    3. Fully secure and block plugs, caps, and bulkheads installed for testing to withstand specified test pressure.
    4. Where plugging is required for phasing of the Work or subsequent connection of piping, install watertight, permanent type plugs, caps, or bulkhead acceptable to ENGINEER.

D. Bedding Pipe: Bed pipe as specified and in accordance with details on the Drawings.
    1. Trench excavation and backfill, and bedding materials shall conform to Section 31 20 00, Earth Moving, as applicable.
    2. Where ENGINEER deems existing bedding material unsuitable, remove and replace existing bedding with approved granular material furnished, placed, and compacted in accordance with Section 31 20 00, Earth Moving. Payment for

additional excavation and providing granular material will be made under the unit price payment items in the Contract.

3. Excavate trenches below bottom of pipe by amount shown and indicated in the Contract Documents. Remove loose and unsuitable material from bottom of trench.
4. Carefully and thoroughly compact pipe bedding with hand held pneumatic compactors.
5. Do not lay pipe until ENGINEER approves bedding condition.
6. Do not bring pipe into position until preceding length of pipe has been bedded and secured in its final position.

E. Laying Pipe:
   1. Conform to manufacturer's instructions and requirements of standards and manuals listed below, as applicable:
      a. Thermoplastic Pipe: ASTM D2321, ASTM D2774, ANSI/AWWA C605, AWWA M23, AWWA M45, AWWA, M55.
      b. Sanitary and Storm Sewers: ASCE 37.
   2. Install pipe accurately to line and grade shown and indicated in the Contract Documents, unless otherwise approved by ENGINEER. Remove and reinstall pipes that are not installed correctly.
   3. Slope piping uniformly between elevations shown.
   4. Keep groundwater level in trench at least 24 inches below bottom of pipe before laying pipe. Do not lay pipe in water. Maintain dry trench conditions until jointing and backfilling are complete. Keep clean and protect interiors of pipe, fittings, valves, and appurtenances.
   5. Start laying pipe at lowest point and proceed towards higher elevations, unless otherwise approved by ENGINEER.
   6. Place bell and spigot-type pipe so that bells face the direction of laying, unless otherwise approved by ENGINEER.
   7. Excavate around joints in bedding and lay pipe so that pipe barrel bears uniformly on trench bottom.
   8. Deflections at joints shall not exceed 75 percent of amount allowed by pipe manufacturer, unless otherwise approved by ENGINEER.
   9. For PVC and CPVC piping with solvent welded joints, 2.5-inch diameter and smaller, and copper tubing, snake piping in trench to compensate for thermal expansion and contraction.
   10. Carefully examine pipe, fittings, valves, and specials for cracks, damage, and other defects while suspended above trench before installation. Immediately remove defective materials from the Site and replace with acceptable products.
   11. Inspect interior of all pipe, fittings, valves, and specials and completely remove all dirt, gravel, sand, debris, and other foreign material from pipe interior and joint recesses before pipe and appurtenances are moved into excavation. Bell and spigot-type mating surfaces shall be thoroughly wire brushed, and wiped clean and dry immediately before pipe is laid.

12. Field cut pipe, where required, with machine specially designed for cutting the type of pipe being installed. Make cuts carefully, without damage to pipe, coating or lining, and with smooth end at right angles to axis of pipe. Cut ends on push-on joint type pipe shall be tapered and sharp edges filed off smooth. Do not flame-cut pipe.
13. Do not place blocking under pipe, unless specifically approved by ENGINEER for special conditions.
14. Touch up protective coatings in manner satisfactory to ENGINEER prior to backfilling.
15. Notify ENGINEER in advance of backfilling operations.
16. On steep slopes, take measures acceptable to ENGINEER to prevent movement of pipe during installation.
17. Thrust Restraint: Where required, provide thrust restraint conforming to Article 3.3 of this Section.
18. Exercise care to avoid flotation when installing pipe in cast-in-place concrete, and in locations with high groundwater.

F. Jointing Pipe:
   1. Ductile Iron Mechanical Joint Pipe:
      a. Immediately before making joint, wipe clean the socket, plain end, and adjacent areas. Taper cut ends and file off sharp edges to provide smooth surface.
      b. Lubricate plain ends and gasket with soapy water or manufacturer's recommended pipe lubricant, in accordance with ANSI/AWWA C111, just prior to slipping gasket onto plain end of the joint assembly.
      c. Place gland on plain end with lip extension toward the plain end, followed by gasket with narrow edge of gasket toward plain end.
      d. Insert plain end of pipe into socket and press gasket firmly and evenly into gasket recess. Keep joint straight during assembly.
      e. Push gland toward socket and center gland around pipe with gland lip against gasket.
      f. Insert bolts and hand-tighten nuts.
      g. If deflection is required, make deflection after joint assembly and prior to tightening bolts. Alternately tighten bolts approximately 180 degrees apart to seat gasket evenly. Bolt torque shall be as follows:

Pipe Diameter (inches)	**Bolt Diameter (inches)**	**Range of Torque (ft-lbs)**
3	5/8	45 to 60
4 to 24	3/4	75 to 90
30 to 36	1	100 to 120
42 to 48	1.25	120 to 150

h. Bolts and nuts, except those of stainless steel, shall be coated with two coats, minimum dry film thickness of eight mils each, of high build solids epoxy or bituminous coating manufactured by Tnemec, or equal.

i. Restrained mechanical joints shall be in accordance with Section 40 05 19, Ductile Iron Process Pipe.

2. Ductile Iron Push-On Joint Pipe:
   a. Prior to assembling joints, thoroughly clean with wire brush the last eight inches of exterior surface of spigot and interior surface of bell, except where joints are lined or coated with a protective lining or coating.
   b. Wipe clean rubber gaskets and flex gaskets until resilient. Conform to manufacturer's instructions for procedures to ensure gasket resiliency when assembling joints in cold weather.
   c. Insert gasket into joint recess and smooth out entire circumference of gasket to remove bulges and to prevent interference with proper entry of spigot of entering pipe.
   d. Immediately prior to joint assembly, apply thin film of pipe manufacturer's recommended lubricant to surface of gasket that will come in contact with entering spigot end of pipe, or apply a thin film of lubricant to outside of spigot of entering pipe.
   e. For assembly, center spigot in pipe bell and push pipe forward until spigot just makes contact with rubber gasket. After gasket is compressed and before pipe is pushed or pulled in the rest of the way, carefully check gasket for proper position around the full circumference of joint. Final assembly shall be made by forcing spigot end of entering pipe past gasket until spigot makes contact with base of the bell. When more than a reasonable amount of force is required to assemble the joint, remove spigot end of pipe to verify proper positioning of gasket. Do not use gaskets that have been scored or otherwise damaged.
   f. Maintain an adequate supply of gaskets and joint lubricant at the Site when pipe jointing operations are in progress.
3. Ductile Iron Proprietary Joints:
   a. Install pipe that utilizes proprietary joints for restraint specified in Section 40 05 19, Ductile Iron Process Pipe, or other such joints, in accordance with manufacturer's instructions.
4. Ductile Iron Flanged Joints:
   a. Assemble flanged joints using ring-type gaskets, thickness as recommended by pipe manufacturer but not less than 1/8-inch thick, for raised face flanges. Use full face gaskets for flat face flanges, unless otherwise approved by ENGINEER or recommended by pipe manufacturer. Gaskets shall be suitable for service intended in accordance with manufacturer's ratings and instructions. Gaskets shall be properly centered.
   b. Bolts shall be tightened as recommended by the manufacturer in sequence that ensures equal distribution of bolt loads.

c. Length of bolts shall be uniform. Bolts shall not project beyond the nut more than 1/4-inch when fully tightened. Bolts shall not fall short of the nut when fully taken up. Ends of bolts shall be machine cut and neatly rounded. Do not use washers.
d. Prior to assembly, lubricate bolt threads and gasket faces.
e. After assembly, coat all bolts and nuts, except those of stainless steel, with two coats, minimum dry film thickness of eight mils each, of high-build epoxy or bituminous coating manufactured by Tnemec, or equal.

5. Thermoplastic Pipe Joints:
   a. Solvent Cement Welded Joints:
      1) Bevel pipe ends and remove all burrs before making joints. Clean pipe and fittings thoroughly. Do not attempt to make solvent cement joints if temperature is below 40 degrees F. Do not make solvent cement welded joints in wet conditions.
      2) Use solvent cement supplied or recommended by pipe manufacturer.
      3) Apply joint primer and solvent cement and assemble joints in accordance with recommendations and instructions of manufacturer of joint materials and pipe manufacturer.
      4) Take appropriate safety precautions when using joint primers and solvent cements. Allow air to circulate freely through pipelines to allow solvent vapors to escape. Slowly admit water when flushing or filling pipelines to prevent compression of gases within pipes.
   b. Bell and Spigot Joints:
      1) Bevel pipe ends, remove all burrs, and provide a reference mark at correct distance from pipe end before making joints.
      2) Clean spigot end and bell thoroughly before making the joint. Insert O-ring gasket while ensuring that gasket is properly oriented. Lubricate spigot with manufacturer's recommended lubricant. Do not lubricate bell and O-ring. Insert spigot end of pipe carefully into bell until reference mark on spigot is flush with bell.
6. Copper Tubing Joints:
   a. Threaded Joints:
      1) When open flames for soldering are impractical, or at unions and connections to equipment and appurtenances, assemble copper tubing with flared ends as permitted by authority having jurisdiction.
      2) Ends of tubing shall be flared at an angle of 45 degrees with flaring tool recommended by pipe manufacturer. Flaring tool shall have same outside diameter as tube to be flared.
      3) Tubing to be flared shall be soft temper or annealed prior to flaring.
      4) End of tube shall be cut square and reamed to remove burrs.

5) Tube that is out-of-round shall be resized back to round.
6) Clean and polish contact surfaces of joints using an abrasive cloth.
7) Place flare nut over the end of tube with threads closest to end being flared.
8) Insert appropriate length of tube between flaring bar of flaring tool and position the yolk with flaring cone over tube end and clamp yoke in place.
9) Turn handle of yolk clockwise without over-tightening. Cracked or deformed tubes will be rejected.
10) Do not apply jointing compounds to mating surfaces of flare fitting and flared tube end before attaching flare nut to threaded connection.

7. Mechanical Coupling Joints:
   a. Mechanical couplings include: sleeve-type flexible couplings, split flexible couplings, ANSI/AWWA C606 grooved or shouldered end couplings, plasticized PVC couplings, and other mechanical couplings specified in Section 40 05 06, Couplers, Adapters, and Specials for Process Piping.
   b. Prior to installing and assembling mechanical couplings, thoroughly clean joint ends with wire brush to remove foreign matter.
   c. For mechanical couplings that incorporate gaskets, after cleaning apply lubricant to rubber gasket or inside of coupling housing and to joint ends. After lubrication, install gasket around joint end of previously installed piece and mate joint end of subsequent piece to installed piece. Position gasket and place coupling housing around gasket and over grooved or shouldered joint ends. Insert bolts and install nuts tightly by hand. Tighten bolts uniformly to produce an equal pressure on all parts of housing. When housing clamps meet metal to metal, joint is complete and further tightening is not required.
   d. For plasticized PVC couplings, loosen the stainless steel clamping bands and remove clamps from coupling. Slide coupling over plain ends of pipes to be joined without using lubricants. Place clamps over each end of coupling at grooved section and tighten with torque wrench to torque recommended by manufacturer.
8. HDPE Pipe Joints:
   a. Butt Fusion Welded Joints:
      1) Install joints in accordance with manufacturer's instructions using hydraulic butt fusion machine or manual machine equipped with torque wrench. Equipment shall be able to achieve and maintain heating tool temperature range of 400 to 450 degrees F and an interface pressure of 60 to 90 psi.
      2) Clean interior and exterior of pipe and fitting ends with clean, dry, lint-free cloth.
      3) Align ends to be joined in the fusion machine without forcing

ends into alignment. Adjust alignment as necessary and tighten clamps to prevent slippage.

4) Place facing tool between ends to be joined and face them to provide clean, smooth, parallel mating surface. If stops are present, face ends down to the stops. Remove all shavings after facing without touching ends.
5) Re-check alignment of ends and check for slippage against fusion pressure. There shall be no detectable gaps between ends. Align outside diameters.
6) Heating tool shall maintain pipe manufacture's recommended temperature range. Place the tool between ends to be joined. Move ends against heating tool to achieve full contact. Hold ends against heating tool without force until the following melt bead size is formed:

Pipe Diameter (inches)	Required Melt Bead Size (inches)
2 to 4	1/8 to 3/16
4 to 12	3/16 to 1/4
12 to 24	1/4 to 7/16
24 to 54	7/16 to 9/16

7) Upon forming proper melt bead size, quickly separate ends and remove heating tool. Quickly inspect melted ends and bring ends together applying joining force recommended by manufacturer, using 60 to 90 psi interfacial pressure to form double bead rolled over surface of pipe on both ends.
8) Hold joining force against ends until joint is cool to the touch. Cooling period shall be 30 to 90 seconds per inch of pipe diameter. Heavier wall thicknesses may require longer cooling times as recommended by pipe manufacturer.
9) Upon completing joint, inspect to verify double bead has been formed on both sides, uniformly rounded and consistent in size all around joint. Remove faulty joints and re-joint.

G. Backfilling:
   1. Conform to applicable requirements of Section 31 20 00, Earth Moving.
   2. Place backfill as Work progresses. Backfill by hand and use power tampers until pipe is covered by at least one foot of backfill.

H. Connections to Valves:
   1. Install valves as shown and indicated in the Contract Documents.
   2. Provide suitable adapters when valves and piping have different joint types.
   3. Provide thrust restraint at valves located at pipeline terminations.

I. Transitions from One Type of Pipe to Another:

1. Provide necessary adapters, specials, and connection pieces required when connecting different types and sizes of pipe or connecting pipe made by different manufacturers.

J. Closures:
   1. Provide closure pieces shown or required to complete the Work.

3.2 TRACER TAPE INSTALLATION

A. Detectable Underground Warning Tape for Non-Metallic Pipelines:
   1. Provide polyethylene tracer tape with aluminum backing for buried, non-metallic piping, which includes pipe that is PVC and HDPE.
   2. Provide magnetic tracer tape 12 to 18 inches below finished grade, above and parallel to buried pipe.
   3. Tape shall be spread flat with message side up before backfilling.

3.3 THRUST RESTRAINT

A. Provide thrust restraint on pressure piping systems where shown or indicated in the Contract Documents.

B. Thrust restraint may be accomplished by using restrained pipe joints, concrete thrust blocks, or harnessing buried pipe.

C. Place concrete thrust blocks against undisturbed soil. Where undisturbed soil does not exist, or for projects where the Site consists of backfill material, thrust restraint shall be provided by restrained pipe joints.

D. Restrained Pipe Joints:
   1. Pipe joints shall be restrained by means suitable for the type of pipe being installed.
      a. Ductile Iron, Push-on Joints and Mechanical Joints: Restrain with proprietary restrained joint system as specified in Section 40 05 19, Ductile Iron Process Pipe; lugs and tie rods; or other joint restraint systems approved by ENGINEER.
      b. Thermoplastic and HDPE Joints: Where bell and spigot-type or other non-restrained joints are utilized, provide tie rods across joint or other suitable joint restraint system, subject to the approval of ENGINEER.

E. Concrete Thrust Blocks:
   1. Provide concrete thrust blocks on pressure piping at changes in alignment of 15 degrees or more, at tees, plugs and caps, and where shown or indicated in the Contract Documents. Construct thrust blocks of Class B concrete, conforming to 03 00 05, Concrete.

2. Install thrust blocks against undisturbed soil. Place concrete so that pipe and fitting joints are accessible for repair.
3. Concrete thrust block size shall be as shown on the Drawings or as approved by ENGINEER.

F. Harnessed lengths of buried pipe shall be as shown on the Drawings.

3.4 WORK AFFECTING EXISTING PIPING

A. Location of Existing Underground Facilities:
   1. Locations of existing Underground Facilities shown on the Drawings should be considered approximate.
   2. Determine the true location of existing Underground Facilities to which connections are to be made, crossed, and that could be disturbed, and determine location of Underground Facilities that could be disturbed during excavation and backfilling operations, or that may be affected by the Work.

B. Taking Existing Pipelines and Underground Facilities Out of Service:
   1. Conform to Section 01 14 16, Coordination with Owner's Operations.
   2. Do not take pipelines or Underground Facilities out of service unless specifically listed in Section 01 14 16, Coordination with Owner's Operations, or approved by ENGINEER.
   3. Notify ENGINEER in writing prior to taking pipeline or Underground Facilities out of service. Shutdown notification shall be provided in advance of the shutdown in accordance with the General Conditions and Section 01 14 16, Coordination with Owner's Operations.

C. Work on Existing Pipelines or Underground Facilities:
   1. Cut or tap piping or Underground Facilities as shown or required with machines specifically designed for cutting or tapping pipelines or Underground Facilities, as applicable.
   2. Install temporary plugs to prevent entry of mud, dirt, water, and debris into pipe.
   3. Provide necessary adapters, sleeves, fittings, pipe, and appurtenances required to complete the Work.
   4. Conform to applicable requirements of Section 01 14 16, Coordination with Owner's Operations.

3.5 FIELD QUALITY CONTROL

A. General:
   1. Test all piping.

2. When authorities having jurisdiction are to witness tests, notify ENGINEER and authorities having jurisdiction in writing at least 48 hours in advance of testing.
3. Conduct all tests in presence of ENGINEER.
4. Remove or protect pipeline-mounted devices that could be damaged by testing.
5. Provide all apparatus and services required for testing, including:
    a. Test pumps, compressors, hoses, calibrated gages, meters, test containers, valves, fittings, and temporary pumping systems required to maintain OWNER's operations.
    b. Temporary bulkheads, bracing, blocking, and thrust restraints.
6. Provide air if an air test is required, power if pumping is required, and gases if gases are required.
7. Unless otherwise specified, OWNER will provide fluid required for hydrostatic testing. CONTRACTOR shall provide means to convey fluid for hydrostatic testing into piping being tested. CONTRACTOR shall provide fluid for other types of testing required.
8. Repair observed leaks and repair pipe that fails to meet acceptance criteria. Retest after repair.
9. Pipe testing shall closely follow pipe laying. No more than 1,000 feet of pipe shall remain untested at any time unless otherwise approved by ENGINEER. Testing shall not proceed until facilities are in place and concrete cured.

B. Test Schedule:
1. Refer to the Buried Piping Schedule in this Section for type of test required and required test pressure.
2. Unless otherwise specified, required test pressures are at lowest elevation of pipeline segment being tested.
3. For piping not listed in Buried Piping Schedule in this Section:
    a. Hydrostatically test pipe that will convey liquid at a pressure greater than five psig.
    b. Use exfiltration testing or low-pressure air testing for other piping.
4. Test Pressure:
    a. Use test pressures listed in Buried Piping Schedule in this Section.
    b. If test pressure is not listed in Buried Piping Schedule, or if test is required for piping not listed in the Buried Piping Schedule, or if test is required for piping not listed in the Buried Piping Schedule, test pressure will be determined by ENGINEER based on maximum anticipated sustained operating pressure and methods described in applicable ANSI/AWWA manual or standard that applies to the piping system.

C. Hydrostatic Testing:
1. Preparation for Testing:
    a. For thermoplastic pipe and fiberglass pipe, follow procedures described in Section 7 of ANSI/AWWA Standard C605.

b. For HDPE pipe, follow procedures described in ASTM F2164. Test duration, including time to pressurize, time for initial expansion, time at test pressure, and time to depressurize, shall not exceed eight hours. If re-testing of a test section or pipeline is required, at least eight hours shall elapse between tests.

c. For other piping follow procedures described in ANSI/AWWA Manual M9, except that minimum wetting period required immediately prior to testing for asbestos cement pipe shall be 24 hours rather than the 48 hours prescribed for concrete pipe. Wetting period is not required for pipe that is not cement mortar-lined.

d. Prior to testing, ensure that adequate thrust protection is in place and joints are properly installed.

e. Piping for Hydraulic Fluid, Lube Oil, and Diesel Fuel: Hydrostatically test system using the fluid with which system will function permanently. Allowable leakage is zero. For fluid power systems, pipe manufacturer shall supervise installation and testing of system components, including field piping.

2. Test Procedure:

a. Fill pipeline slowly to minimize air entrapment and surge pressures. Fill rate shall not exceed one foot of pipe length per second in pipe being tested.

b. Expel air from pipe as required. Obtain approval of ENGINEER prior to tapping pipe for expelling air.

c. Examine exposed joints and valves, and make repairs to eliminate visible leakage.

d. After specified wetting period, add fluid as required to pressurize line to required test pressure. Maintain test pressure for a stabilization period of ten minutes before beginning test.

e. HDPE Pipe: After filling pipeline, gradually pressurize pipe to test pressure and maintain required test pressure for three hours for pipe to expand. During expansion, add fluid to maintain required test pressure. Begin timed test period after expansion period and other requirements are met.

f. Timed test period shall not begin until after pipe has been filled, exposed to required wetting period, air has been expelled, and pressure stabilized.

g. Timed Test Period: After stabilization period, maintain test pressure for at least two hours. During timed testing period, add fluid as required to maintain pressure within five psig of required test pressure. For HDPE pipe, after three hour expansion phase, reduce test pressure by ten psig and do not add liquid. Test pressure shall then remain steady for one hour, indicating no leakage.

h. Pump from test container to maintain test pressure. Measure volume of fluid pumped from test container and record on test report. Record pressure at test pump at 15 minute intervals for duration of test.

3. Allowable Leakage Rates: Leakage is defined as the quantity of fluid supplied to pipe segment being tested to maintain pressure within five psi of test pressure during timed test period. Allowable leakage rates for piping are:
    a. No Leakage: Pipe with flanged, welded, fused, threaded, soldered, or brazed joints.
    b. Rates based on formula or table in ANSI/AWWA C605:
        1) Plastic pipe joined with O-ring gasket sealing members.

D. Exfiltration Testing:
1. CONTRACTOR shall test piping using exfiltration/infiltration and low-pressure methods at his option and with ENGINEER'S approval. Method for exfiltration testing is described below.
2. Plug and bulkhead ends and lateral connections of pipe segment to be tested and admit fluid until the pipe is full. Admit fluid slowly to minimize air entrapment. Groundwater level shall be below the pipe during exfiltration test.
3. Maintain hydrostatic head during test to equal an elevation two feet above maximum groundwater elevation at pipe segment tested or two feet above crown of upstream end of pipe segment tested, whichever is greater. ENGINEER will determine test water surface elevation for each pipe segment.
4. Add fluid from test container or from metered supply as required to maintain test water level within three inches of test head throughout the test.
5. Test duration shall be at least two hours.
6. Allowable Leakage Rates:
    a. Leakage is defined as the quantity of fluid that must be supplied to pipe segment tested to maintain hydrostatic head within three inches of test head during the test after pipe has been filled and exposed for required wetting period, plus quantity required to refill to original head at end of test.
    b. Leakage shall not exceed 100 gallons per inch of internal diameter per mile of pipe tested in 24 hours, or that required by authority having jurisdiction, whichever is less.

E. Infiltration Testing
1. CONTRACTOR shall test piping using exfiltration/infiltration and low-pressure methods at his option and with ENGINEER'S approval. Method for exfiltration testing is described below.
2. Plug and bulkhead ends and lateral connections of pipe segment to be tested.
3. Dewatering activities should be suspended three (3) days prior to the start of the test and throughout the duration of the test.
4. A 90 degree V-notch weir in pipe on downstream manhole shall be inserted.
5. Testing may begin after water flow over weir stabilizes.
6. Take five (5) reading of accumulated volume over period of 2 hours and use average for infiltration.
7. Allowable Leakage Rates:

a. Leakage is defined as the quantity of fluid that enters the pipe segment to be tested during the testing period.
b. Leakage shall not exceed 100 gallons per inch of internal diameter per mile of pipe tested in 24 hours, or that required by authority having jurisdiction, whichever is less.

E. Low-Pressure Air Testing:
1. CONTRACTOR shall test piping using exfiltration/infiltration and low-pressure methods at his option and with ENGINEER'S approval. Method for low pressure air testing is described below.
2. Plug and bulkhead ends and lateral connections of pipe segment to be tested.
3. Maintain a minimum positive head of two (2) feet throughout the test.
4. Test in accordance with requirements of authority having jurisdiction.
5. If there are no Laws and Regulations covering the test, use test procedures described in the following standards:
a. Thermoplastic and HDPE Pipe: ASTM F1417.

F. Vertical Deflection Test for Thermoplastic and HDPE Pipe:
1. Conduct vertical deflection test at least thirty days after backfill has been placed.
2. Manually pull pin-type vertical gauge mounted on sled through pipe. Gauge shall be manufactured by Quality Test Products, or equal. Set gauge so that sled will stop if vertical deflection of pipe exceeds five percent. Excavate and re-install piping that fails deflection test, and retest.
3. Use rigid ball or mandrel for deflection test, which shall have diameter of at least 95 percent of base inside diameter or average inside diameter of piping, depending on which is specified in applicable ASTM standard, including appendix, to which pipe is manufactured. Perform test without mechanical pulling devices. Re-install and retest pipe segments that exceed deflection of five percent.

3.6 CLEANING

A. Cleaning, General: Clean pipe systems as follows:
1. Thoroughly clean all piping, including flushing with water, dry air, or inert gas as required, in manner approved by ENGINEER, prior to placing in service.

3.7 SCHEDULES

A. Schedules listed below, following the "End of Section" designation, are part of this Specification section.
1. Table 33 05 05-A, Buried Piping Schedule.

+ + END OF SECTION + +

TABLE 33 05 05-A, BURIED PIPING SCHEDULE

Service	Diameter (inch)	Material	Interior Lining	Exterior Coating	Pressure Class/ Thickness	Joint	Test	Remarks
SFM	4”	HDPE	--	--	DR 13.5	BW	HYD (125) & VD	
RW	3”	PVC	--	--	SCH. 80	SW	HYD (125) & VD	Lift Station
SFM	4”	PVC	--	--	DR 18 / C900	POJ / MJ	HYD (125) & VD	
PEW	6”	PVC	--	--	C900	POJ	EX / AIR & VD	
SAN	8”	PVC	--	--	DR 35	POJ	EX / AIR & VD	
SAN	4”	DI	CE	AC	150 psi	Flg	HYD (125)	

A. Service Abbreviations

Service	Abbrev		Service	Abbrev.
Sanitary Sewer	SAN		Wastewater	WW
Storm Sewer	ST		Overflow	OF
Combined Sewer	CS		Centrate	CEN
Sanitary Force Main	SFM		Filtrate	FILT
Raw Water	RW		Scum	SCUM
Potable Water	PW		Primary Sludge	PS
City Water	CW		Return Activated Sludge	RAS
Non-Potable Water	NPW		Waste Activate Sludge	WAS
Plant Effluent Water	PEW		Thickened Sludge	TS
Spray Water	SPW		Mixed Sludge	MS
Backwash Water	BW		Digested Sludge	DS
Hot Water Supply	HWS		Chlorine Solution	CLS
Hot Water Return	HWR		Sodium Hydroxide	NAOH
Influent	INF		Sodium Hypochlorite	NAOCL
Effluent	EFF		Polymer Solution	POLYS
Drain	DR		Alum	AL
Process Air	PA		Hydraulic Fluid	HF
Instrument Air	IA		Fuel Oil	FO
Digester Gas	DIG		Lube Oil	LO
Chlorine Gas	CLG			

B. Material Abbreviations

Material	Abbrev		Material	Abbrev.
Ductile Iron	DI		Polyvinyl Chloride	PVC
Cast Iron	CI		Chlorinated Polyvinyl Chloride	CPVC
Carbon Steel	CS		Polyethylene	PE
Stainless Steel	SS		High Density Polyethylene	HDPE
Copper	C		Fiberglass Reinforced Plastic	FRP
Corrugated Metal Pipe	CMP		Acrylonitrile Butadiene Styrene	ABS
Reinforced Concrete Pipe	RCP		Vitrified Clay	VC
Prestressed Concrete Cylinder Pipe	PCCP			
Non-Prestressed Concrete Cylinder Pipe	CCP			
Steel Cylinder Pipe	SCP			

C. Lining/Coating Abbreviations

Lining	Abbrev		Coating	Abbrev.
Cement Mortar Lined	CL		Asphaltic Coated	AC
Glass Lined	GL		Polyethylene Wrapped	PEW
Ceramic Epoxy	CE		Painted	P
Fusion Bonded Epoxy Lined	FBEL		Fusion Bonded Epoxy Coated	FBEC
Plastic Lined	PL		Insulated	I
			Galvanized	Galv

D. Joint Abbreviations

Joint Type	Abbrev		Joint Type	Abbrev.
Bell and Spigot	BS		Butt Weld	BW
Restrained Bell and Spigot	RBS		Lap Weld	LW
Push-on Joint	POJ		Butt Fusion Weld	BFW
Restrained Push-on Joint	RPOJ		Solvent Weld	SW
Mechanical Joint	MJ		Sleeve-type Flexible Coupling	SLFC
Restrained Mech. Joint	RMJ		Split Flexible Coupling	SPFC
Soldered	Sd		Plasticized PVC Coupling	PPVC
Brazed	Bz		Grooved or Shouldered End Coupling	GSEC
Threaded	Thd		Flanged	Flg
Compression Sleeve Coupling	CSC		Compression Flange Adapter	CFA

E. Test Abbreviations

Test	Abbrev		Test	Abbrev.
Hydrostatic Test (test pressure in psig)	HYD ( )		Process Air Pipe Test (test pressure in psig)	PA ( )
Exfiltration	EX		Chlorine Pipe Test	CL
Infiltration	INF		Disinfection and Bacteriological Testing	DBT
Low-pressure Air Sewer Test	AIR		Examination of Welds	EW
Vacuum Test	VAC		Televised Inspection	TV
Vertical Deflection	VD		No Test Required	NR

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SECTION 40 05 53

PROCESS VALVES, FOUR-INCH DIAMETER AND LARGER

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:
   1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install process valves, four-inch diameter and larger, and appurtenances, complete and operational.
   2. Valves for digester gas and air have been specifically identified. All other valves are for liquid service.

B. Coordination:
   1. Review installation procedures under this and other Sections and coordinate installation of items that must be installed with or before process valves Work.

C. Related Sections:
   1. Section 05 05 33, Anchor Systems.
   2. Section 09 91 00, Painting.
   3. Section 33 05 05, Buried Piping Installation.
   4. Section 40 05 05, Exposed Piping Installation.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:
   1. American Bearing Manufacturers Association (ABMA).
   2. ANSI B16.1, Cast-Iron Pipe Flanges and Flanged Fittings.
   3. ANSI B16.34, Valves-Flanged, Threaded and Welding end. (ASME B16.34).
   4. API STD 594, Check Valves, Flanged Lug, Wafer and Butt-Welding.
   5. API STD 598, Valve Inspection and Testing.
   6. API STD 609, Butterfly Valves: Double Flanged, Lug-Type and Wafer-Type.
   7. ASTM A126, Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
   8. ASTM A193/A193M, Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.

9. ASTM A194/A194M, Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service, or Both.
10. ASTM A240/A240M, Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
11. ASTM A276, Specification for Stainless Steel Bars and Shapes.
12. ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
13. ASTM A351/A351M, Specification for Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure-Containing Parts.
14. ASTM A380, Practice for Cleaning, Descaling and Passivation of Stainless Steel Parts, Equipment and Systems.
15. ASTM A536, Specification for Ductile Iron Castings.
16. ASTM A564/A564M, Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes.
17. ASTM A743/A743 M, Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.
18. ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.
19. ASTM B98/B98M, Specification for Copper-Silicon Alloy Rod, Bar, and Shapes.
20. ASTM B138/B138M, Specification for Manganese Bronze Rod, Bar and Shapes.
21. ASTM B265, Specification for Titanium and Titanium Alloy Strip, Sheet and Plate.
22. ASTM B584, Specification for Copper Alloy Sand Castings for General Applications.
23. ASTM D429, Test Methods for Rubber Property - Adhesion to Rigid Substrates.
24. AWWA C500, Metal-Seated Gate Valves for Water Supply Service.
25. AWWA C504, Rubber-Seated Butterfly Valves.
26. AWWA C508, Swing-Check Valves for Waterworks Service, 2-inch through 24-inch NPS.
27. AWWA C509, Resilient-Seated Gate Valves for Water Supply Service.
28. AWWA C550, Protective Interior Coatings for Valves and Hydrants.
29. AWWA Manual M49, Butterfly Valves: Torque, Head Loss, and Cavitation Analysis.
30. FS TT-C-494, Coating Compound, Bituminous, Solvent Type, Acid-Resistant.

1.3 QUALITY ASSURANCE

A. Manufacturer’s Qualifications:

1. Manufacturer shall have minimum of five years of experience producing substantially similar materials and equipment to that required and be able to provide evidence of at least five installations in satisfactory operation for at least five years.

B. Component Supply and Compatibility:
   1. Obtain each type of equipment and appurtenances included in this Section, regardless of the component manufacturer, from a single manufacturer of the type of process valve. For each type of valve, do not furnish valves of more than one manufacturer.
   2. Supplier of each type of equipment specified shall review and approve or prepare all Shop Drawings and other submittals for all components associated with the type of process valve Supplier is furnishing.
   3. Components shall be suitable for use in the specified service conditions. Components shall be integrated into the overall assembly by the process valve manufacturer.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:
   1. Shop Drawings:
      a. Installation drawings showing orientation of valve and handwheel in both plan and elevation view. Drawings shall clearly identify valve and its appurtenances, including controls, actuators, valve stems, and other components. Show dimensions of valves and appurtenances in relation to piping and structural and architectural components, where applicable.
   2. Product Data:
      a. Product data sheets.
      b. Complete catalog information, including dimensions, weight, specifications, and identification of materials of construction of all parts.
      c. Corrosion resistance information to confirm suitability of valve materials for the application. Furnish information on chemical resistance of elastomers from elastomer manufacturer.
      d. Cv values and hydraulic headloss curves.

B. Informational Submittals: Submit the following:
   1. Certificates:
      a. Certificates of compliance with referenced standards, where applicable, including those of AWWA, NSF, and others required by ENGINEER.
   2. Manufacturer Instructions:

a. Submit manufacturer's instructions for handling, storing, and installing valves and appurtenances. Provide templates and setting drawings for valves and appurtenances that require anchor bolts or similar anchorages.

3. Field Quality Control Submittals:
   a. Submit results of field tests required.
4. Qualifications Statements:
   a. When requested by ENGINEER, submit manufacturer's qualifications demonstrating compliance with the Specifications, including list of existing installations with contact names and telephone number(s) for each.

C. Closeout Submittals: Submit the following:
   1. Operations and Maintenance Data:
      a. Furnish operation and maintenance manuals in accordance with Section 01 78 23, Operations and Maintenance Data.
      b. Furnish in operations and maintenance manuals complete nameplate data for each valve and electric actuator.

D. Maintenance Material Submittals: Submit the following:
   1. Spare Parts, Extra Stock Materials, and Tools:
      a. Spare Parts and Extra Stock Materials: Furnish as specified for each valve type.
      b. Tools: Furnish two sets of special tools (excluding metric tools, if applicable) for each size and type of valve furnished.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling, and Unloading:
   1. Deliver materials and equipment to Site to ensure uninterrupted progress of the Work. Deliver anchorage products that are to be embedded in concrete in ample time to prevent delaying the Work.
   2. Inspect boxes, crates, and packages upon delivery to Site and notify ENGINEER in writing of loss or damage to materials and equipment. Promptly remedy loss and damage to new condition in accordance with manufacturer's instructions.
   3. Conform to Section 01 65 00, Product Delivery Requirements.

B. Storage and Protection:
   1. Keep products off ground using pallets, platforms, or other supports. Store equipment in covered storage and prevent condensation and damage by extreme temperatures. Store in accordance with manufacturer's recommendations. Protect steel, packaged materials, and electronics from corrosion and deterioration.

2. Conform to Section 01 66 00, Product Storage and Handling Requirements.

1.6 WARRANTY

A. Valves and all components shall have a 3-year warranty from the date of authorized start-up.

PART 2 - PRODUCTS

2.1 GENERAL

A. Valves, General:
   1. Provide each valve with manufacturer's name and rated pressure cast in raised letters on valve body.
   2. Provide valves with brass or Type 316 stainless steel nameplate attached with Type 316 stainless steel screws. Nameplates shall have engraved letters displaying the following minimum information:
      a. Valve size.
      b. Pressure and temperature ratings.
      c. Application (other than water and wastewater).
      d. Date of manufacture.
      e. Manufacturer's name.
   3. Provide valves to turn clockwise to close, unless otherwise specified.
   4. Provide valves with permanent markings for direction to open.
   5. Manually operated valves, with or without extension stems, shall require not more than 40-pound pull on manual operator to open or close valve against specified criteria. Manual operators include handwheel, chainwheel, crank, lever, and T-handle wrench.

B. Valve Materials:
   1. Valve materials shall be suitable for the associated valve's service or application, as shown.
   2. Protect wetted parts from galvanic corrosion caused by contact of different metals.
   3. Wetted components and wetted surfaces of valves used with potable water or water that will be treated to become potable shall conform to ANSI/NSF 61.
   4. Clean and descale fabricated stainless steel items in accordance with ASTM A380 and the following:
      a. Passivate all stainless steel welded fabricated items after manufacture by immersing in pickling solution of six percent nitric acid and three percent hydrofluoric acid. Temperature and detention time shall be sufficient for removing oxidation and ferrous contamination without

etching surface. Perform complete neutralizing operation by immersing in trisodium phosphate rinse followed by clean water wash.

b. Scrub welds with same pickling solution or pickling paste and clean with stainless steel wire brushes or by grinding with non-metallic abrasive tools to remove weld discoloration, and then neutralize and wash clean.

C. Valve Joints:
1. Exposed Valves: Unless otherwise specified, provide with flanged ends conforming to ANSI B16.1. Pressure class of flanges shall be equal to or greater than specified pressure rating of the associated valve.
2. Buried Valves: Unless otherwise specified, provide with mechanical or push-on joints, restrained or unrestrained, as required by piping with which valve is installed.
3. For stainless steel bolting, except where nitrided nuts are required, use graphite-free anti-seize compound to prevent galling. Strength of joint shall not be affected by using anti-seize compound.

2.2 RESILIENT-SEATED GATE VALVES

A. Manufacturers: Provide products of one of the following:
1. M&H Valve Company
2. US Pipe and Foundry.
3. Or equal.

B. General:
1. Provide valves conforming to AWWA C509 and as specified in this Section.
2. Sizes: Four-inch through 12-inch diameter, 16-inch and 20-inch diameter.
3. Type:
a. Provide non-rising stem (NRS) valves for buried service.
b. For interior and exposed service, provide outside screw and yoke (OS&Y) rising-stem valves, unless otherwise specified.
c. Provide position indicators for NRS valves used in exposed service.
4. Minimum Rated Working Pressure:
a. Valves 12-inch Diameter and Smaller: 200 psig.
b. Valves 16-inch and 20-inch Diameter: 150 psig.
5. Maximum Fluid Temperature: 150 degrees F.
6. Provide valves with fully encapsulated resilient wedges, unless otherwise specified.

C. Materials of Construction: Shall conform to AWWA C509 and shall be as follows:
1. Valve Body, Bonnet, and Stuffing Box: Cast-iron.

2. Wedge: Cast-iron, symmetrically and fully encapsulated with molded rubber having minimum 1/8-inch thickness.
3. Stem: Manganese bronze.
4. Rubber Items: Buna-N or other synthetic rubber suitable for the application.
5. Internal and external bolting and other hardware including pins, set screws, plug, studs, bolts, nuts, and washers shall be Type 316 stainless steel.

D. Interior Coating:
1. Valves shall be coated inside. Steel, cast-iron and ductile iron surfaces, except machined surfaces, shall be epoxy coated in accordance with AWWA C550.

E. Testing:
1. Test valves in valve manufacturer's shop in accordance with AWWA C509.

F. Gear Actuators for Manually-operated Valves:
1. Provide valves with gear actuators conforming to AWWA C500.
2. Size gear actuators for the following maximum differential pressures:

2.3 ECCENTRIC PLUG VALVES

A. Manufacturers: Provide products of one of the following:
1. DeZurik.
2. Or equal.

B. General:
1. Provide eccentric-type plug valves each with rectangular ports.
2. Minimum Rated Working Pressure:
   a. Valves 12-inch Diameter and Smaller: 175 psig.
   b. Valves 14-inch through 72-inch Diameter: 150 psig.
3. Maximum Fluid Temperature: 180 degrees F.
4. Minimum Port Area:
   a. Valves 20-inch Diameter and Smaller: 100 percent of nominal pipe area.
5. Packing and packing gland shall be externally adjustable and accessible without disassembling valve and without removing the actuator.
6. Valves shall provide drip-tight, bi-directional shutoff at rated pressures.
7. Plug shall have cylindrical seating surface eccentrically offset from center of plug shaft. Interface between plug face and body seat, with plug in closed position, shall be externally adjustable in the field with valve in the line while under pressure.
8. Plug shall be supported to top bearing by using spring that is externally adjustable.

9. For sludge service, plug valves shall allow pigging of the piping with line-size pigs.

C. Materials of Construction:
   1. Body: Cast Iron ASTM A126 Class B, or Ductile-iron ASTM A536 Grade 65-45-12.
   2. Plug:
      a. Core: Cast Iron ASTM A126 Class B, or Ductile-iron, ASTM A536 Grade 65-45-12.
      b. Plug Facing: Neoprene.
      c. For valves up to eight-inch diameter, plugs shall be fully encapsulated with rubber. For valves larger than eight-inch diameter, provide plugs with rubber facing. Minimum thickness of rubber lining shall be 1/8-inch. Rubber hardness shall be a minimum of 70 (Shore A) durometer. Rubber-to-metal bond shall withstand minimum 75-pound pull conforming to ASTM D429 Method B.
   3. Seats: Minimum 1/8-inch welded overlay of minimum 90 percent pure nickel on surfaces contacting plug face. Seats shall provide contact area of at least 1/2-inch width all around.
   4. Stem Bearings: Sintered, oil impregnated, permanently lubricated of Type 316 stainless steel.
   5. Stem Seal: Multiple neoprene V-ring type.
   6. All internal and external bolting and other hardware including pins, set screws, plug, studs, bolts, nuts and washers shall be Type 316 stainless steel.

D. Interior Coating and Lining:
   1. Valves shall be coated inside. Steel, cast-iron, and ductile iron surfaces, except machined surfaces, shall be epoxy-coated in accordance with AWWA C550.

E. Shop Testing:
   1. Operational Tests:
      a. To demonstrate that complete assembly is workable, successfully operate each valve (with actuator mounted directly on valve) three times from fully closed to fully open position and reverse under no-flow condition.
   2. Leakage Tests:
      a. Test each valve for leaks while valve is in closed position.
      b. Test valves at rated pressures. During test, valves shall be drip-tight. Test duration shall be at least five minutes for valves up to 20-inch diameter and ten minutes for valves larger than 20-inch diameter. Tests shall be repeated successfully with pressure in the unseating direction.

3. Hydrostatic Test: Test valves to an internal hydrostatic pressure equivalent to twice rated pressure of valve. During hydrostatic test, there shall be no leakage through metal, end joints, and shaft seal, nor shall any part be permanently deformed. Duration of hydrostatic test shall be sufficient to allow visual examination for leakage. Test duration shall be at least one minute for valves eight-inch diameter and smaller, three minutes for valves 10-inch through 20-inch diameter, and ten minutes for valves 24-inch diameter and larger.

F. Gear Actuators for Manually-operated Valves:
   1. Provide gear actuators on buried and exposed valves, except valves four-inch diameter and smaller located less than five feet above operating floor. Gas service valves shall be provided with worm gear actuators.
   2. Size gear actuators for valves eight-inch diameter and smaller for 175 psig differential pressure.
   3. Provide actuators capable of holding associated valves in any intermediate position without creeping or vibrating.
   4. Provide valve position indicator on each actuator. Provide stop-limiting devices for open and closed position. For buried and submerged service actuators, provide position indicators in valve box.
   5. Provide adjustable stop to adjust seating pressure.
   6. Make packing accessible for adjustment without requiring removal of actuator from valve, except for valves in buried and submerged service.
   7. Diameter ratio of handwheel or chainwheel and gear sector shall be less than two.
   8. For buried and submerged valves, gear actuator shall be grease-packed and designed to withstand submersion, and shall be drip-tight in water 20 feet deep, with self-adjusting packing.
   9. Provide each actuator with gearing totally enclosed.
   10. Operator shaft and gear sector shall be supported on permanently lubricated bronze or stainless steel bearings.
   11. Provide metal-encased spring loaded seals in top and bottom covers of gear housing.
   12. Actuators shall be provided to produce indicated torque with maximum pull of 40 pounds on handwheel or chainwheel and maximum input of 150-foot pounds on operating nuts, for both seating and unseating heads equal to maximum differential pressure rating of valve.
   13. Actuator components between input and stops shall be designed to withstand, without damage, a pull of 200 pounds for handwheel or chainwheel actuators and input torque of 300-foot pound for operating nuts when operating against stops.
   14. Materials of Construction:
      a. Housing: Cast-iron, ASTM A126 Class B.

b. Gear Sector: Cast-iron ASTM A126 Class B, or ductile iron ASTM A536.
c. Worm Shaft: Steel, AISI 1144, hardened and tempered to an average Rc 40 and within range of Rc 35-45.
d. Bearings: Bronze oil-impregnated, or stainless steel.
e. Hardware, including bolts, nuts, washers, set screws, and pins, shall be Type 316 stainless steel.

2.4 THERMOPLASTIC BALL VALVES

A. Manufacturers: Provide products of one of the following:
1. Spears Manufacturing Company, True Union Ball Valves.
2. Or equal.

B. General:
1. Provide valves conforming to ASTM D 1784 Cell Classification 12454 for PVC Type I or ASTM D1784 Cell Classification 23447 for CPVC Type IV and as specified herein.
2. Sizes: ½-inch through 8-inch diameter.
3. Rated Working Pressure: 150 psig at 73 degrees F.
4. Maximum Fluid Temperature: 120 degrees F.
5. Valve body shall have full, unobstructed, circular inlet and outlet port diameters equal to nominal diameter of valve.
6. Valves shall provide drip-tight bi-directional shutoff at rated pressures.
7. Valve shall include:
a. Heavy bodied PVC or CPVC
b. Buttress threaded double union nuts
c. Safe-T-Blocked carrier
d. EPDM or Viton O-ring options
e. High impact polypropylene handle
f. Safe-T-Shear stem
8. Valve shall be fully repairable.

C. Materials of Construction: Materials of construction shall conform to the following:
1. Body: PVC or CPVC.
2. Ball: PVC or CPVC.
3. PTFE Ball Seats.

2.5 APPURTENANCES FOR BURIED METALLIC VALVES

A. Wrench Nuts:
1. Provide wrench nuts on buried valves of nominal two-inch size, in accordance with AWWA C500.

2. Arrow indicating direction of opening the valve shall be cast on the nut along with the word "OPEN".
3. Material: Ductile iron or cast-iron.
4. Secure nut to stem by mechanical means.

B. Extension Stems for Non-Rising Stem Gate Valves and Quarter-turn Buried Valves:
1. Provide extension stems to bring operating nut to six inches below valve box cover.
2. Materials of Stems and Stem Couplings: Type 316 stainless steel.
3. Maximum Slenderness Ratio (L/R): 100
4. Provide top nut and bottom coupling of ductile iron or cast-iron with pins and set screws of Type 316 stainless steel.

C. Valve Boxes:
1. Valve boxes shall be as indicated and as required.
2. Type: Heavy-duty, suitable for highway loading, two-piece telescopic, and adjustable. Lower section shall enclose valve operating nut and stuffing box and rest on valve bonnet.
3. Material: Cast-iron or ductile iron.
4. Coating: Two coats of asphalt varnish conforming to FS TT-C-494.
5. Marking: As required for service.

2.6 ANCHORAGES AND MOUNTING HARDWARE

A. General:
1. Comply with Section 05 05 33, Anchor Systems, except as modified in this Section.
2. Obtain bolts, nuts, and washers for connection of valve and appurtenances to concrete structure or other structural members from valve Supplier.
3. Bolts, nuts, and washers shall be of ample size and strength for purpose intended. Anchorages in concrete shall be at least 5/8-inch diameter.
4. Provide stem guide anchorages of required strength to prevent twisting and sagging of guides under load.
5. Materials: Provide bolts and washers of Type 316 stainless steel and nitrided nuts. Bolts shall have rolled threads. Bolts and nuts shall be electropolished to remove burrs.

2.7 TOOLS, LUBRICANTS, AND SPARE PARTS

A. Provide the following T-handle operating wrenches for buried valves.

B. Lubricants: For valves, actuators, and appurtenances requiring lubricants, provide suitable lubricants for initial operation and for first year of use following

Substantial Completion. Lubricants for equipment associated with conveying potable water or water that will be treated to become potable shall be food-grade and ANSI/NSF 61-listed.

C. Tools, spare parts, and maintenance materials shall conform with Section 01 78 43, Spare Parts and Extra Materials.

2.8 PAINTING OF EXPOSED VALVES, HYDRANTS, AND APPURTENANCES

A. Exterior steel, cast-iron, and ductile iron surfaces, except machined surfaces of exposed valves and appurtenances, shall be finish painted in manufacturer's shop. Surface preparation, priming, finish painting, and field touch-up painting shall conform to Section 09 91 00, Painting.

2.9 PAINTING OF BURIED VALVES

A. Exterior steel, cast-iron, and ductile iron surfaces, except machined or bearing surfaces of buried valves, shall be painted in valve manufacturer's shop with two coats of asphalt varnish conforming to FS TT-C 494.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which materials and equipment are to be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:
   1. Install valves and appurtenances in accordance with:
      a. Supplier's instructions and the Contract Documents.
      b. Requirements of applicable AWWA standards.
      c. Applicable requirements of Section 33 05 05, Buried Piping Installation, and Section 40 05 05, Exposed Piping Installation.
   2. Install valves plumb and level. Install all valves to be free from distortion and strain caused by misaligned piping, equipment, and other causes.
   3. Position swing check valves and butterfly valves so that, when valve is fully open, valve disc does not conflict with piping system elements upstream and downstream of valve.

B. Exposed Valves:
   1. Provide supports for large or heavy valves and appurtenances as shown or required to prevent strain on adjoining piping.
   2. Operators:
      a. Install valves so that operating handwheels or levers can be conveniently turned from operating floor without interfering with access to other valves, piping, structure, and equipment, and as approved by ENGINEER.
      b. Avoid placing operators at angles to floors or walls.
      c. Orient chain operators out of way of walking areas.
      d. Install valves so that indicator arrows are visible from floor level.
      e. For motor-operated valves located lower than five feet above operating floor, orient motor actuator to allow convenient access to pushbuttons and handwheel.
   3. Floor Stands and Stems:
      a. Install floor stands as shown and as recommended by manufacturer.
      b. Provide lateral restraints for extension bonnets and extension stems as shown and as recommended by manufacturer.
      c. Provide sleeves where operating stems pass through floor. Extend sleeves two inches above floor.

C. Buried Valves:
   1. Install valve boxes plumb and centered, with soil carefully tamped to a lateral distance of four feet on all sides of box, or to undisturbed trench face if less than four feet.

D. Plug Valves:
   1. Install plug valves that are in horizontal liquid piping with stem horizontal and plugs on top when valve is open. Plug shall be on upstream end when valve is closed.
   2. Install plug valves that are in vertical liquid piping with plug at top when closed or as recommended by valve Supplier.
   3. Supplier shall tag or mark plug valves to indicate proper mounting position.

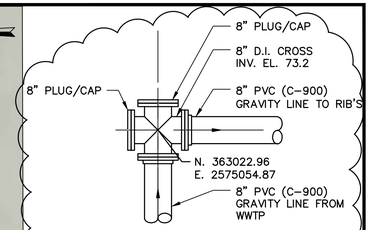
3.3 FIELD QUALITY CONTROL

A. Field Tests:
   1. Adjust all parts and components as required to provide correct operation of valves.
   2. Conduct functional field test on each valve in presence of ENGINEER to demonstrate that each valve operates correctly.
   3. Verify satisfactory operation and controls of motor operated valves.
   4. Demonstrate satisfactory opening and closing of valves at specified criteria requiring not more than 40 pounds effort on manual actuators.

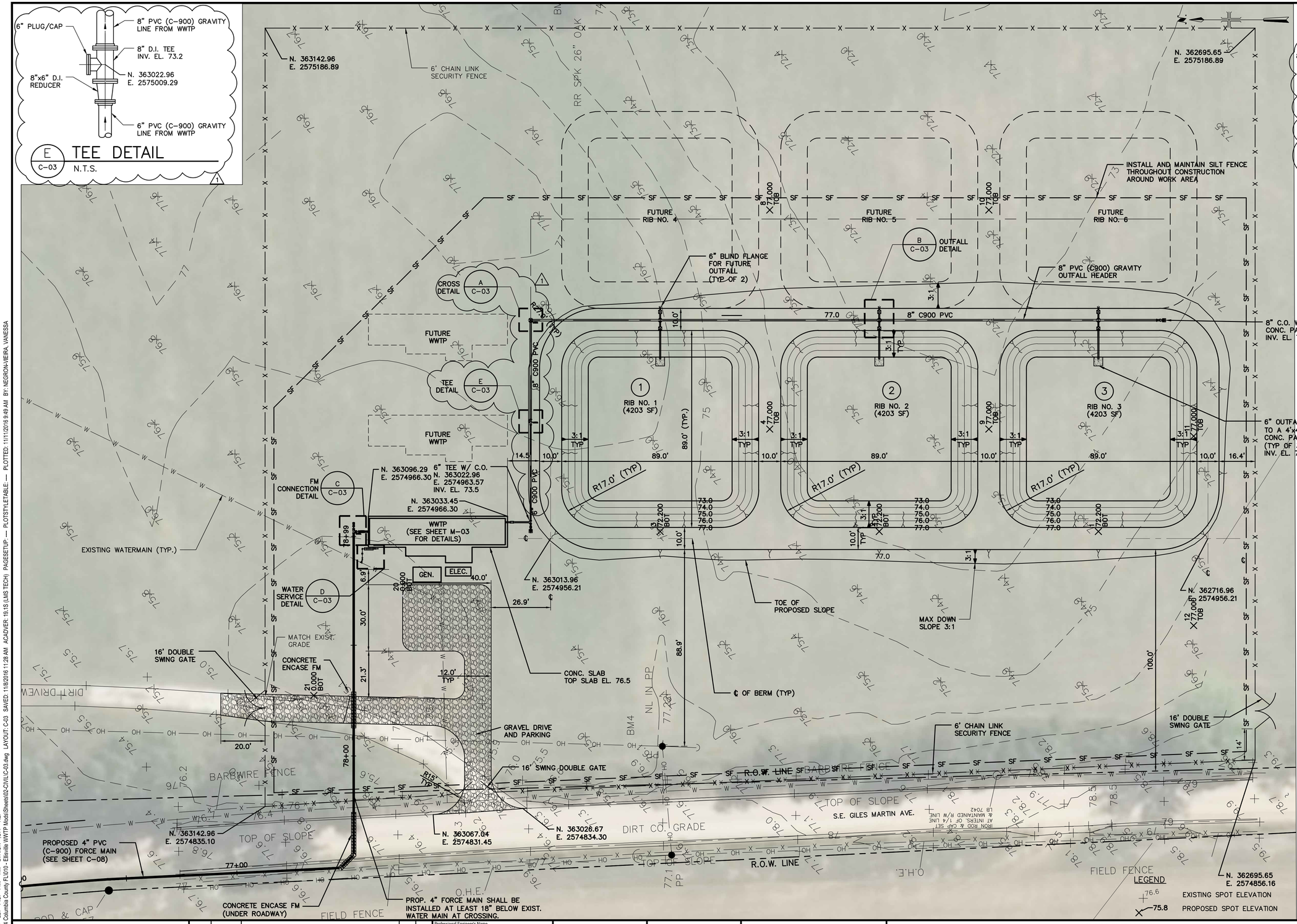
5. Test ten percent of valves of each type by applying 200 pounds effort on manual operators. There shall be no damage to gear actuator or valve.

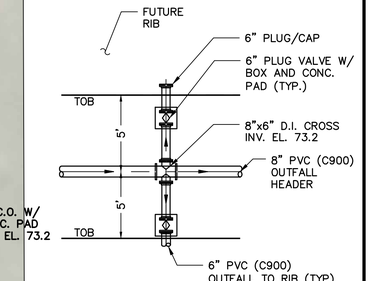
+ + END OF SECTION + +

E C-03 TEE DETAIL N.T.S.

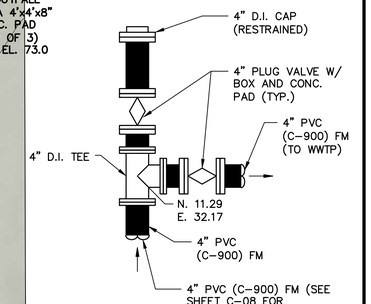


A C-03 CROSS DETAIL N.T.S.

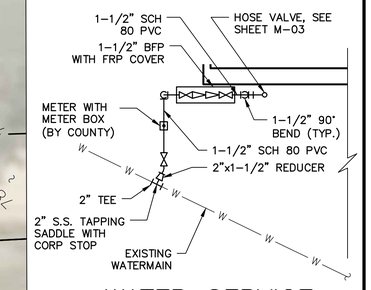




B C-03 OUTFALL DETAIL N.T.S.



C C-03 FM CONNECTION DETAIL N.T.S.



D C-03 WATER SERVICE DETAIL N.T.S.

0 10' 20' 40'

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING. USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
1	11/08/2016	Addendum No. 3	JAR	SKC

Professional Engineer's Name: SEAN K. CHAPARRO, P.E.
Professional Engineer's No.: 75865
State: FL | Date Signed: | Project Mgr.: SKC
Designed by: SLJ | Drawn by: KAK | Checked by: DAO

SEAN K. CHAPARRO P.E. NO. 75865

ARCADIS

ARCADIS U.S., INC.
FLORIDA CERTIFICATE OF AUTHORIZATION NUMBER 7917

COLUMBIA COUNTY, FLORIDA
ELLISVILLE WASTEWATER TREATMENT PLANT

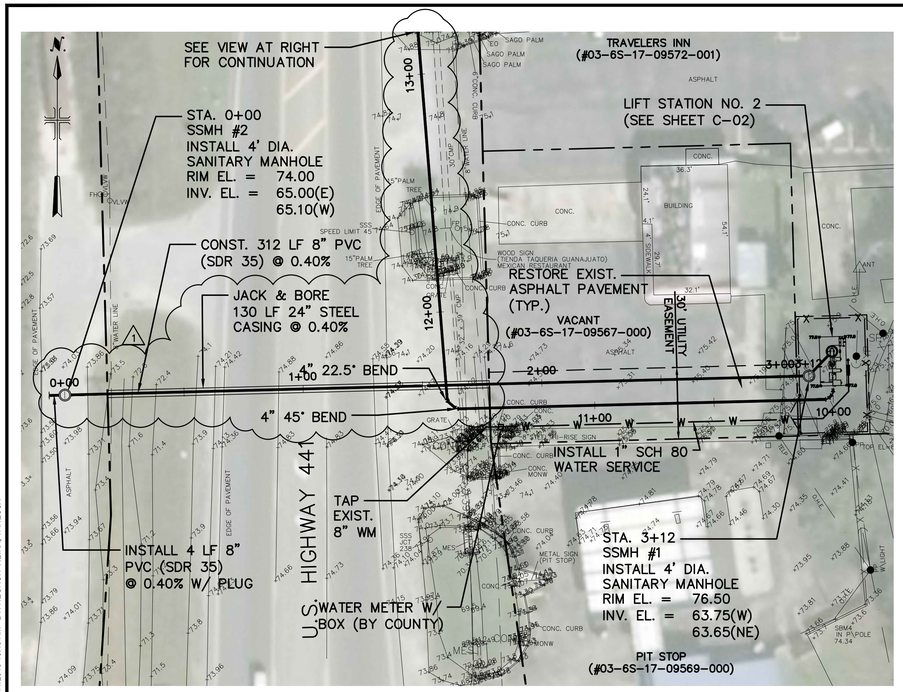
WASTEWATER TREATMENT PLANT - SITE PLAN

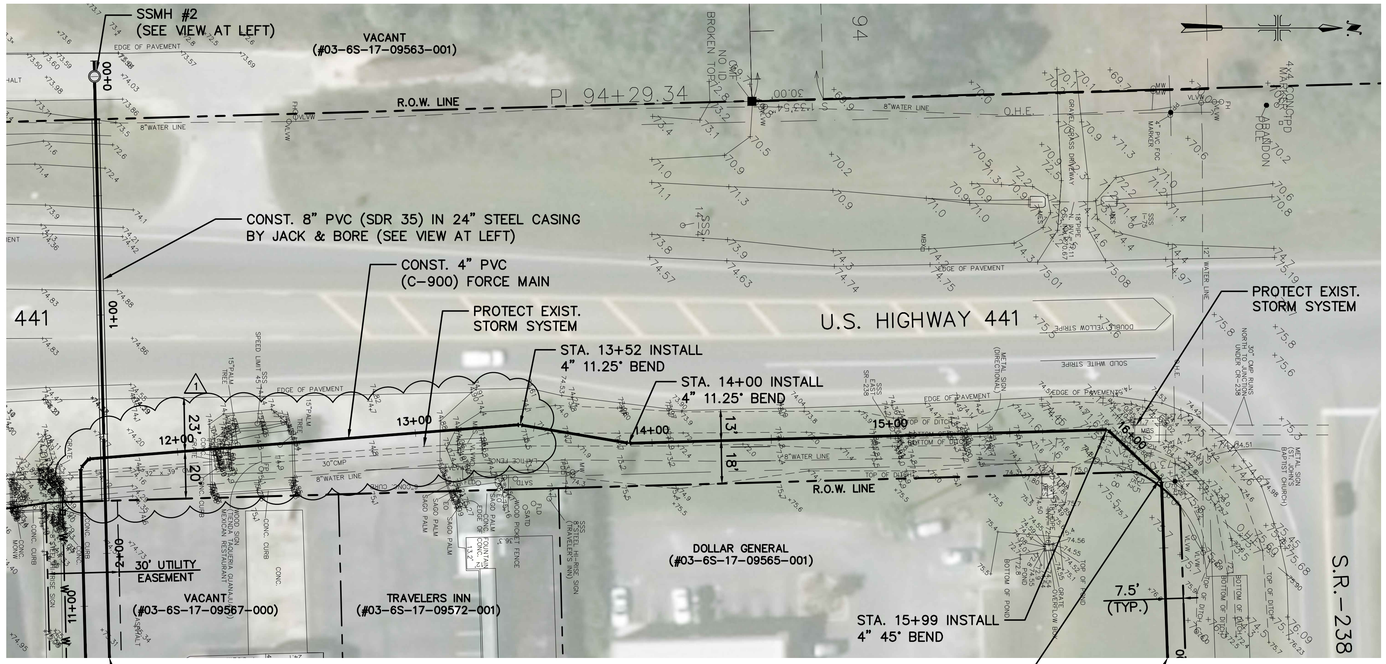
ARCADIS Project No. 06704010.0000
Date: OCTOBER 2016

ARCADIS
3109 W. DR. MARTIN LUTHER KING JR. BLVD., SUITE 350
TAMPA, FLORIDA 33607
TEL. 813.903.3125

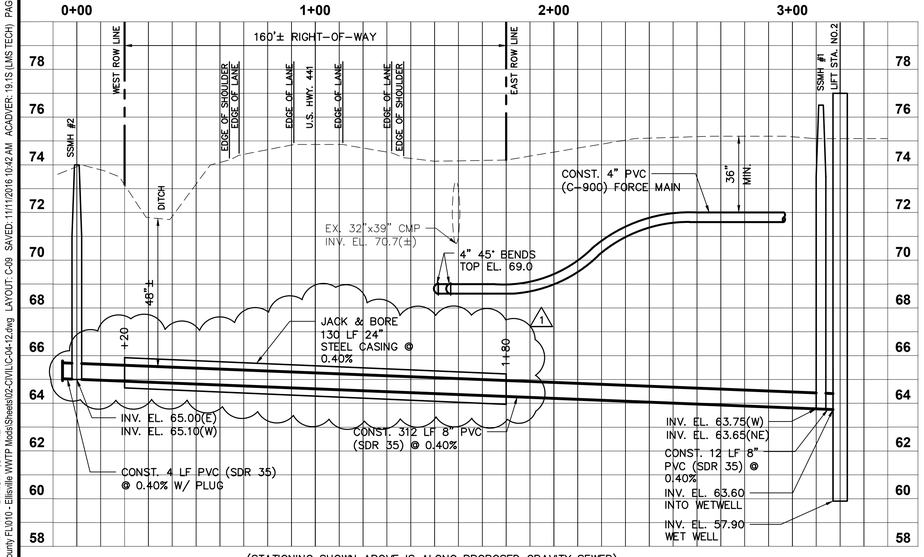
C-03

CITY: DIV/GROUP: DB: LD: PIC: PM: TM: LYR:ON=*;OFF=*REF*
G:\CADD\ACAD\PROJ\6704 Columbia County FL\010 - Ellisville WWTP Mods\Sheets\02-CIVIL\C-03.dwg LAYOUT: C-03 SAVED: 11/8/2016 11:29 AM ACADVER: 19.1S (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: --- PLOTTED: 11/11/2016 9:49 AM BY: NEGRON-VIEIRA, VANESSA

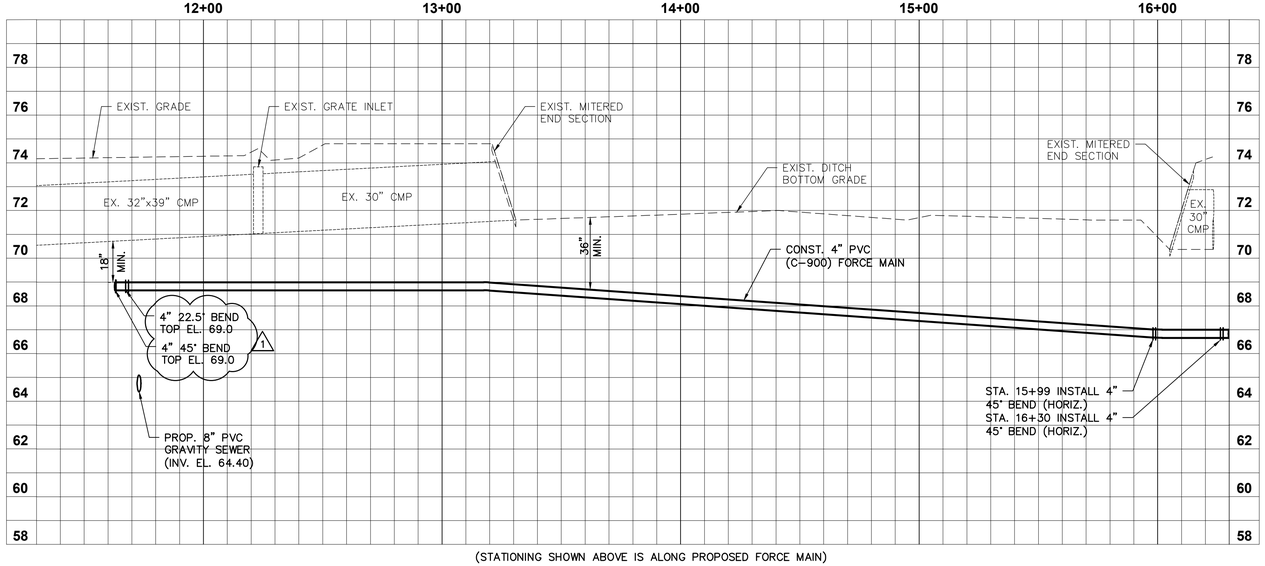




NOTE:
1. INSTALL THE GRAVITY SEWER AND CASING AT A MINIMUM SLOPE OF 0.40%.



(STATIONING SHOWN ABOVE IS ALONG PROPOSED GRAVITY SEWER)



(STATIONING SHOWN ABOVE IS ALONG PROPOSED FORCE MAIN)

SCALE: 1" = 30' (HORIZ.)
SCALE: 1" = 3' (VERT.)

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
1	11/11/2016	Addendum No. 3	JAR	SKC

Professional Engineer's Name	SEAN K. CHAPARRO, P.E.
Professional Engineer's No.	75865
State	FL
Date Signed	
Project Mgr.	SKC
Designed by	SLJ
Drawn by	KAK
Checked by	DAO

SEAN K. CHAPARRO
P.E. NO. 75865

ARCADIS
ARCADIS U.S., INC.
FLORIDA CERTIFICATE OF AUTHORIZATION NUMBER 7917

COLUMBIA COUNTY, FLORIDA
ELLISVILLE WASTEWATER TREATMENT PLANT

FORCE MAIN PLAN

ARCADIS Project No.
06704010.0000

Date
OCTOBER 2016

ARCADIS
3109 W. DR. MARTIN LUTHER KING JR. BLVD., SUITE 350
TAMPA, FLORIDA 33607
TEL. 813.903.3125

C-09

CITY: DIVGROUP DB: LD: PIC: PM: TM: LYR:ON=*;OFF=*REF*
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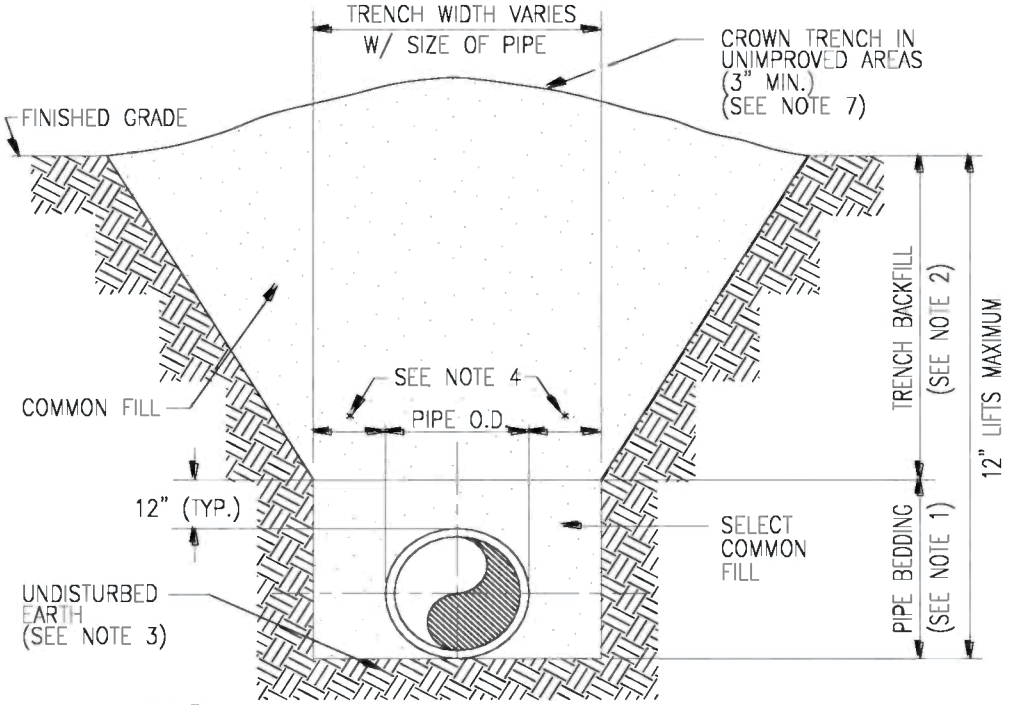
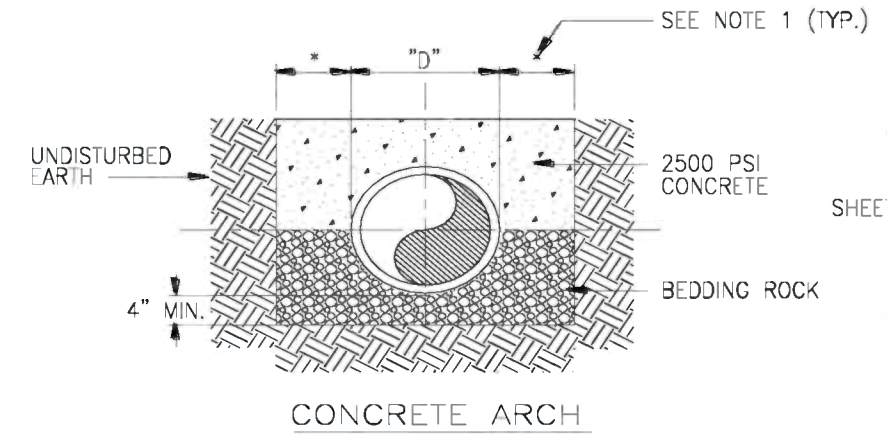


NOTES:

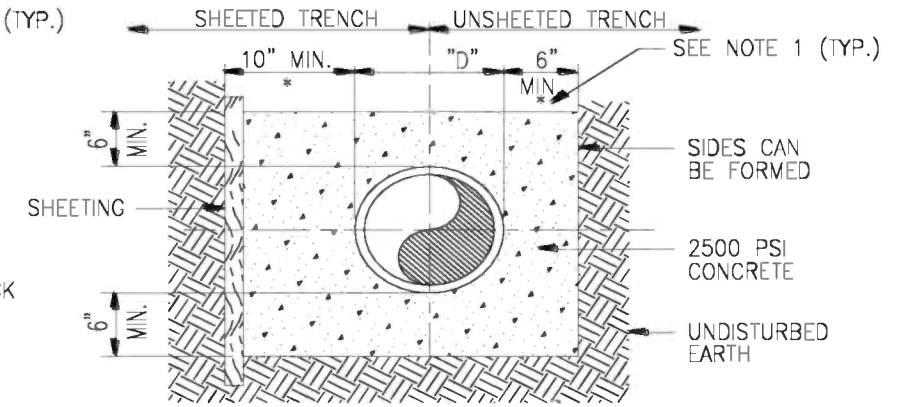
1. PIPE BEDDING: SELECT COMMON FILL COMPACTED TO 95% OF THE MAXIMUM DENSITY AS PER AASHTO T-180.
2. TRENCH BACKFILL: COMMON FILL COMPACTED TO 95% OF THE MAXIMUM DENSITY AS PER AASHTO T-180.
3. PIPE BEDDING UTILIZING SELECT COMMON FILL OR BEDDING ROCK IN ACCORDANCE WITH TYPE A BEDDING AND TRENCHING DETAIL MAY BE REQUIRED AS DIRECTED BY THE COUNTY.
4. (*): 15" MAX. FOR PIPE DIAMETER LESS THAN 24", AND 24" MAX. FOR PIPE DIAMETER 24" AND LARGER.
5. WATER SHALL NOT BE PERMITTED IN THE TRENCH DURING CONSTRUCTION.
6. ALL PIPE TO BE INSTALLED WITH BELL FACING UPSTREAM TO THE DIRECTION OF THE FLOW.
7. FINAL RESTORATION IN IMPROVED AREAS SHALL BE IN COMPLIANCE WITH ALL APPLICABLE REGULATIONS OF GOVERNING AGENCIES. SURFACE RESTORATION WITHIN THE COUNTY RIGHT-OF-WAY SHALL COMPLY WITH THE APPLICABLE REGULATIONS.
8. NO CROWN UNDER PAVED AREAS.

			COLUMBIA COUNTY			
			TYPE B BEDDING AND TRENCHING DETAIL			
08/14	NOTES	TRM				
Date	Revisions	Appr. by	Date: Sept. 1996	Scale: N.T.S.	Dwg: Q100	Fig: 100

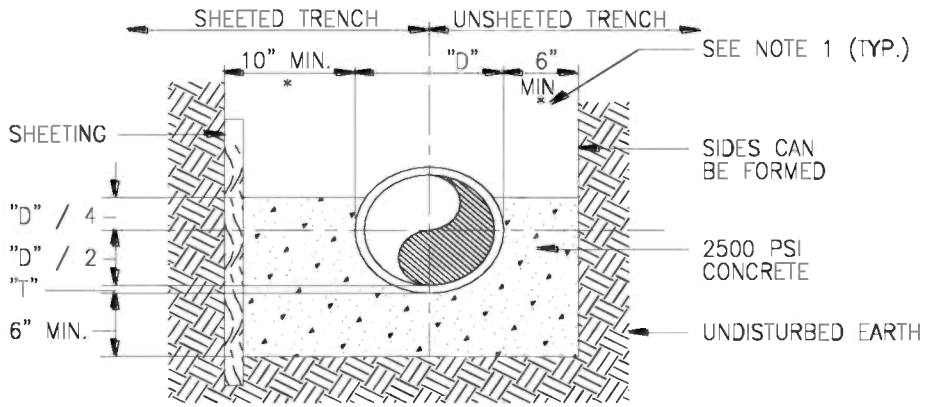
FIGURE D-100 TYPE B BEDDING AND TRENCHING DETAIL



CONCRETE ARCH



FULL ENCASEMENT



CRADLE OR HALF ENCASEMENT

NOTES:
1. (*): 15" MAX. FOR PIPE DIAMETER LESS THAN 24", AND 24" MAX. FOR PIPE DIA. 24" AND OVER.
2. "D" REFERS TO THE DIAMETER OF THE PIPE.
3. "T" REFERS TO THE THICKNESS OF THE PIPE.
4. USE OF CONCRETE ARCH HALF ENCASEMENT OR FULL ENCASEMENT TO BE DETERMINED IN THE FIELD AS DIRECTED BY THE COUNTY.

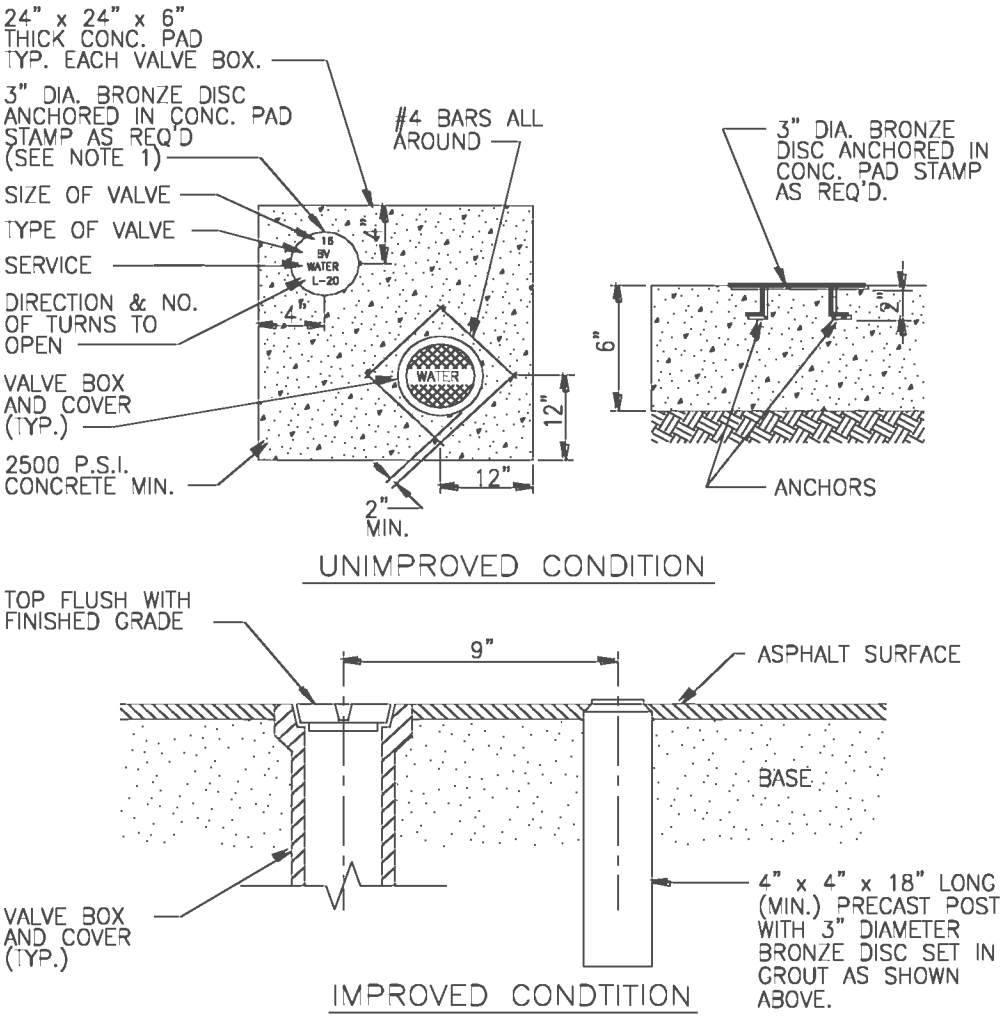
Date	Revisions	Appr. by

COLUMBIA COUNTY

CONCRETE ARCH and ENCASEMENT DETAILS

Date: Jan. 2001 | Dwg: Q102 | Fig: 102

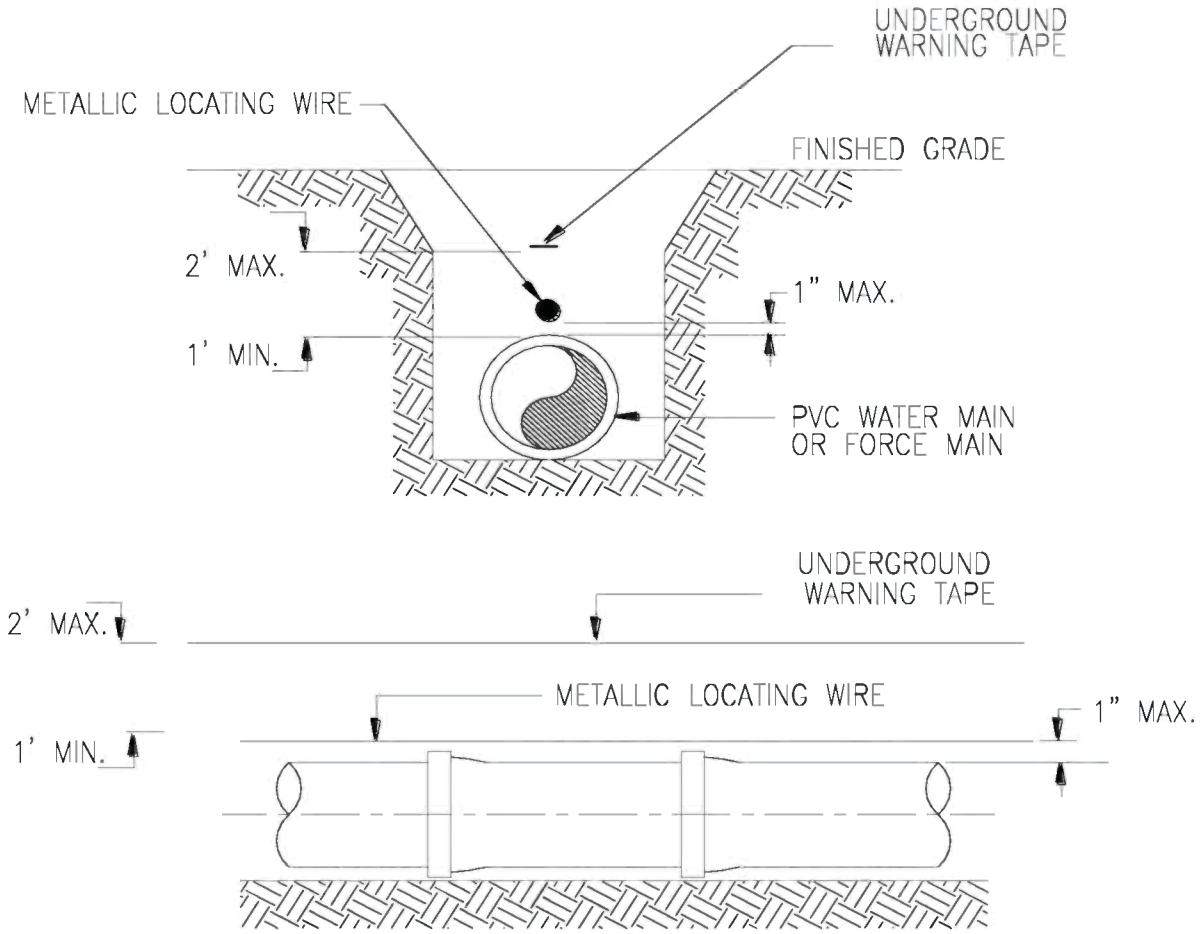
FIGURE D-102 CONCRETE ARCH AND ENCASEMENT DETAILS



NOTES:
1. BRONZE IDENTIFICATION DISC SHALL BE REQUIRED FOR ALL VALVES.

Date	Revisions	Appr. by	COLUMBIA COUNTY			
			VALVE COLLAR DETAIL			
			Date: Sept. 1996	Scale: N.T.S.	Dwg: Q107	Fig: 107

FIGURE D-107 VALVE COLLAR DETAIL



NOTES:

1. PVC PIPE SHALL REQUIRE INSULATED METALLIC LOCATING WIRE (14 GAUGE COPPER) CAPABLE OF DETECTION BY A CABLE LOCATOR AND SHALL BE BURIED DIRECTLY ABOVE THE CENTERLINE OF THE PIPE. LOCATING WIRE SHALL TERMINATE AT THE TOP OF EACH VALVE BOX AND BE CAPABLE OF EXTENDING 12" ABOVE TOP OF BOX IN SUCH A MANNER SO AS NOT TO INTERFERE WITH VALVE OPERATION. USE DUCT TAPE AS NECESSARY TO HOLD WIRE DIRECTLY ON THE TOP OF THE PIPE.
2. PROPERLY COLOR CODED UNDERGROUND WARNING TAPE SHALL BE PLACED AT A MIMIMUM OF 1 FOOT ABOVE THE PIPE AND NO GREATER THAN 2 FEET ABOVE THE PIPE, FOR THE PURPOSE OF IDENTIFYING THE LOCATION OF UNDERGROUND UTILITY LINES.

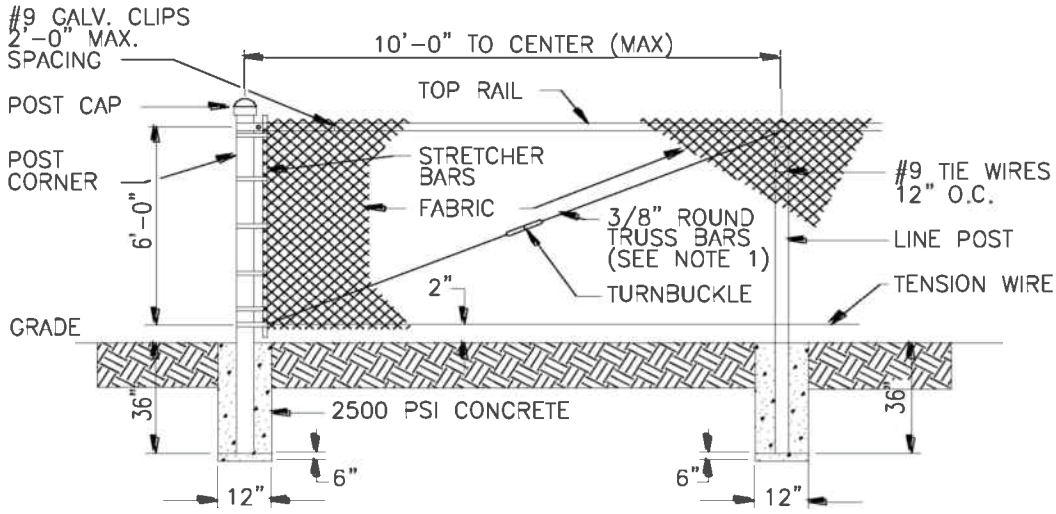
Date	Revisions	Appr. by

COLUMBIA COUNTY

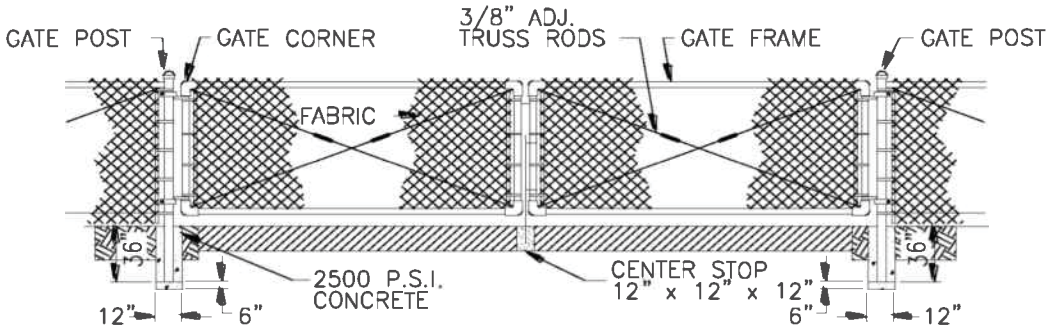
PVC PIPE LOCATING WIRE DETAIL

Date: FEB. 2010	Scale: N.T.S.	Dwg: Q108	Fig: 108

FIGURE D-108 PVC PIPE LOCATING WIRE DETAIL



FENCE DETAIL



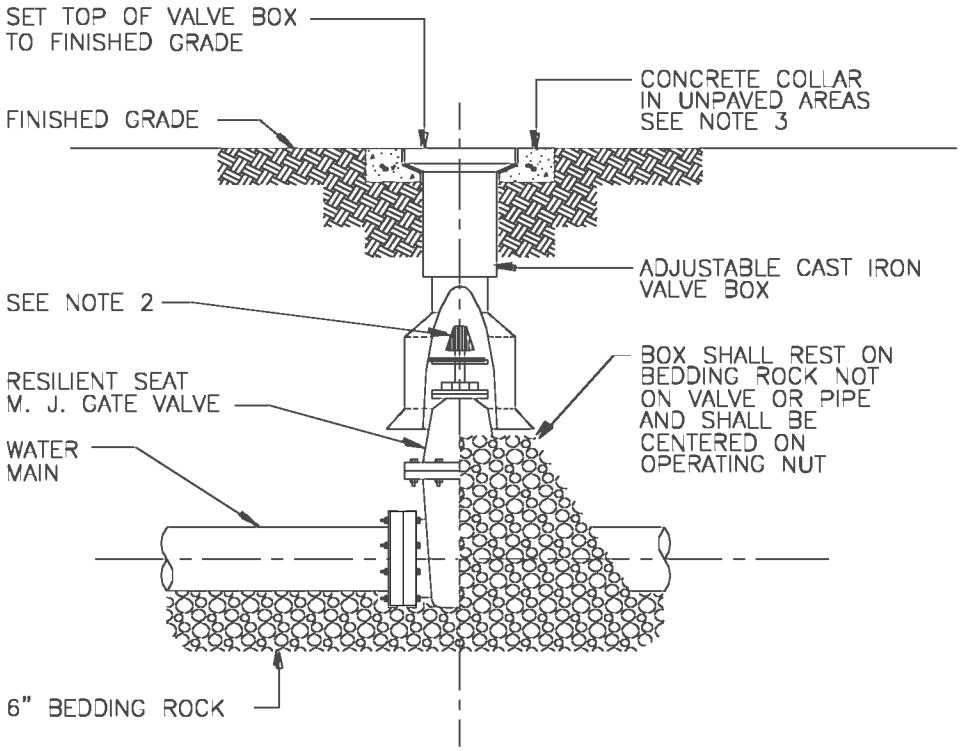
20' DOUBLE SWING GATE DETAIL

NOTES:
1. TRUSS BARS ARE REQUIRED FOR EACH GATE SECTION AND THE FIRST SPAN ON EACH SIDE OF A CORNER POST ONLY.

Date	Revisions	Appr. by

COLUMBIA COUNTY			
CHAIN LINK FENCE DETAIL			
Date: Sept. 1996	Scale: N.T.S.	Dwg: Q307	Fig: 307

FIGURE D-307 CHAIN LINK FENCE DETAIL



NOTES:
1. PVC EXTENSIONS SHALL NOT BE USED ON VALVE BOX INSTALLATION.
2. THE ACTUATING NUT FOR DEEPER VALVES SHALL BE EXTENDED TO COME UP TO 4 FOOT DEPTH BELOW FINISHED GRADE.
3. VALVE COLLAR SHALL BE 18"X18"X6" CONCRETE COLLAR W/4 – #4 BARS.

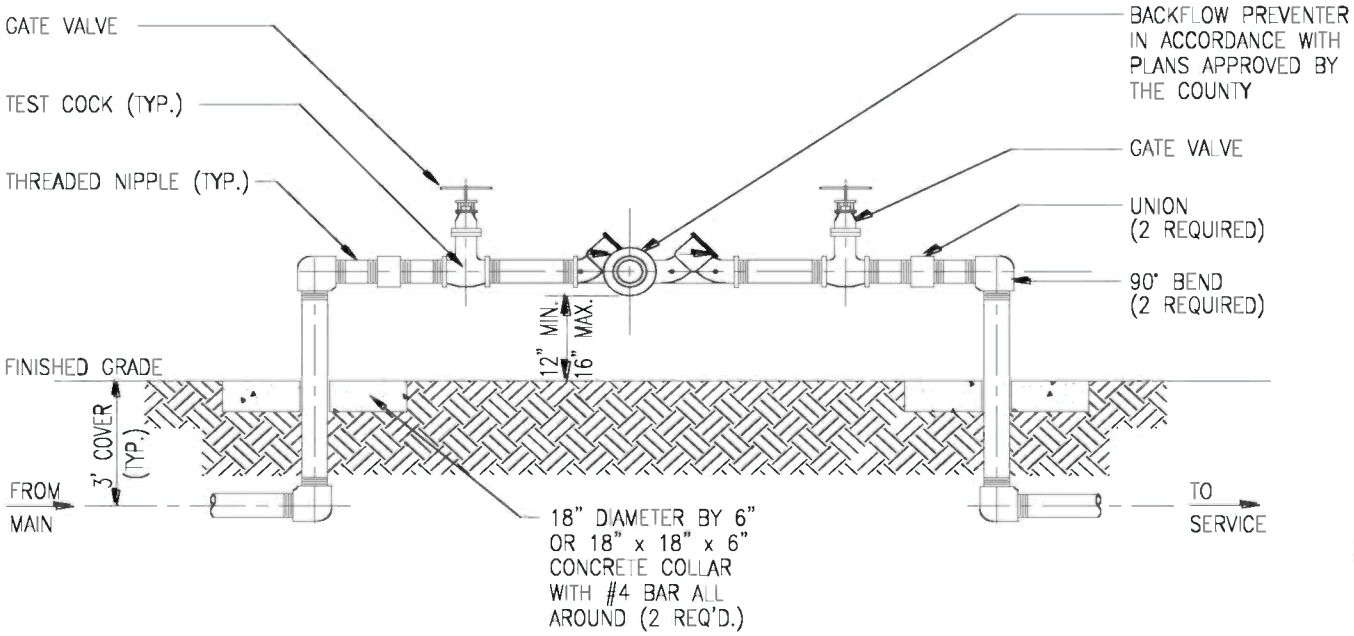
Date	Revisions	Appr. by
08/14	FLANGES AND TITLE	TRM

COLUMBIA COUNTY

PLUG VALVE AND BOX DETAIL

Date: Sept. 1996	Scale: N.T.S.	Dwg: Q400	Fig: 400

FIGURE D-400 GATE VALVE AND BOX DETAIL



NOTES:
1. ALL PIPE AND FITTINGS 2" AND SMALLER SHALL BE THREADED SCHEDULE 40 GALVANIZED STEEL OR BRASS.

Date	Revisions	Appr. by

COLUMBIA COUNTY

REDUCED PRESSURE BACKFLOW PREVENTER

Date: Sept. 1996	Scale: N.T.S.	Dwg: Q501	Fig: 501

FIGURE D-501 REDUCED PRESSURE BACKFLOW PREVENTER

Cal-Tech Testing, Inc.
• Engineering
• Geotechnical
• Environmental
LABORATORIES

PO Box 1625 Lake City, Florida 32056
450 SR13N, 106-308 Jacksonville, Florida 32259

Tel (386) 755-3633 - Fax (386) 752-5456
Tel (904) 381-8901 - Fax (904) 381-8902

July 21, 2016
Project No. 16-361

Arcadia Company
14025 River Edge Drive, 'Suite 600
Tampa, Florida 33637

Attention: Mr. Steven Jones, Senior Engineering Specialist

Re: Geotechnical Investigation for the expansion of the Columbia County waste water treatment plant

Gentlemen:

At the request of Steven Jones of Arcadia Company, Cal-Tech Testing, Inc. undertook a geotechnical investigation for the above named project. The original planned investigation has been modified since two of the original seven borings were not drilled because of access problems. The remainder of this report will present the results of the Standard Penetration Test (SPT) borings and auger borings, the depth of the water table from our borings and the estimated seasonal high ground water table from the NRCS soil survey for Columbia County, use of soil for back fill and, finally, construction recommendations.

FIELD INVESTIGATION

Drilling Procedures

The field investigation consisted of three Standard Penetration Test (SPT) borings that were drilled to a depth of 15 feet and two auger borings that were drilled to a depth of 8 feet. The locations of the borings are shown on the attached site plan.

The Standard Penetration Test (SPT) borings were drilled and tested in accordance with ASTM Specification D-1586 and the auger borings were drilled in accordance with ASTM D-1452. The top 10 feet of the SPT borings were tested and sampled continuously in order to provide a complete description and relative density of the near surface soils. Beneath the top 10 feet, sampling and testing was done every five feet with stratum changes determined from resistance to drilling and/or color changes encountered during the drilling. Rotary drilling with drilling fluid was used to advance

the borings.

The attached SPT boring logs indicated the soil types, stratigraphy, relative density of the soil as measured by the Standard Penetration Resistances (N-counts) and the depth of the ground water at the time the borings were made. It should be noted that although the stratum changes are indicated at a specific depth, soil changes often occur in a gradual way. The soil descriptions are only valid for the boring locations and variations in soil type and relative density could occur between soil borings. The soil is originally described in the field; however, every sample is reviewed in the laboratory and either verified or modified from the field description. The soil samples were not subjected to grain size analyses nor Atterberg limits; therefore, the soil descriptions are based upon visual classification.

Subsurface Conditions

The general conditions in the near-surface soil layers consist of loose to medium dense fine sand with varying amounts of silt and clay. This layer extends to a depth of 4 ½ feet with the exception of boring B-3 that is west of highway 41, that extends to a depth of 7 ½ feet. Beneath the above sand layer, with the exception of the boring B-3 location, the soil consists of a stiff clay to the termination of the borings at depths of 8 and 15 feet. At the boring B-3 location the soil from 7 ½ feet to the termination of the boring at 15 feet the soil is a medium dense slightly clayey fine sand. This clay layer contained a trace of fine sand in borings B-4 and B-5. The detailed stratification can be seen in the attached boring logs.

DEPTH OF WATER TABLE

The water table was not encountered in any of the five borings that were drilled on July fifth or sixth. However, after a significant rainfall event, it is probable that a perched water table will exist above the underlying clay soil layer.

ESTIMATED SEASONAL HIGH WATER TABLE

It was not clear from an examination of the near surface soil samples where the seasonal high water table is located. However, the NRCS Soil Survey for the site location places the depth of the water table at a depth of about 42 to 72 inches below the ground surface. With the underlying clay layer beneath the surficial fine sand it is highly probable that this depth to the water table represents a perched water table condition. Regardless of whether this depth is a normal or perched condition this water table depth should be considered during construction activities.

USE OF SOIL FOR BACK FILL

The soil layer that was encountered above a depth of 4 ½ feet (exception of B-3) contains either a trace, or some, sand or silt; however, it should be suitable for back fill around the pipe installation or the pits that are necessary for the horizontal drilling. The clay layer beneath the sand layer will be difficult to place and compact and should not be considered as back fill material.

CONSTUCTION RECOMMENDATIONS

The construction activities involve a pipe installation at boring locations B-4 and B-5 and excavation for a pit to allow for horizontal drilling at boring location B-3, B-6 and B-7. Assuming the pipe installations are relatively shallow, it is probable that no de-watering or side shoring will be required. However, if the pipe installation is above or close to the bottom of the pipe ditch de-watering may be required. It is also probable that a crushed stone base placed on a geotextile fabric may be necessary to provide suitable bedding for the pipe. If the pipe installation extends to a deeper depth, shoring of the sides of the ditch may also be required.

For the deeper pits that will be necessary for the horizontal drilling, it is highly probable that de-watering may be required. This will depend on the depth of the pit and the water table at the time of construction. At least several days before pit construction begins an auger hole or a small diameter pipe should be extended to a depth that is several feet beneath the expected depth of the pit to determine the depth of the water table at the time of construction. Bear in mind that the presence of the clay layer will likely cause a perched water table condition. If water is encountered in the test hole, then provisions should be made to de-water the excavation to a depth of several feet below the depth of the pit. If the bottom of the pit is in the clay layer of the soil, well points will not be effective and deepened sump that can be pumped during construction will be necessary to keep the bottom of the pit above the water table.

The sides of the pit excavation must be designed with a sufficiently flat slope to avoid a slope failure or side sheeting will be required to support the sides of the excavation.

The excavations for the pipe installations and the proposed pits for the horizontal drilling should be done in a manner that would comply with OSHA and any other federal and state safety requirements.

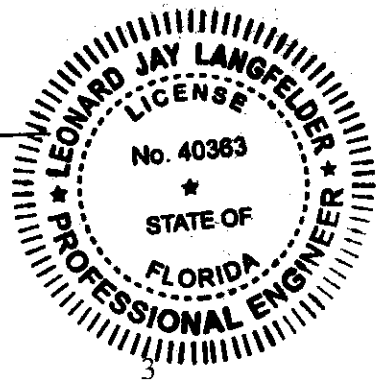
We appreciate the opportunity of working with you on this project and look forward to serving as your geotechnical and construction materials testing consultant on the remainder of this and future projects. Should you have any questions and/or comments concerning this report, pleas contact our office at 904-381-8901.

Sincerely,

CAL-TECH TESTING, INC.

Jay Langfelder

Jay Langfelder, Ph.D., P.E.
Senior Geotechnical Engineering
Licensed Florida 40363



CAL-TECH TESTING PO BOX 1625 LAKE CITY, FL 32056	ELLISVILLE WWTP EXPANSION COLUMBIA COUNTY, FLORIDA	COLUMBIA COUNTY BOARD OF COUNTY COMMISSIONERS PO DRAWER 1529 LAKE CITY, FL 32056

CAL-TECH TESTING, INC.

ENGINEERING & TESTING LABORATORY
LAKE CITY • JACKSONVILLE

JOB NO. 16-00361-01

TEST BORING RECORD

Project:	ELLISVILLE WWTP EXPANSION	**BORING NO.:**	**B-3**
Client:	COLUMBIA COUNTY	**Sheet:**	1 of 1
Boring Location:	N 30º00'08.43" W 82º35'57.72"	**Boring Began:**	7/5/16
Ground Elevation:	N/A	**Boring Completed:**	7/5/16
Groundwater Depth:	N/A	**Driller:**	CB
Length of Casing Set:	N/A	**Engineer:**	J. Langfelder

Depth (Ft)	MATERIAL DESCRIPTION	Depth (Ft)	Sample No	STANDARD PENETRATION TEST	
				BLOWS / 6-INCH	BLOW COUNT (N*)
0	2" ASPHALT	0			
	Tan Fine SAND w/ some Clay				
	Medium Dense Tan Fine SAND w/ Trace of Clay and Silt		1	8 9 8	17
	Medium Dense Gray and Tan Fine SAND w/ Trace of Silt		2	7 6 5	11
5	Loose Tan Fine SAND	5	3	5 3 2	5
			4	1 2 3	5
	Loose Tan and Red Slightly Clayey Fine SAND		5	4 2 3	5
10	Medium Dense Tan and Red Slightly Clayey Fine SAND	10	6	4 6 6	12
	Loose Tan and Red Slightly Clayey Fine SAND		7	5 4 6	10
15	TERMINATED AT 15'	15			
20		20			
25		25			
30		30			

REMARKS: * MudBug was used

BORING TERMINATED AT 15'

BORING & SAMPLING: ASTM D1586

BLOW COUNT (N) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

CAL-TECH TESTING, INC.

ENGINEERING & TESTING LABORATORY
LAKE CITY • JACKSONVILLE

JOB NO. 16-00361-01

TEST BORING RECORD

Project:	ELLISVILLE WWTP EXPANSION	**BORING NO.:**	**B-4**
Client:	COLUMBIA COUNTY	**Sheet:**	1 of 1
Boring Location:	N 30º00'10.28" W 82º35'49.98"	**Boring Began:**	7/6/16
Ground Elevation:	N/A	**Boring Completed:**	7/6/16
Groundwater Depth:	N/A	**Driller:**	CB
Length of Casing Set:	N/A	**Engineer:**	J. Langfelder

Depth (Ft)	MATERIAL DESCRIPTION	Depth (Ft)	Sample No	STANDARD PENETRATION TEST	
				BLOWS / 6-INCH	BLOW COUNT (N*)
0	Brown and Gray Fine SAND with Trace Of Silt	0			
	Tan Slightly Silty Fine SAND				
5	Tan CLAY with Trace of Tan Fine Sand	5			
	TERMINATED AT 8'				
10		10			
15		15			
20		20			
25		25			
30		30			

REMARKS: * MudBug was used

BORING TERMINATED AT 8'

BORING & SAMPLING: ASTM D1586

BLOW COUNT (N) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

CAL-TECH TESTING, INC.

ENGINEERING & TESTING LABORATORY
LAKE CITY • JACKSONVILLE

JOB NO. 16-00361-01

TEST BORING RECORD

Project:	ELLISVILLE WWTP EXPANSION	**BORING NO.:**	**B-5**
Client:	COLUMBIA COUNTY	**Sheet:**	1 of 1
Boring Location:	N 30º00'12.84" W 82º35'49.89"	**Boring Began:**	7/6/16
Ground Elevation:	N/A	**Boring Completed:**	7/6/16
Groundwater Depth:	N/A	**Driller:**	CB
Length of Casing Set:	N/A	**Engineer:**	J. Langfelder

Depth (Ft)	MATERIAL DESCRIPTION	Depth (Ft)	Sample No	STANDARD PENETRATION TEST	
				BLOWS / 6-INCH	BLOW COUNT (N*)
0		0			
	Brown and Gray Fine SAND with Trace of Silt				
	Tan and Gray Fine SAND with Trace of Silt				
	Tan and Gray Slightly Clayey Fine SAND				
5	Tan and Gray CLAY with a Trace of Tan Fine Sand	5			
	TERMINATED AT 8'				
10		10			
15		15			
20		20			
25		25			
30		30			

REMARKS: * MudBug was used

BORING TERMINATED AT 8'

BORING & SAMPLING: ASTM D1586

BLOW COUNT (N) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

CAL-TECH TESTING, INC.

ENGINEERING & TESTING LABORATORY
LAKE CITY • JACKSONVILLE

JOB NO. 16-00361-01

TEST BORING RECORD

Project:	ELLISVILLE WWTP EXPANSION	**BORING NO.:**	**B-6**
Client:	COLUMBIA COUNTY	**Sheet:**	1 of 1
Boring Location:	N 29º59'55.08" W 82º35'35.50"	**Boring Began:**	7/5/16
Ground Elevation:	N/A	**Boring Completed:**	7/5/16
Groundwater Depth:	N/A	**Driller:**	CB
Length of Casing Set:	N/A	**Engineer:**	J. Langfelder

Depth (Ft)	MATERIAL DESCRIPTION	Depth (Ft)	Sample No	STANDARD PENETRATION TEST: BLOWS / 6-INCH	STANDARD PENETRATION TEST: BLOW COUNT (N*)
0		0			
	Brown and Gray Fine SAND with Trace of Silt				
	Loose Tan Fine SAND		1	3 3 3	6
	Loose Slightly Silty Tan Fine SAND		2	3 3 3	6
5	Very Stiff Tan and Red CLAY	5	3	6 8 8	16
	Very Stiff Gray and Red CLAY		4	9 13 15	28
	Hard Gray and Red CLAY		5	15 18 17	35
10	Very Stiff Gray and Red CLAY	10	6	14 14 14	28
			7	8 8 10	18
15	TERMINATED AT 15'	15			
20		20			
25		25			
30		30			

REMARKS: * MudBug was used

BORING TERMINATED AT 15'

BORING & SAMPLING: ASTM D1586

BLOW COUNT (N) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

CAL-TECH TESTING, INC.

ENGINEERING & TESTING LABORATORY
LAKE CITY • JACKSONVILLE

JOB NO. 16-00361-01

TEST BORING RECORD

Project:	ELLISVILLE WWTP EXPANSION	**BORING NO.:**	**B-7**
Client:	COLUMBIA COUNTY	**Sheet:**	1 of 1
Boring Location:	N 29º59'51.9" W 82º35'37.3"	**Boring Began:**	7/5/16
Ground Elevation:	N/A	**Boring Completed:**	7/5/16
Groundwater Depth:	N/A	**Driller:**	CB
Length of Casing Set:	N/A	**Engineer:**	J. Langfelder

Depth (Ft)	MATERIAL DESCRIPTION	Depth (Ft)	Sample No.	STANDARD PENETRATION TEST	
				BLOWS / 6-INCH	BLOW COUNT (N*)
0		0			
	Gray Fine SAND with Trace of Silt				
	Loose Gray and Tan Fine SAND		1	6 5 5	10
	Loose Tan Fine SAND		2	4 3 3	6
5	Firm Gray and Red CLAY with Tan Fine Sand	5	3	3 2 3	5
	Stiff Gray and Red CLAY		4	5 5 6	11
			5	9 10 9	19
10		10	6	9 10 9	19
	Very Stiff Gray and Red CLAY				
			7	9 11 10	21
15	TERMINATED AT 15'	15			
20		20			
25		25			
30		30			

REMARKS: * MudBug was used

BORING TERMINATED AT 15'

BORING & SAMPLING: ASTM D1586

BLOW COUNT (N) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

REPORT OF GEOTECHNICAL EXPLORATION

Ellisville WWTP – New Water Storage Structures
I-75 & U.S. Highway 41
Ellisville, Columbia County, Florida
CTTI Project No. 14-00208-01

- Prepared For -
Columbia County Board of County Commissioners
P.O. Box 969
Lake City, Florida 32056

- Prepared by -
Cal-Tech Testing, Inc.
P.O. Box 1625
Lake City, Florida 32056-1625

June 12, 2014

Cal-Tech Testing, Inc.
• Engineering
• Geotechnical
• Environmental
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450 SR 13N, Suite 106-308, Jacksonville, FL 32259 . Tel. (904) 381-8901 • Fax (904) 381-8902

June 12, 2014

Columbia County Board of County Commissioners
P.O. Box 969
Lake City, Florida 32056

Attention: Mr. Chad Williams, P.E., County Engineer

Reference: Report of Geotechnical Exploration
Ellisville WWTP – New Water Storage Structures
I-75 & U.S. Highway 41, Ellisville, Columbia County, Florida
CTTI Project No. 14-00208-01

Dear Mr. Williams:

Cal-Tech Testing, Inc. (CTTI) has completed the geotechnical exploration for the proposed storage tank structures at the referenced site. Our work was planned and performed in general accordance with our proposal dated May 23, 2014. Acceptance to this proposal and authorization to proceed was provided in an e-mail dated May 28, 2014.

The following report presents the results of our field exploration and testing, an evaluation of the subsurface conditions with respect to available project information and geotechnical engineering recommendations to aid in the design and construction of the proposed facility.

We have enjoyed assisting you on this phase of your project and look forward to serving as your geotechnical and construction materials testing consultant for the remainder of this and future projects. Should you have any questions concerning this report, please contact our office at 386-755-3633.

Sincerely,
Cal-Tech Testing, Inc.

NABIL O. HMEIDI LICENSE No 57842 STATE OF FLORIDA PROFESSIONAL ENGINEER

COPY

Nabil O. Hmeidi, P.E.
Senior Geotechnical Engineer
Licensed, Florida No. 57842

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Mr. Reed Meriwether, P.E. – ARCADIS (pdf via e-mail)

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Purpose and Scope of Service 1

2.0 SITE & PROJECT CHARACTERISTICS 1
2.1 Site Descriptions 1
2.2 Project Descriptions 1

3.0 FIELD PROGRAMS 2
3.1 Field Program 2

4.0 SITE AND SUBSURFACE CONDITIONS 3
4.1 General Area Geology 3
4.2 Sinkhole Potential 3
4.3 USDA/SCS Soil Survey 3
4.4 Subsurface Conditions 4
4.4.1 Water Storage Structures: 4
4.4.2 Drainage "Ribs" Area: 4
4.5 Groundwater 4

5.0 FOUNDATION DESIGN RECOMMENDATIONS 5
5.1 Foundation Support 5
5.2 Settlement Analyses 5
5.3 Soil-Supported Concrete Slabs 5
5.4 Uplift Resistance 6
5.5 Lateral Resistance 6
5.6 Lateral Earth Pressures 6
5.7 Seismic Consideration 7
5.8 Temporary Slope Designs 7
5.9 Drainage Considerations & Construction Dewatering 7

7.0 GENERAL EARTHWORK RECOMMENDATIONS 7
7.1 Exposed Subgrade 7
7.2 Structural Fill/Backfill 8
7.3 Construction Monitoring and Testing Guidelines 9
7.4 Design Recommendations for Drainage Facility 9

8.0 REPORT LIMITATIONS 9

ATTACHMENTS

Exhibit No. 1 *Vicinity Map (1 page)*
Exhibit No. 2 *Field Exploration Plan (1 page)*
Exhibit No. 3 *Record of Boring Logs (5 pages)*

1.0 INTRODUCTION

1.1 Purpose and Scope of Service

The purpose of this exploration was to develop information to evaluate the site and subsurface conditions and to present site preparation recommendations and foundation support for the proposed water storage structures at the referenced site. This report briefly describes our field activities and presents our findings and recommendations. The services rendered by CTTI during the course of this exploration can be summarized as follows:

1. Reviewed available data such as results of similar explorations and published data including the U.S.G.S. Quadrangle Map and the Geologic Map of Florida;
2. Planned and performed two (2) Standard Penetration Test (SPT) borings within the proposed water storage structures. These borings extended 25 feet below the existing ground surface;
3. Planned and performed three (3) auger borings within the drain filed areas each extending 15 feet below the existing ground surface;
4. Performed one (1) double-ring infiltrometer test within the upper 12 inches of the existing ground surface near boring A-3;
5. Reviewed and analyzed gathered data to evaluate the general subsurface conditions with respect to the proposed construction, and
6. Prepared this report, which includes the results of our field exploration as well as our recommendations with respect to foundation design, foundation related site work, general site development, and quality control within the proposed construction areas.

2.0 SITE & PROJECT CHARACTERISTICS

2.1 Site Descriptions

Ellisville Waste Water Treatment Plant (WWTP) is located on the west side of I-75 approximately 1¼ miles south of I-75/U.S. Highway 41 interchange in Ellisville, Columbia County, Florida. At the time of our field work, the ground surface within the proposed structures was grass covered and appears to slope down to the south-southeast.

2.2 Project Descriptions

We have been furnished with an undated drawing (unknown author) indicating the location of the proposed structures and borings. Based on our review of this drawing, we understand that Columbia County Board of County Commissioners is planning on constructing three new 17.5' wide x 50' long x 12' high concrete water storage structures with associated drainage areas near the existing Ellisville WWTP. One of the storage structures and drainage areas will be constructed during this phase. However, the remaining two storage structures and drainage areas will be constructed during future expansion phases (see attached Field Exploration Plan for more details).

3.0 FIELD PROGRAMS

3.1 Field Program

The subsurface conditions within the proposed/future storage tanks and drainage areas were explored by performing two (2) SPT and three (3) auger borings extending to depths ranging from 15 to 25 feet below the existing ground surface. In addition, one (1) double-ring infiltrometer test was performed within the drainage areas at a depth of 1 foot below the existing ground surface.

The sampling and penetration procedures of the SPT borings were accomplished in general accordance with ASTM D-1586, "*Penetration Test and Split-Barrel Sampling of Soils*", using power rotary drill rig. The SPT borings were performed by driving a standard 1-3/8" I.D. and 2" O.D. split spoon sampler with a 140 pound hammer falling 30 inches. The number of hammer blows required to drive the sampler a total of 18 inches, in 6 inch increments, were recorded. The penetration resistance or "*N*" value is the summation of the last two 6 inch increments and is illustrated on the attached boring logs adjacent to their corresponding sample depths. The penetration resistance is used as an index to derive soil parameters from various empirical correlations. The auger borings were performed mechanically using a continuous flight auger in general accordance with ASTM D 1452-80 ("*Soil Investigation and Sampling by Auger Borings*"). Representative samples of the soils were brought to the ground surface by the auger process and transported to our laboratory for visual evaluation and classification.

The double-ring infiltrometer test was performed in general accordance with ASTM D-3385, "*Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer.*" The test location was prepared by removing the soil cover to a depth of approximately 12 inches below the existing ground surface. Then two concentric cylinders (12-inch and 24-inch I.D.) were driven into the ground with the smaller ring in the center of the larger ring. The large cylinder was driven to a depth of about 6 inches and the smaller cylinder to a depth of 4 inches below the surface being tested, then both cylinders were partially filled with water. A constant head of water was maintained in each cylinder and the volume added every 5 minutes was recorded. The rate of infiltration was then calculated from the rate of steady-state flow, time elapsed, and cylinder's inside diameters.

The attached record of boring logs graphically illustrates penetration resistances, groundwater levels, and soil descriptions. It must be noted the stratification lines and depth designations indicated on the boring records represent approximate boundaries between soil types. In some instances the transition between these soil types may be gradual. When reviewing the boring records, it should be understood that soil conditions may vary away from the boring locations.

4.0 SITE AND SUBSURFACE CONDITIONS

4.1 General Area Geology

Published information[1] regarding the geology of Columbia County, Florida indicates the site is situated within the undifferentiated quaternary sediments (Qu) of the Pleistocene and Holocene periods. Typically, the undifferentiated sediments consist of siliciclastics, organics and freshwater carbonates. The siliciclastics are light gray, tan, brown to dark, unconsolidated to poorly consolidated, clean to clayey, silty, fossiliferous, variably organic-bearing sands to blue green to olive green, poorly to moderately consolidated, sandy, silty, clays.

4.2 Sinkhole Potential

The USGS Map Series No. 110, Sinkhole Type, Development, and Distribution in Florida dated 1985 identifies the subject site within Area I. This area consists of ground with bare or thinly covered limestone. Gradually developed solution sinkholes in this area are few, broad and shallow.

The sinkhole Database issued by the Florida Geological Survey (last updated May 6, 2013) indicates a number of "*reported*" sinkhole occurrences within 1½ miles radius of the referenced site with the nearest being about ½ mile to the northeast (see database reference No. 29-024 occurred on March 22, 2005). However, results of the test borings did not reveal presence of active sinkholes within the explored profile. Therefore, it is our opinion the proposed development on this site will have no greater risk of damage due to sinkhole activity than the development of structures in nearby areas. In any event, it must be understood that this exploration was not intended to predict or preclude future sinkholes from occurring within the limits of the subject area.

4.3 USDA/SCS Soil Survey

A review of the Columbia County, Florida USDA Soil Survey indicates the majority of the soils within the vicinity of auger boring A-3 to consist of the following:

- Albany fine sand (Soil Map Unit No. 1). The surface layer of this map unit is dark grayish brown fine sand to about 9 inches. The surface cover is underlain by about 48 inches of light yellowish brown fine sand mottled with brown and white; and pale yellow fine sand mottled with red and white. The subsoil is light yellowish brown fine sandy loam mottled with brown and light gray; and gray sandy clay loam that has strong brown mottles to a depth of about 80 inches or more below the "original" ground surface. The soil survey indicates the apparent[2] high water table in areas underlain by this map unit is at about 2 feet below the ground surface between the period of December to March. These soils have a hydrologic group C[3] designation.

---

1 Geologic Map of the State of Florida, Series MS 146, by the Florida Geological Survey (FGS), 2001, revised April 15, 2006 & Open-File Report 80, by FGS dated 2001.
2 Thick zone of free water in the soil indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soils.
3 Typically, soils assigned Hydrologic Group C have a slow infiltration rate when thoroughly wet, and slow rate of water transmission. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of fine to moderately fine texture.

- Blanton fine sand (Soil Map Unit No. 8). This soil unit consists of about 7 inches of gray sand, underlain by about 45 inches of very pale brown to light gray sand. The substratum soils are underlain by light yellowish brown to light brownish gray sandy loam to a depth of 80 inches or more below the natural ground surface. The soil survey indicates a perched[4] water table at about 5 to 6 feet below the original ground surface during the period of December to March. This map unit has a Hydrologic Group A[5] designation.
- Orangeburg loamy fine sand (Soil Map Unit No. 43). Typically, the surface layer of this unit is brown loamy fine sand about 8 inches thick. The subsoil extends to a depth of 80 inches or more consisting of about 5 inches of yellowish red sandy loam; about 38 inches of yellowish red sandy clay loam underlain by sandy clay; and about 29 inches of mottled strong brown, yellowish red, and gray sandy clay loam. The soil survey indicates a high water table at greater than 6 feet below the original ground surface. This map unit has a Hydrologic Group B[6] designation.

4.4 Subsurface Conditions

4.4.1 Water Storage Structures:

The soil profile as disclosed by SPT borings B-1 and B-2 initially consisted of about 6 to 9 inches of grayish tan sand with silt and organic (TOPSOIL). This surface cover is underlain by alternating layers of tan sand with silt (SP-SM), gray sand (SP) with trace of silt, reddish brown and gray mottled clayey sand (SC), and reddish brown with gray mottles sandy clay (CL).

The standard penetration resistance or "*N*" values of the sandy soils ranged from 6 to 30 Blows Per Foot (BPF) indicating these soils to vary from very loose to medium in relative density. The clay soils are very stiff in consistency with "*N*" value of 17 BPF.

4.4.2 Drainage "Ribs" Area:

The soil profile as disclosed by auger borings A-1, A-2 and A-3 initially consisted of about 6 inches of grayish tan sand with silt and organic (TOPSOIL). This surface cover is underlain by alternating layers of tan sand with silt (SP-SM), reddish brown and gray mottled clayey sand (SC), and gray with red mottles sandy clay (CL).

4.5 Groundwater

The measurement from the existing ground surface to the groundwater table was attempted immediately following completion of the drilling. At the time of completion, the groundwater was not encountered in any of the borings. We should note that due to the relatively short time frame of the field exploration and the clayey nature of the site soils, the groundwater may not have had sufficient time to stabilize. Therefore, fluctuation in groundwater levels should be expected due to

---

4 Water standing above an unsaturated zone. In places, a perched (or upper) water table is separated from the lower one by a dry zone.
5 Typically, soils assigned to Hydrologic Group "A" have a high infiltration rate when thoroughly wet, and have a high water transmission. These consist mainly of deep, well- to excessively-drained sands or gravelly sands.
6 Typically, Group B soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

seasonal climatic changes, construction activity, rainfall variations, surface water runoff, and other site-specific factors. Perched water conditions should be expected at or near the top of the clayey soils (about 4½ to 6 feet below the existing ground surface), particularly after periods of precipitations.

5.0 FOUNDATION DESIGN RECOMMENDATIONS

The recommendations presented in this report are based upon available project information, available loading conditions, and data obtained during our field program. If the loading information is incorrect or the location of the structures change, please contact this office so our recommendations may be reviewed and/or revised. Discovery of any site or subsurface conditions during construction, which deviates from the data collected during this exploration, should be reported to us for evaluation.

5.1 Foundation Support

Based on our evaluation of the encountered soils and furnished information, it is our opinion the subject site can be made suitable for the support of the proposed facility. Provided the foundation and site soils are prepared in accordance with the guidelines presented in this report, the proposed structures can be supported on conventional shallow foundation system. This foundation system should be designed using an allowable bearing pressure of 2,500 pounds per square foot (psf) supported on recompacted soils (see Structural Fill/Backfill and Drainage Considerations & Construction Dewatering sections for more details).

In using net pressures, the weight of the footings and backfill over the footings need not be considered. Only loads applied at or above final grade need to be used for dimensioning footings. Wall bearing footings should be designed with a minimum width of 18 inches, while individual column footings should have minimum dimensions of 2 feet by 2 feet.

5.2 Settlement Analyses

Assuming the foundation related site work and design are completed in accordance with our recommendations, we estimate the total settlement under the water storage structures will be about 1 inch, with differential settlements of about one-half that of the total settlement. We anticipate the majority of this settlement will be the result of the elastic compression of the upper sandy soils, and should occur almost immediately following the application of the structural dead load. Therefore, we recommend the storage structures be loaded prior to making the final utility connections and that connections be made of articulating flexible joints, if possible.

5.3 Soil-Supported Concrete Slabs

All unsuitable material located within the proposed structure areas (including a minimum of 5 feet outside the perimeter of each slab area) should be overexcavated and removed (see Structural Fill/Backfill for more details). The exposed subgrade should be compacted and tested prior to placement of any new fill . Provided satisfactory compaction of all exposed subgrades, then new structural fill may be placed as indicated herein.

All concrete slabs-on-grade should be supported on at least 4 inches of relatively clean granular material, such as sand, sand and gravel, or crushed stone. This is to help distribute concentrated loads and equalize moisture beneath the slab. This granular material should have 100 percent passing the 1½ -inch sieve and a maximum of 12 percent passing the No. 200 sieve. Based upon the soil conditions encountered at the subject site, the anticipated fill placement, and the recommended site preparation operations presented in this report, a modulus of vertical subgrade reaction (k) of 150 pounds per square inch per inch of vertical deflection (pci) may be used.

5.4 Uplift Resistance

Under wind loading conditions, the proposed storage structures may be subjected to uplift forces. To resist these uplift forces, it may be necessary to increase the footing size (thus increasing the dead weight) or lower the footing to mobilize additional soil weight above the footing. Uplift resistance from the soil may be evaluated as the weight of the soil directly above the footing, plus the shearing resistance along the vertical face of the soil prism. Alternately, the available soil uplift resistance may be calculated as the weight of the soil prism defined by the diagonal line drawn from the top of the footing to the ground surface at an angle of 30 degrees with the vertical. To calculate the uplift resistance, an average total unit weight of 115 pcf (or ±113 pcf when compacted to a minimum of 98% of the modified Proctor's maximum dry density) may be used for newly placed structural fill. Should the bottom of any structure bear at depths below the groundwater level, these structures must be properly designed to resist the resulting uplift forces due to hydrostatic pressures.

5.5 Lateral Resistance

Lateral loads created by wind may be resisted by the passive pressure of the soil acting against the side of the individual footings and/or the friction developed between the base of the foundation system and the underlying soils. For in-situ material and/or compacted backfill, the passive pressure may be taken as an equivalent to the pressure exerted by a fluid weighing 339 pcf for above the groundwater table and 152 pcf below the water level. A coefficient of friction equal to 0.40 may be used for calculating the frictional resistance at the base of the shallow footings. The resistance values discussed herein are based on the assumption the foundations can withstand horizontal movements on the order of ¼ inch. Lateral resistance determined in accordance with the recommendations provided should be considered the total available resistance. Consequently, the design should include a suitable factor of safety (minimum of 1.5).

5.6 Lateral Earth Pressures

Side walls of the storage structures may act as retaining walls, particularly when below grade and/or empty, and may be subject to "at-rest" or "active" lateral earth pressures. Walls which are fixed or restrained at the top and bottom may be subject to "at-rest" earth pressure. These pressures may be calculated as the equivalent pressure exerted by a fluid density of 57 pcf. For walls which are not restrained at the top and thus allowed sufficient movement to mobilize "active" pressures, an equivalent fluid density of 38 pcf should be used in the design. These values may be used only for walls above the groundwater table. The presence of any groundwater due to surface water intrusion should be handled with the use of a drainage layer behind the walls/footings with a collection pipe discharging accumulated water away from the walls. If this is not practical, then the hydrostatic pressure due to water should be included in the design of the walls.

5.7 Seismic Consideration

Based on the 1997 Uniform Building Code, the subject site is located within Zone 0 with respect to earthquake risk as indicated by the Seismic Zone Map of the United States (1997 Uniform Building Code) and no significant seismic activity has been recorded in this area. Our exploration did not include field or laboratory testing for seismic evaluation. However, Zone 0 refers to areas having the lowest probability of seismic activity. Based on Table 16-J of the UBC, the soils at this site generally correspond to Soil Profile Type S_D ("*Stiff Soil Profile*"). For this soil type, an estimated average shear wave velocity (v_s) of 900 ft./sec may be used for the referenced site.

5.8 Temporary Slope Designs

A detailed analysis of temporary slope stability was beyond the scope of this exploration. However, it is recommended that all Occupational Safety and Health Administration (OSHA) regulations regarding excavating slopes be met (see OSHA Document 2226 for more details). For the on-site soils we recommend temporary construction slopes not exceeding 10 feet in height be graded no steeper than 1½(H):1(V). Shoring and bracing should be considered for steeper excavation and excavation at or below the water level and coarse grained soils. Perched water should be expected at depths ranging from 4½ to 6 feet below the existing ground surface. Proper management of this perched and surface water runoff into excavations will contribute to the stability of temporary slopes. Material removed from the excavations should not be stockpiled within a distance of twenty (20) feet from the crest of any temporary excavations. If deeper temporary or open-cut excavations can not be accommodated, then steel sheetpile-supported excavations should be used.

5.9 Drainage Considerations & Construction Dewatering

Adequate drainage should be provided at the site to minimize increase in moisture content of the foundation soils. Excessive moisture can significantly reduce the soil's bearing capacity and contribute to foundation settlement. For the protection of the foundation soils, we recommend the ground surface be sloped away from all proposed structures.

The perched water table may be encountered within the upper 5 feet of the existing ground surface after periods of precipitation. This groundwater may be diverted so that it does not affect the area being excavated or compacted. Dewatering, if needed, may be accomplished by the use of a perimeter ditch and/or sump pumps outside the limits of the excavation and compaction areas. Dewatering should be performed so that the groundwater level is controlled at a minimum depth of 2 feet below the elevation that is being compacted.

7.0 GENERAL EARTHWORK RECOMMENDATIONS

7.1 Exposed Subgrade

All soils within the proposed structures (including a minimum of 5 feet outside the perimeter of each structure, where possible) should be compacted with overlapping passes of a drum roller to a minimum of 98 percent of the modified Proctor maximum dry density (ASTM D-1557) and to a depth of at least 8 inches below the compacted surface (refer to the Structural Fill/Backfill section for more details).

7.2 Structural Fill/Backfill

Structural fill should be placed in thin loose lifts not exceeding 8 inches in thickness and compacted with a drum roller having adequate weight to provide the minimum recommended compaction level. Each lift should be thoroughly compacted to provide a minimum of 98 percent of the modified Proctor maximum dry density value (ASTM D-1557). Structural fill should consist of inorganic, non-plastic, granular soil containing less than 10 percent material passing the No. 200 sieve (Unified Soil Classification of SP or SP-SM).

Soils with fines content greater than 12 percent and classified as SC, such as soils encountered in the borings at depths of about 4½ to 6 feet below the existing ground surface, may be used as structural fill, however, these soils are difficult to compact due to their moisture sensitivity. If encountered, these soils may be used as structural fill provided their fines content does not exceed 30 percent, and their Plasticity Index (PI) does not exceed 20. Clayey sands used as structural fill should be placed in thin loose lifts not exceeding 6 inches in thickness and compacted accordingly. For these soils, a steel drum or rubber-tired roller may be used for compaction to a minimum of 100 percent of the standard Proctor maximum dry density (ASTM D-698), and moisture conditioned to within 2 percentage points of their optimum moisture content.

The soil borings indicated the presence of about 6 to 9 inches of topsoil that is not considered suitable for the support of the proposed structures. This topsoil should be removed prior to placement of any new structural fill required to achieve the desired grades. Beneath the topsoil cover, the subsurface profile disclosed very loose to loose sand or sand with silt soils to depths of about 4½ to 6 feet below the existing ground surface. These sandy soils are considered suitable for reuse as structural fill, however, they are not considered acceptable for the support of the proposed storage structures in their current conditions. To improve the density of the supporting soils, the upper 4 feet of the existing soils within the storage structure areas (including 5 feet outside the perimeter of each structure) will need overexcavation and recompaction as indicated above.

The bottom of all excavations (including footing excavations) should be cleaned of all loose soils and compacted prior to placement of reinforcing steel and concrete. Excavations extending deeper than 4½ feet of the existing ground surface will likely expose clayey soils that will require stabilization prior to subsequent placement of any new fill or steel-reinforced concrete. If clayey soils are encountered within 12 inches of the exposed surfaces, these soils should be overexcavated to a minimum depth of 12 inches. The overexcavated depth may be re-established using lean concrete or well compacted structural fill.

Compaction of soils in deep excavations may cause pumping and/or yielding of the soils being compacted. This instability is caused by excess pore water pressure build-up in the soils being compacted. To allow this excess pore water pressure to dissipate, the contactor may temporarily halt the compaction operation. In any event, it is recommended to maintain a distance of at least two feet between the groundwater level and the compaction surface.

7.3 Construction Monitoring and Testing Guidelines

Prior to initiating compaction operations, we recommend that representative samples of the on-site and any off-site materials to be used as structural fill be tested to verify their acceptability. A representative number of in-place field density tests should be performed in the compacted soils and in each lift of structural fill or backfill to confirm that the required degree of compaction has been achieved. The following minimum density testing frequencies are recommended:

Area	Recommended Minimum Density Test Frequency
Concrete slab-on-grade/Subgrade	1 test per 500 ft^2 or 2 tests per structure in compacted soils and in each subsequent lift of structural fill.
Footing Bearing Level Soils	
-Spread Footings	1 test per 50 ft^2 of bearing surface
-Continuous (Strip) Footings	1 test per 50 linear feet of bearing surface
Pavement Areas	N/A

7.4 Design Recommendations for Drainage Facility

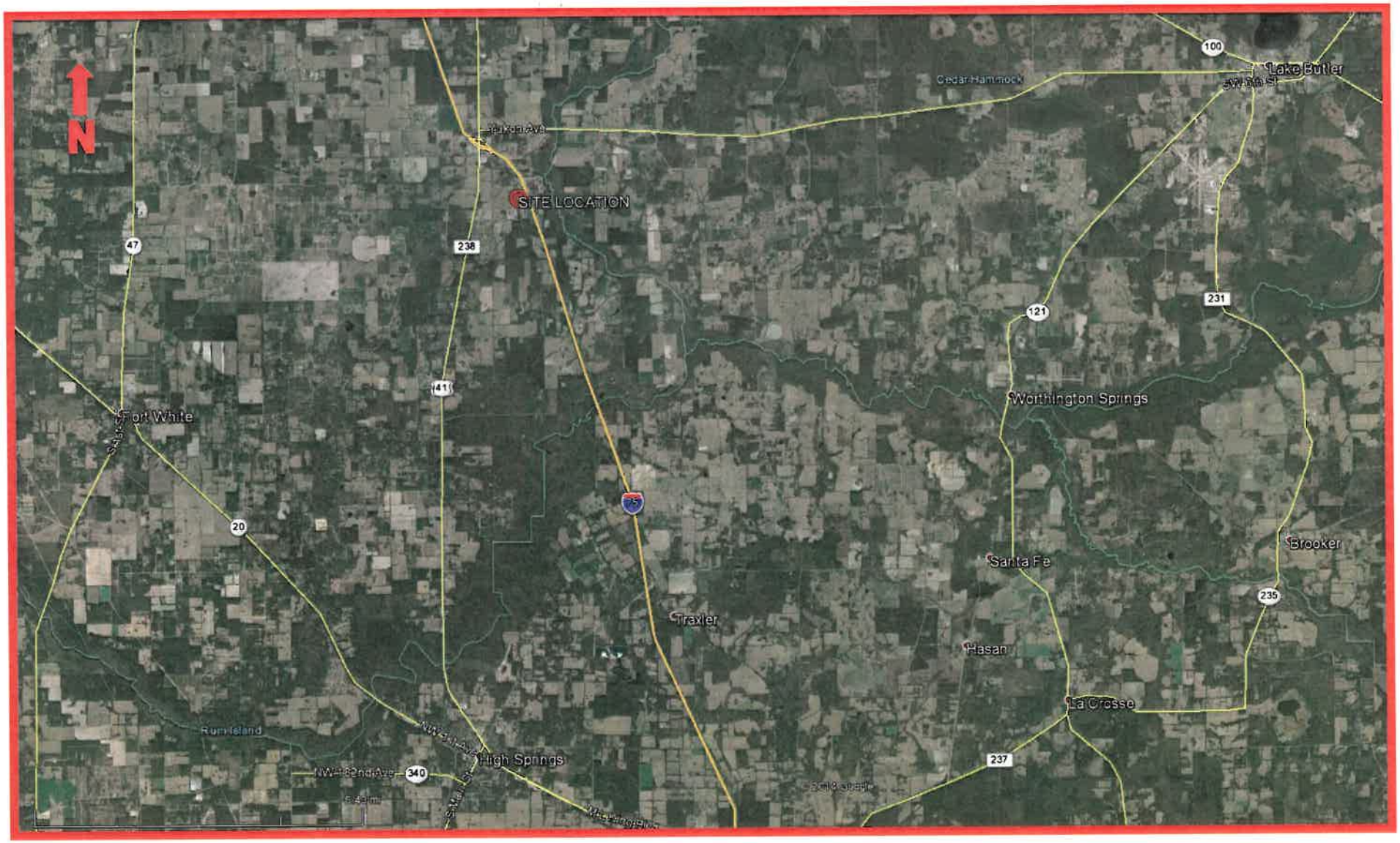
Based on the results of the auger borings, our field testing and review of the USDA data, the following parameters may be used for the design of the drainage facility at the referenced site:

- Estimated average depth to confining layer= 5½ feet (average of A-1, A-2 & A-3)
- Estimated steady-state infiltration rate (double-ring)= 40.10 ft./day ($1.415x10^{-2}$ cm/sec)
- Estimated saturated horizontal hydraulic conductivity (K_{sat})= 58.15 ft./day ($2.051x10^{-2}$ cm/sec)
- Estimated fillable porosity = 25%
- Estimated depth to seasonal high water table = 4½ feet (based average seasonal high, USDA data)

8.0 REPORT LIMITATIONS

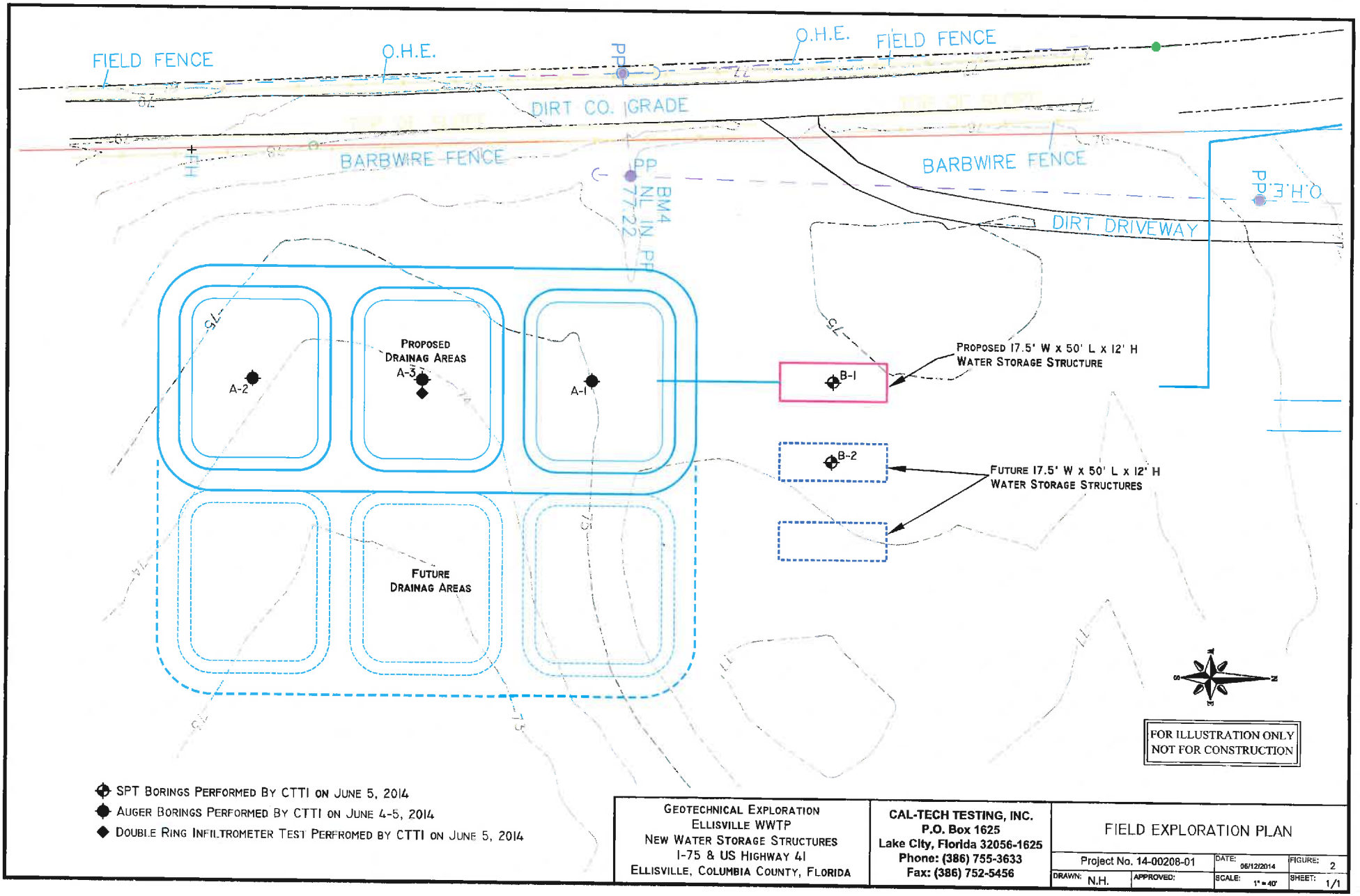
This geotechnical exploration report has been prepared for the exclusive use of Columbia County Board of County Commissioners, Lake City, Florida for the specific application to the project discussed herein. Our conclusions and recommendations have been rendered using generally accepted standards of geotechnical engineering practice in the State of Florida. No other warranty is expressed or implied. Environmental assessment for the presence of pollutants in the explored subsurface was beyond the scope of this exploration. CTTI is not responsible for the interpretations, conclusions, opinions, or recommendations of others based on the data contained herein.

ATTACHMENTS



CAL-TECH TESTING, INC. **P.O. Box 1625** **Lake City, Florida 32056-1625** **Phone: (386) 755-3633** **Fax: (386) 752-5456**	**Vicinity Map** **Ellisville WWTP – New Water Storage Structures** **I-75 & US Highway 41** **Ellisville, Columbia County, Florida** **Cal-Tech Testing Project No. 14-00208-01**

Exhibit 1



- SPT BORINGS PERFORMED BY CTTI ON JUNE 5, 2014
- AUGER BORINGS PERFORMED BY CTTI ON JUNE 4-5, 2014
- DOUBLE RING INFILTROMETER TEST PERFROMED BY CTTI ON JUNE 5, 2014

GEOTECHNICAL EXPLORATION
ELLISVILLE WWTP
NEW WATER STORAGE STRUCTURES
I-75 & US HIGHWAY 41
ELLISVILLE, COLUMBIA COUNTY, FLORIDA

CAL-TECH TESTING, INC.
P.O. Box 1625
Lake City, Florida 32056-1625
Phone: (386) 755-3633
Fax: (386) 752-5456

FIELD EXPLORATION PLAN

Project No. 14-00208-01		DATE: 06/12/2014	FIGURE: 2
DRAWN: N.H.	APPROVED:	SCALE: 1" = 40'	SHEET: 1/1

Cal-Tect Testing, Inc.
3309 SR 247
Lake City, FL 32024
Telephone: 386-755-3633
Fax: 386-755-3633

BORING NUMBER A-1

CLIENT Columbia County Board of County Commissioners
PROJECT NAME Ellisville WWTP - New Water Storage Structures
PROJECT NUMBER 14-00208-01 / I-75 & US Highway 41
PROJECT LOCATION Ellisville, Columbia County, Florida
DATE STARTED 6/4/14 **COMPLETED** 6/4/14
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Cal-Tech Testing, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Continuous Flight Auger
AT TIME OF DRILLING ---
LOGGED BY N.H. **CHECKED BY** _____
AT END OF DRILLING -- Not Encountered
NOTES BK-51
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		Grayish tan, sand with silt and organic (TOPSOIL)						
		Tan, sand with silt (SP-SM)	AU 1	100				
			AU 2	38				
5		Reddish brown and gray, mottled, clayey sand (SC)						
10			AU 3	100				
15		Bottom of borehole at 15.0 feet.						

Cal-Tect Testing, Inc.
3309 SR 247
Lake City, FL 32024
Telephone: 386-755-3633
Fax: 386-755-3633

BORING NUMBER A-2

CLIENT Columbia County Board of County Commissioners
PROJECT NAME Ellisville WWTP - New Water Storage Structures
PROJECT NUMBER 14-00208-01 / I-75 & US Highway 41
PROJECT LOCATION Ellisville, Columbia County, Florida
DATE STARTED 6/5/14 **COMPLETED** 6/5/14
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Cal-Tech Testing, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Continuous Flight Auger
AT TIME OF DRILLING ---
LOGGED BY N.H. **CHECKED BY** _____
AT END OF DRILLING --- Not Encountered
NOTES BK-51
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		Grayish tan, sand with silt and organic (TOPSOIL)	AU 1	100				
		Tan, sand with silt (SP-SM)						
			AU 2	100				
5		Reddish brown and gray, mottled, clayey sand (SC)						
			AU 3	100				
10		Gray with red mottles, sandy clay (CL)						
			AU 4	100				
15								

Bottom of borehole at 15.0 feet.

Cal-Tect Testing, Inc.
3309 SR 247
Lake City, FL 32024
Telephone: 386-755-3633
Fax: 386-755-3633

BORING NUMBER A-3

CLIENT Columbia County Board of County Commissioners
PROJECT NAME Ellisville WWTP - New Water Storage Structures
PROJECT NUMBER 14-00208-01 / I-75 & US Highway 41
PROJECT LOCATION Ellisville, Columbia County, Florida
DATE STARTED 6/5/14 **COMPLETED** 6/5/14
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Cal-Tech Testing, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Continuous Flight Auger
AT TIME OF DRILLING ---
LOGGED BY N.H. **CHECKED BY** _____
AT END OF DRILLING — Not Encountered
NOTES BK-51
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		Grayish tan, sand with silt and organic (TOPSOIL)	AU 1	100				
		Tan, sand with silt (SP-SM)						
			AU 2	100				
5								
		Reddish brown and gray, mottled, clayey sand (SC)						
10			AU 3	100				
15		Bottom of borehole at 15.0 feet.						

Cal-Tect Testing, Inc.
3309 SR 247
Lake City, FL 32024
Telephone: 386-755-3633
Fax: 386-755-3633

BORING NUMBER B-1

CLIENT Columbia County Board of County Commissioners
PROJECT NAME Ellisville WWTP - New Water Storage Structures
PROJECT NUMBER 14-00208-01 / I-75 & US Highway 41
PROJECT LOCATION Ellisville, Columbia County, Florida
DATE STARTED 6/5/14 **COMPLETED** 6/5/14
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Cal-Tech Testing, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Continuous Flight Auger/Split Spoon
AT TIME OF DRILLING ---
LOGGED BY N.H. **CHECKED BY** _____
AT END OF DRILLING — Not Encountered
NOTES BK-51 (Manual Hammer)
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		Grayish tan, sand with silt and organic (TOPSOIL)					
		VERY LOOSE, tan, sand with silt (SP-SM)	SPT 1	100	3-2-2 (4)		
		VERY LOOSE to LOOSE, gray, sand (SP) with trace of silt	SPT 2	100	2-1-2 (3)		
5			SPT 3	100	2-2-3 (5)		
		MEDIUM DENSE, reddish brown and gray, mottled, clayey sand (SC)	SPT 4	100	4-6-7 (13)		
			SPT 5	100	7-7-8 (15)		
10			SPT 6	100	11-12-12 (24)		
			SPT 7	100	5-5-7 (12)		
15							
			SPT 8	100	6-7-11 (18)		
20		becomes gray with red mottles at 20 feet					
			SPT 9	100	8-10-12 (22)		
25		Bottom of borehole at 25.0 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Cal-Tect Testing, Inc.
3309 SR 247
Lake City, FL 32024
Telephone: 386-755-3633
Fax: 386-755-3633

BORING NUMBER B-2

CLIENT Columbia County Board of County Commissioners
PROJECT NAME Ellisville WWTP - New Water Storage Structures
PROJECT NUMBER 14-00208-01 / I-75 & US Highway 41
PROJECT LOCATION Ellisville, Columbia County, Florida
DATE STARTED 6/5/14 **COMPLETED** 6/5/14
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Cal-Tech Testing, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Continuous Flight Auger/Split Spoon
AT TIME OF DRILLING —
LOGGED BY N.H. **CHECKED BY** _____
AT END OF DRILLING — Not Encountered
NOTES BK-51 (Manual Hammer)
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		Grayish tan, sand with silt and organic (TOPSOIL)					
		VERY LOOSE, tan, sand with silt (SP-SM)	SPT 1	100	2-2-2 (4)		
			SPT 2	100	2-2-2 (4)		
		LOOSE, gray, sand (SP) with trace of silt	SPT 3	100	2-3-4 (7)		
5			SPT 4	100	4-7-11 (18)		
		MEDIUM DENSE, reddish brown and gray, mottled, clayey sand (SC)	SPT 5	100	10-10-9 (19)		
			SPT 6	100	9-15-15 (30)		
10							
			SPT 7	100	6-6-9 (15)		
15							
		VERY STIFF, reddish brown with gray mottles, sandy clay (CL)	SPT 8	100	7-7-10 (17)		
20							
		MEDIUM DENSE, gray with red mottles, clayey sand (SC)	SPT 9	100	9-10-11 (21)		
25							

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 25.0 feet.