

PROJECT MANUAL

BID #2023-02

**WEST SECOND AVENUE ROADWAY
AND DRAINAGE IMPROVEMENTS**



**TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

NOVEMBER 2023

**BID SET
FOR BIDDING PURPOSES ONLY**

Prepared by:

MICHAEL GALURA ENGINEERING CONSULTANTS, LLC

3222 Corrine Drive, Suite H, Orlando, FL 32803
(407) 493-9983 - mchgalu@aol.com
<http://www.mgaluraengineeringconsult.com>

**TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

BID # 2023-02

**WEST SECOND AVENUE ROADWAY AND
DRAINAGE IMPROVEMENTS**

TABLE OF CONTENTS

DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS

<u>SECTION</u>	<u>TITLE</u>
00007	Seals Page
00100	Invitation to Bid
00200	Instructions to Bidders
00300	Information Available to Bidders
00400	Bid Form
00400A	Local Agency Program
00401	Questionnaire
00401A	Drug-Free Workplace Certification
00430	Bid Bond
00450	Non-collusion Affidavit
00451	Certification of Non-Segregated Facilities
00452	Sworn Statement on Public Entity Crimes
00453	Certification of Non-discriminatory Labor Practices
00501	Corporate Authority to Execute Documents
00510	Notice of (Intent to) Award
00520	Agreement between Owner and Contractor
00540	Indemnification Agreement
00550	Notice to Proceed
00600	100% Performance and Payment Bond
00611	Construction Payment Bond
00620	Certificate of Liability Insurance
00621	Certificate of Substantial Completion
00622	Change Order Form
00623	Periodic Estimate for Partial Payment
00640A	Release of Lien (Progress Payment)
00640B	Release of Lien (Final Payment)
00650	Final Contractor's Affidavit (Statutory Declaration Form)
00670	Certification of Owner's Attorney
00700	Standard General Conditions of the Construction Contract
00800A	Supplementary Conditions
00900	Addenda (As Required)

**TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

BID # 2023-02

**WEST SECOND AVENUE ROADWAY AND
DRAINAGE IMPROVEMENTS**

**TABLE OF CONTENTS
(Cont'd)**

DIVISION 1 - GENERAL REQUIREMENTS

01001	General Requirements
01010	Summary of Work
01025	Measurement and Payment
01027	Application for Payment
01040	Coordination
01050	Field Engineering
01200	Project Meetings
01300	Submittals
01400	Quality Control
01490	Contractor Sampling and Testing
01500	Temporary Facilities and Controls
01558	Traffic Control
01600	Materials and Equipment
01630	Substitutions and Product Options
01700	Contract Closeout
01710	Final Cleaning

DIVISION 2 - SITE CONSTRUCTION

02140	Dewatering
02200	Earthwork
02222	Trenching Backfilling and Compacting
02605	Precast Concrete Manholes and Structures
02611	Reinforced Concrete Pipe for Gravity Service
02720	Drainage Structures and Piping
02801	Restoration of Surface Improvements
02930	Grassing

DIVISION 3 - CONCRETE

03100	Cast-In-Place and Poured Concrete
03300	Concrete
03600	Grout

**TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

BID # 2023-02

**WEST SECOND AVENUE ROADWAY AND
DRAINAGE IMPROVEMENTS**

**TABLE OF CONTENTS
(Cont'd)**

DIVISION 4 - 5 (NOT USED)

DIVISION 11 - 16 (NOT USED)

ADDITIONAL TECHNICAL SPECIFICATIONS

Section 120	Earthwork and Related Operations for Local Agencies
Section 347	Local Agency Program – Concrete Class NS
Section 443	French Drains

EXHIBIT A - FEDERAL DISASTER RELIEF AND RECOVERY PROVISIONS

Exhibit A	Federal Disaster Relief and Recovery Provisions
-----------	---

ORANGE COUNTY UTILITIES STANDARDS AND CONSTRUCTION SPECIFICATIONS

APPENDICES

APPENDIX A	Report of Geotechnical Engineering Investigation West 2 nd Avenue Roadway Improvements
------------	--

APPENDIX B	SFWMD NO. 48-106682-P
------------	-----------------------

APPENDIX C	FDEP 417221-001-NPR
------------	---------------------

DIVISION 0
BIDDING AND CONTRACT REQUIREMENTS

**TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

BID #2023-02

**WEST SECOND AVENUE ROADWAY AND
DRAINAGE IMPROVEMENTS**

The engineering material and data contained in the Contract Drawings and Specifications was prepared under the supervision and direction of the respective undersigned, whose seal as a registered professional engineer is affixed below:



Michael B. Galura

_____, P.E.

Michael B. Galura, P.E.

President/Principal Engineer

MICHAEL GALURA ENGINEERING CONSULTANTS, LLC

ENGINEERING BUSINESS NO. 0025885

FBPE CERTIFICATE OF AUTHORIZATION NO. 29032

Drawings:

Specifications: All divisions not listed

SECTION 00100

INVITATION TO BID

**TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

BID # 2023-02

**WEST SECOND AVENUE ROADWAY AND
DRAINAGE IMPROVEMENTS**

Sealed bids, in duplicate, will be accepted at the office of the Town Clerk, in the Town Hall, Town of Windermere, Orange County, Florida, not later than **Monday, November 27, 2023 at 3:00 p.m.** (local time). Sealed bids must be hand delivered, and dated and time stamped at the office of the Town Clerk. Immediately thereafter, bids will be publicly opened and read aloud at Town Hall.

Any bids received after the above noted time will not be accepted under any circumstances. Any uncertainty regarding the time a bid is received will be resolved against the Bidder. Bids submitted after this designated time will be returned unopened.

Description of Work:

All work for the Project shall be constructed in accordance with the Drawings and Specifications prepared by Michael Galura Engineering Consultants, LLC, Orlando, Florida, and the proposed contract will be awarded and constructed, if award is made, under these Contract Documents. Bids shall be submitted for furnishing, delivering, and installing all materials, equipment, incidentals and services, including labor, for the Work, which generally includes, but is not necessarily limited to, the following:

The project involves the construction of roadway improvements and additional drainage infrastructure along West Second Avenue from Main Street west to the street terminus at the Aladar Replat cul-de-sac. The work involved the construction of French drains and non-slotted reinforced concrete pipes within the project area to improve the capture and conveyance of stormwater volume; and to provide supplemental treatment of stormwater runoff. The roadway improvements involve the construction ribbon curb and drop curb and gutter along the entire length of the driveway. In addition, potable water main improvements will be constructed to expand the Town's ability to provide water service to its residents. The project construction will be partially funded by the Federal Emergency Management Agency (FEMA), administered by the Florida Division of Emergency Management under the disaster declaration for Hurricane Irma.

Program for Utilization of Disadvantaged Business Enterprises (DBE):

The Contractor shall be encouraged to comply with the State of Florida Equal Opportunity Office goals and objectives as follows:

Florida Fair Share Goals	
Construction (SRF)	9% MBE and 3% WBE
All Other Categories	15% Combined

The Contractor, to the fullest extent possible, shall agree that at least the applicable fair share objectives for supplies, construction, equipment or services are made available to organizations owned or controlled by socially and economically disadvantaged individuals, women and Historically Black Colleges and Universities. The Contractor shall also agree to include in its bid documents the applicable DBE fair share objectives and percentages.

Pre-Bid Conference: A non-mandatory pre-bid conference will be held on **Thursday, November 9th at 10:00 a.m.** (local time) Training Room, 614 Main Street, Building 100, Town of Windermere, Orange County, Windermere, Florida, 34786.

Questions and clarifications shall be submitted in accordance with the Bidding Documents. Contact Michael Galura, P.E., Michael Galura Engineering Consultants, LLC, 3222 Corrine Drive, Suite H, Orlando, FL. 32803, (407) 493-9983, mchgalu@aol.com.

Prospective bidders may secure a copy of the complete bid package (Project Manual and Drawings), from the Town's website at <http://www.town.windermere.fl.us> or from Demand Star at <http://demandstar.com>. When downloading from the Town's website, please advise the Town as to who and when the plans and specifications were downloaded so the plan holder's list can be updated.

Bids shall be prepared from complete full size contract documents. Addenda will be sent via e-mail to all holders of complete contract documents or can be downloaded from the Town's website or Demand Star. Addendums will be issued up to seventy-two (72) hours before bid time. No addenda will be issued within 72-hours of the Bid date.

Bid Bond: A certified check or bid bond shall accompany each bid. The certified check or bid bond shall be for an amount not less than five percent (5 percent) of the bid price and shall be made payable to the Town of Windermere as a guarantee that the Bidder will not withdraw for a period of sixty (60) days after bid closing time.

Bid Submittal: Each bidder shall submit only one (1) bid for the Work. Each bidder shall submit an original and one (1) copy of its bid. The award will be made in accordance with the requirements of applicable state and federal laws and regulations and pursuant to the provisions of the Bid Documents and/or any applicable Town of Windermere purchasing rules and procedures. Each Bidder shall submit the Bid Form provided in the Project Manual in a sealed envelope with the words "**BID FOR BID #2023-02, WEST SECOND AVENUE ROADWAY AND DRAINAGE IMPROVEMENTS, TOWN OF WINDERMERE, WINDERMERE, FLORIDA**" and the Bidder's name, address and Florida Contractor's License Number clearly shown on the outside thereof. Each Bidder must acknowledge receipt of all addenda in the prescribed Bid Form. An authorized representative of the Bidder must sign the Bid Form. Failure to comply with these conditions or the conditions contained in the Instructions to Bidders may be cause for bid disqualification. **Mailed bids shall be sent to the attention of Town Clerk, Dorothy Burkhalter, Town of Windermere, 614 Main Street, Windermere, FL 34786 and shall be received before the deadline for the bid opening.**

Award of Contract to Lowest Qualified and Responsive Bidder: The Town intends to award the Contract to the Bidder which, in the sole discretion of the Town, is the lowest qualified and responsive Bidder. The Town of Windermere may waive technicalities or irregularities, reject any or all bids. The Town will advertise the project at a minimum of three (3) weeks and will make plans and specifications available to bidders during that time.

TOWN OF WINDERMERE, FLORIDA

END OF SECTION

SECTION 00200

INSTRUCTIONS TO BIDDERS

TABLE OF CONTENTS

<u>ARTICLE</u>	<u>DESCRIPTION</u>
1	Defined Terms
2	Copies of Bidding Documents
3	Qualifications of Bidders
4	Examination of Contract Documents and Site
5	Availability of Lands for Work, Etc.
6	Addenda and Interpretations
7	Bid Security
8	Contract Time
9	Liquidated Damages and Indemnity
10	Substitute Material and Equipment
11	Subcontractors, Etc.
12	Bid Form
13	Submission of Bids
14	Modification and Withdrawal of Bids
15	Opening of Bids
16	Bids to Remain Subject to Acceptance
17	Award of Contract
18	Taxes
19	Organization of Drawings and Specifications
20	Required Disclosure
21	Qualifications of Surety Companies
22	Qualifications Submittals
23	Interpretation of Quantities
24	Unit Prices Information
25	Construction Safety
26	Special Warranty, Performance Bond, Insurance and Correction Period Requirements
27	Signing of Agreement
28	Protests
29	Apprentices
30	Drug-Free Workplace
31	Licenses and Permits
32	Contingency Allowances
33	Retainage
34	Pre-bid Conference

(This Page Left Blank Intentionally.)

SECTION 00200

INSTRUCTIONS TO BIDDERS

ARTICLE 1 - DEFINED TERMS

- 1.1 Terms used in these Instructions to Bidders which are defined in the General Conditions have the meanings assigned to them in the General Conditions, as supplemented. The term "Apparent Low Bidder" means the Bidder submitting the lowest Bid at the Bid opening without correction of numerical discrepancies, consideration of alternates or determination of qualification and responsibility. The term "Successful Bidder" means the Bidder to whom Owner awards or expects to award the contract. Bidding Documents consist of the Project Manual dated **November 2023** and Drawings dated **November 2023**, both as may be modified by Addenda.
- 1.2 The Work, as defined in the General and Supplemental Conditions, is described in Article 1 of the Agreement.

ARTICLE 2 - COPIES OF BIDDING DOCUMENTS

- 2.1 Complete sets of Bidding Documents in the number and for the sum stated in the Advertisement for Bids may be obtained from the Town's website at <http://www.town.windermere.fl.us> or from Demand Star at <http://demandstar.com>.
- 2.2 Complete sets of full size Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.3 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

ARTICLE 3 - QUALIFICATIONS OF BIDDERS

Each Bidder shall complete the Questionnaire (Section 00401) included in the Bid Form. To demonstrate qualifications to perform the Work, each Bidder must be prepared to submit, within seven (7) days of Owner's request, the additional qualifications submittals set forth in Article 22 of the Instructions to Bidders.

ARTICLE 4 - EXAMINATION OF CONTRACT DOCUMENTS AND SITE

- 4.1 It is the responsibility of each Bidder before submitting a Bid to: (a) examine thoroughly the Contract Documents and other related data identified in the Bidding Documents (including "technical data" referred to below); (b) visit the site to become familiar with and satisfy Bidder as to the general, local and site conditions that may affect cost, progress, performance or furnishing of the Work; (c) consider federal, state and local Laws and Regulations that may affect cost, progress, performance or furnishing of the Work; (d) study and carefully correlate Bidder's knowledge and observations with the Contract Documents and such other related data; and (e) promptly notify Engineer of all conflicts, errors, ambiguities or discrepancies which Bidder has discovered in or between the Contract Documents and such other related documents.
- 4.2 Information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities or others, and Owner and

Engineer do not assume responsibility for the accuracy or completeness thereof unless it is expressly provided otherwise in the Supplementary Conditions.

- 4.3 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions and Underground Facilities, and possible changes in the Contract Documents due to differing or unanticipated conditions appear in Paragraphs 4.2 and 4.3 of the General Conditions.
- 4.4 Before submitting a Bid each Bidder will be responsible to obtain such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise, which may affect cost, progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of the Contract Documents.
- 4.5 On request, with advanced notice, Owner will provide each Bidder access to the site to conduct such examinations, investigations, explorations, tests and studies as each Bidder deems necessary for submission of a Bid, Bidder must fill all holes and clean up and restore the site to its former conditions upon completion of such explorations, investigations, tests and studies.
- 4.6 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Contract Documents and applying the specific means, methods, techniques, sequences or procedures of construction (if any) that may be shown or indicated or expressly required by the Contract Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities and discrepancies that Bidder has discovered in the Contract Documents and the written resolutions thereof by Engineer is acceptable to Bidder, and that the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.
- 4.7 The provisions above of 4.1 through 4.6, inclusive, do not apply to Asbestos, Polychlorinated Biphenyls (PCBs), Petroleum, Hazardous Waste or Radioactive Material covered by Paragraph 4.06 of the General Conditions.
- 4.8 The submission of the Bid shall be an indication that the Bidder has considered normal local weather conditions (daily and monthly variations) and accounted for these circumstances in the preparation of the bid and schedule of construction.

ARTICLE 5 - AVAILABILITY OF LANDS FOR WORK, ETC.

- 5.1 The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by Contractor in performing the Work are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.

ARTICLE 6 - ADDENDA AND INTERPRETATIONS

- 6.1 Bidders shall promptly notify Engineer of any ambiguity, inconsistency, or error which they may discover upon examination of the Bidding Documents or the site.

All questions about the meaning or intent of the Bidding Documents shall be submitted to Engineer in writing. Replies considered necessary shall be issued through Addenda by registered mail to all parties recorded by Engineer as having received complete sets of Bidding Documents up to seventy-two (72) hours before bid time. Brief addenda which do not materially alter the scope of work may be issued between seventy-two (72) hours and twenty-four (24) hours before bid time by facsimile (fax) to all General Contractors only. Questions received less than seven (7) calendar days prior to the date for opening of Bids shall not be answered. Only questions answered by formal written Addenda shall be binding and prospective Bidders are warned that no other source than a formal written Addenda is authorized to give information concerning, or to explain or interpret the Bidding Documents. Failure of any Bidder to receive any such addendum or interpretation shall not relieve such Bidder from its terms and requirements.

ARTICLE 7 - BID SECURITY

- 7.1 Bid Security shall be submitted and shall be made payable to Owner, in an amount of not less than five percent of the Bidder's Contract Price and in the form of a cashier's check or a Bid Bond issued by a Surety meeting the requirements of Article 21 of this section and Article 5 of the General Conditions. The Bid Bond shall be issued by a company having a registered agent in the State of Florida. Personal checks are not acceptable.
- 7.2 The Bid Security of the Bidder shall be retained until such Bidder has executed the Agreement and furnished the required payment and performance bonds, whereupon the Bid Security shall be returned. If the Successful Bidder fails to furnish the qualifications submittals or fails to execute and deliver the Agreement and furnish the required Bonds within ten days of the Notice of Award, Owner may annul the Notice of Award and the Bid Security of that Bidder shall be forfeited. The Bid Security of any Bidder whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the ninety-first day after the Bid opening. Bid Security of other Bidders shall be returned approximately seven (7) days after the Bid opening.

ARTICLE 8 - CONTRACT TIME

The number of consecutive calendar days within which, or the date by which, the Work is to be completed (the Contract Time) is set forth in the Agreement (Section 00520).

ARTICLE 9 - LIQUIDATED DAMAGES AND INDEMNITY

- 9.1 Provisions for liquidated damages are set forth in the Agreement (Section 00520).
- 9.2 The Bidder must execute an Indemnification Agreement (Section 00540) with the signing of the Agreement as provided in Article 27 of this Section.

ARTICLE 10 - SUBSTITUTE MATERIAL AND EQUIPMENT

The Contract, if awarded, shall be awarded on the basis of material and equipment described in the Drawings or specified in the Specifications with consideration of possible substitute or "or equal" items. Whenever it is indicated in the Drawings or specified in the Specifications that a substitute or "or equal" item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance shall not be considered by Engineer until after the "Effective Date of the Agreement." The procedure for submittal of any such application by Contractor and consideration by Engineer is set forth in the General Conditions, as may be supplemented in Division 1, General Requirements. If a substitution list is provided as part of the prescribed Base Bid Form, Bidders must identify proposed substitute materials. These substitute materials and equipment shall be evaluated after "Effective Date of the Agreement." Only the proposed alternatives, substitutions or "or equal" items listed on the Substitution List shall be evaluated by the Engineer in accordance with the General Conditions.

The cost of changes in related work, additional drawings which may be required to illustrate or define the alternate equipment and its relationship to the other parts or portions of the Work shall be paid by the Contractor. No change shall be made in the amount of time in which to complete the Work or in the liquidated damages. If the proposed substituted material or equipment is found to be unacceptable to the Engineer as an "or equal" item, then the Base Bid material or equipment named in the specification or the Bid Form (circled item) shall be furnished by the Contractor.

ARTICLE 11 - SUBCONTRACTORS, ETC.

- 11.1 Each Bid must identify the names and addresses of the subcontractors listed in the Bid Form "Questionnaire (Section 00401)." If requested by the Owner or Engineer, the Bidder, and any other Bidder so requested, shall, within seven (7) days after the date of the request, submit to Owner an experience statement with pertinent information as to similar projects and other evidence of qualification for each such subcontractor, person and organization. If Owner or Engineer after due investigation has reasonable objection to any proposed subcontractor, other person or organization, either may, before giving the Notice of Award, request the Bidder to submit an acceptable substitute without an increase in Contract Price nor Contract Time. If the Bidder declines to make any such substitution, the Owner may elect not to award the Contract to such Bidder. A Bidder's declining to make any such substitution shall not constitute grounds for sacrificing his Bid Security. No Bidder shall be required to employ any subcontractor, other person or organization against whom Bidder has reasonable objection.
- 11.2 Procedures for approval of other subcontractors after execution of the Agreement are described in the General and Supplementary Conditions.
- 11.3 Each Bidder must complete the Bid Form "Questionnaire" (Section 00401) listing each item of work to be subcontracted and the estimated not-to-exceed cost of these items. (Work in this respect does not include cost paid to suppliers for materials and equipment furnished for this project)

ARTICLE 12 - BID FORM

- 12.1 One (1) set of the Bid Form is included in the Contract Documents for the Bidder's use.
- 12.2 Bid Forms must be completed in duplicate in ink or typed. The Bid price of each item and lump sum "Total Bid" or "Total Base Bid" on the Bid Form must be stated in words and numerals; in case of a conflict, words shall take precedence.
- 12.3 Bids by corporations must be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and State of incorporation must be shown below the signature. If requested, the person signing a Bid for a corporation or partnership must produce evidence satisfactory to the Owner of the person's authority to bind the corporation or partnership. If the Bidder is a corporation, and if the Bid is executed by someone other than the President or Vice President of the corporation, attach to the Bid a certified copy of corporate resolutions of the board of directors of the corporation authorizing the person to execute the Bid on behalf of the Corporation.
- 12.4 Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature and the official address of the partnership must be shown below the signature.
- 12.5 All names and titles must be typed or printed below the signature.

- 12.6 The Bid shall contain an acknowledgement of receipt of all Addenda (the numbers of which shall be filled in on the Bid Form).
- 12.7 The address in which communications regarding the Bid are to be directed must be shown.
- 12.8 Evidence of authority to conduct business as an out-of-state corporation in the state where the Work is to be performed shall be provided in accordance with Paragraph 3 above. State contractor license number, if any, must also be shown.
- 12.9 Bids must be priced on a lump sum basis for the base contract and include a separate price for each alternate described in the Specifications as provided for in the Bid Form. The price of the Bid for each alternate will be the amount to be added to or deducted from the price of the base Bid if Owner selects the alternate.
- 12.10 The Bid price shall include such amounts as the Bidder deems proper for overhead and profit on account of cash allowances named in the Contract Documents as provided in Section 00700 - Article 11 - 11.03.
- 12.11 Bids which are incomplete, conditional, or which contain additions not called for, alterations or irregularities of any kind may be rejected.

ARTICLE 13 - SUBMISSION OF BIDS

- 13.1 Bids shall be submitted before the time and at the place indicated in the Advertisement for Bids, and shall be submitted in an opaque sealed envelope. The envelope shall be marked on the exterior **"BID NO. #2023-02 • WEST SECOND AVENUE ROADWAY AND DRAINAGE IMPROVEMENTS"** with the name and address of the Bidder and accompanied by the Bid Security and other required documents. If the Bid is sent through the mail or other delivery system, the sealed envelope shall be enclosed in a separate envelope with the notation "SEALED BID ENVELOPE ENCLOSED" on the face thereof. The Owner shall in no way be responsible for delays caused by the United States Postal Service or for delays caused by any other occurrence. Bids sent by e-mail, telegram or telecopy shall not be accepted by the Owner.
- 13.2 Each Bid must contain the following documents in completed form: (Two (2) copies each as provided herein):
- A. Bid Forms (Bidding Documents, entire Section 00400, 00400A, 00401 and 00401A).
 - B. Bid Bond (surety bond or cashier's check). (Section 00430) (Original and one (1) copy).
 - C. Power of Attorney (for surety bond only).
 - D. Non-collusion Affidavit (Section 00450).
 - E. Certification of Non-segregated Facilities (Section 00451).
 - F. Sworn Statement on Public Entity Crimes (Section 00452).
 - G. Certification of Non-discriminatory Labor Practices (Section 00453).
 - H. Corporate Authority to Execute Documents (any corporate employee other than president or vice-president). (Section 00501).
- 13.3 More than one Bid received for the same work from an individual, firm or partnership, a corporation or association under the same or different names shall not be considered. Reasonable grounds for believing that any Bidder is interested in more than one Bid for the same work shall cause the rejection of all such Bids in which the Bidder is interested. If there are reasonable grounds for believing that collusion exists among the Bidders, the Bids of participants in such collusion shall not be considered.

ARTICLE 14 - MODIFICATION AND WITHDRAWAL OF BIDS

- 14.1 Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the deadline for submitting Bids. A request for withdrawal or a modification must be in writing and signed by a person duly authorized to do so; and, in case signed by a deputy or subordinate, the principal's proper written authority to such deputy or subordinate must accompany the request for withdrawal or modifications. Withdrawal of a Bid shall not prejudice the rights of a Bidder to submit a new Bid prior to the Bid Date and Time. After expiration of the period for receiving Bids, no Bid may be withdrawn, modified, or explained.
- 14.2 If within 24 hours after bids are opened, any Bidder files a duly signed written notice with Owner and within 48 hours thereafter demonstrates to the reasonable satisfaction of the Owner that: a) there has been a material and substantial mistake in the preparation of the Bid; and that b) the mistake is of such great consequence that to enforce the Contract would be unconscionable; and that c) the mistake occurred notwithstanding the exercise of reasonable care in the preparation of the Bid; the Bidder may withdraw its Bid, and the Bid Security shall be returned provided that the Owner is not seriously prejudiced, except for the loss of its bargain.

ARTICLE 15 - OPENING OF BIDS

- 15.1 At the specified time and place as indicated in the "Invitation to Bid," Bids shall be opened publicly (unless obviously non-responsive) and read aloud.
- 15.2 An abstract of the amounts of the Total Bids and suppliers of major equipment or alternates, (if any), shall be prepared and made available to all Bidders within a reasonable time after the opening of Bids.

ARTICLE 16 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 16.1 All Bids shall remain open for delivery by the Owner of the Notice of Award for ninety (90) calendar days after the day of the Bid opening, but Owner may, at his sole discretion, release any Bid and return the Bid Security prior to that date.
- 16.2 Extensions of time when Bids shall remain open beyond the ninety (90) day period may be made only by mutual agreement between Owner, the Bidder, and the surety, if any, for the Bidder.

ARTICLE 17 - AWARD OF CONTRACT

- 17.1 To the extent permitted by applicable state and federal laws and regulations, Owner reserves the right to reject any or all Bids, including without limitation the rights to reject any or all nonconforming, nonresponsive, unbalanced or conditional Bids and to reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder, whether because the Bid is not responsive or the Bidder is unqualified or of doubtful skill or ability or fails to meet any other pertinent standard or criteria established by Owner. Bids may be considered irregular and subject to rejection if they show serious omission, unauthorized alterations of form, unauthorized alternate bids, incomplete or unbalanced unit prices or irregularities of any kind. Owner also reserves the right to waive all informalities not involving price, time or changes in the Work and to negotiate contract terms with the Bidder. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

- 17.2 If the Contract is to be awarded, it shall be awarded on the basis of the lowest "Total Bid" or "Total Base Bid". Additive or deductive alternates determined by the Owner, in its sole discretion, to be acceptable (if any) shall be considered in determining the lowest qualified and responsive Bidder. In evaluating Bids, Owner will consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.
- 17.3 A Contract shall be awarded by the Owner pursuant to applicable law. The Owner, in its sole discretion, reserves the right to reject any and all Bids and to waive any informality concerning Bids whenever such rejection or waiver is in the best interest of the Owner. If Bids exceed the amount of funds estimated by the Owner as available to finance the Project, the Owner may reject all bids or may award the Contract in the best interest of the Owner. Award of this Contract is contingent upon the Town of Windermere securing adequate bond financing or funding for this Project. The Town of Windermere shall not be required to award this Contract if adequate funding is not available. The ability of a Bidder to obtain a performance and payment bond shall not be regarded as the sole test of such Bidder's competency, qualification or responsiveness. Nothing contained herein shall place a duty upon the Owner to reject Bids or award the contract based upon anything other than its sole discretion as described herein. By submitting a Bid, Bidder recognizes and accepts that the Owner may reject the Bid based upon the exercise of its sole discretion and Bidder waives any claim it might have for damages or other relief resulting from the rejection of its Bid based on these grounds.
- 17.4 Owner may consider the qualifications and experience of Contractors and Subcontractors and other persons and organizations (including those who are to furnish the principal items of materials or equipment) proposed for those portions of the Work as to which the identity of Contractors, Subcontractors and other persons and organizations must be submitted and must meet the minimum qualifications as provided in Articles 11 and 22 of these Instructions to Bidders.
- 17.5 Owner may conduct such investigations as Owner deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications and ability of the Bidders, proposed subcontractors and other persons and organizations to perform the Work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time. Owner reserves the right to reject the Bid of any Bidder who does not pass any such evaluation to Owner's satisfaction.
- 17.6 One contract for the Work shall be awarded, if award is made, to the lowest qualified and responsive Bidder whose evaluation by Owner indicates to Owner that the award will be in the best interests of the Project. The Successful Bidder who is awarded the Contract shall be required to perform the Work as a prime Contractor. No assignment of the Contract shall be allowed without written permission of the Owner.
- 17.7 If the Contract is to be awarded, the Owner will give the Successful Bidder a Notice of (Intent to) Award within Sixty (60) days after the day of the Bid opening.

ARTICLE 18 - TAXES

- 18.1 The Contractor shall pay all applicable sales, consumer, use and other similar taxes required by law. The Contractor is responsible for reviewing the pertinent State statutes involving the sales tax and complying with all requirements.

ARTICLE 19 - ORGANIZATION OF DRAWINGS AND SPECIFICATIONS

- 19.1 Drawings and Specifications for the Work are incorporated as follows:

- A. The Project Manual, consisting of Division 0 - Bidding and Contract Requirements, Division 1 - General Requirements, Division 2 - Site Construction, and Division 3 – Concrete, Additional Technical Specifications, Exhibit A – FEDERAL DISASTER RELIEF AND RECOVERY PROVISIONS, Orange County Utilities Standards and Construction Specifications, and Appenicies.
- B. The Drawings have been separately bound together within a single document.

ARTICLE 20 - REQUIRED DISCLOSURE

- 20.1 Any person submitting a Bid in response to this invitation must execute form PUR. 7068, SWORN STATEMENT UNDER SECTION 287.133(3)(A), FLORIDA STATUTES, ON PUBLIC ENTITY CRIMES, including proper check(s), in the space(s) provided, and enclose it with his Bid. The required disclosure form (provided in Section 00452 of these Specifications) must be completed by the appropriate individual within the organization, notarized and provided with the Bid proposal. Corrections to the form will not be allowed after the Bid opening time and date. Failure to complete this form in every detail and submit it with Bidder's Bid may result in disqualification.
- 20.2 At its sole discretion, the Owner, may reject any Bidder the Owner finds to lack, or whose present or former executive employees, officers, directors, stockholders, partners or owners are found by the Owner to lack honesty, integrity, or moral responsibility. The discretion of the Owner may be exercised based on the disclosure required herein, the Owner's own investigation, public records, or any other reliable sources of information. The Owner may also reject any Bidder failing to make the disclosure required herein. By submitting a Bid, Bidder recognizes and accepts that the Owner may reject the Bid based upon the exercise of its sole discretion and Bidder waives any claim it might have for damages or other relief resulting from the rejection of its Bid based on these grounds.

ARTICLE 21 - QUALIFICATIONS OF SURETY COMPANIES

In order to be acceptable to the Owner, a surety company issuing Bid Guaranty Bonds, or 100 percent Performance/ Payment Bonds or 25 percent Maintenance Bond, called for in these Specifications, shall meet and comply with the following minimum standards:

- A. Surety must be admitted to do business in the State of Florida and shall comply with the provision of Florida Statute 255.05.
- B. Surety companies executing bonds must appear on the United States Treasury Department's most current list (Circular 570 as amended).
- C. Attorneys-in-fact who sign Bid Bonds or Performance/Payment Bonds must file with such bond a certified copy of their power of attorney to sign such bond.
- D. Agents of surety companies must list their name, address and telephone number on all bonds.
- E. Surety shall have at least the following minimum ratings;

<u>CONTRACT AMOUNT</u>	<u>BEST'S RATINGS</u>	
to 50,000	Class IV	B+ or better
50,000 to 500,000	Class V	A or better
500,000 to 2,500,000	Class VI	A or better
2,500,000 and over	Class VII	A or better

RATINGS SCHEDULE (net worth of Bonding Company)

Class IV	3,750,000 to 5,000,000
Class V	500,000 to 12,500,000
Class VI	25,000,000 to 50,000,000
Class VII	75,000,000 to 100,000,000

- F. All bonds must be provided on the forms contained in the Bid Documents. Failure to provide bonds on the Owner's forms may result in the rejection of the bid and the forfeiture of the Bid Security.

ARTICLE 22 - QUALIFICATIONS SUBMITTALS

- 22.1 It is the intention of the Owner to award this contract to a Bidder competent to perform and complete the Work in a satisfactory manner. All bidders must provide evidence of five (5) years minimum experience in projects that incorporate the construction of roads, utilities, drainage systems, and stormwater infrastructure, as well as sidewalks and landscaping. The contractor must demonstrate that they have successfully competed for at least three (3) of these types of construction projects within the last ten (10) years. Accordingly, Owner shall require the Bidder to submit, within seven (7) days of written request by the Owner and prior to award of Contract, 1) evidence of Bidder's certification and license to perform the Work and services, 2) experience statement, 3) Preliminary Progress Schedule, and 4) Preliminary Schedule of Values all as set forth below, to allow Owner to conduct qualifications investigations.
- 22.2 The experience statement shall provide data additional to that information provided in the Bid Form pertaining to Contractor's adequacy of organization, equipment and prior experience.
- 22.3 The Successful Bidder and his surety, if any, hereby agree that any delays within Bidder's control in the delivery of these Qualifications Submittals shall constitute a request by Bidder for an extension of the time during which the Bid shall remain open for the Owner's acceptance. Should Owner agree to such extension, Bidder shall be required to comply with this submittal requirement within five (5) additional days. At the Owner's option, failure by the Successful Bidder to deliver these qualifications submittals within the extended period shall void evaluation of the Bid and shall constitute proof that the Successful Bidder has abandoned his Bid; his Bid Security may be declared forfeited to the Owner as liquidated damages, and the Work may be awarded to another Bidder.
- 22.6 If upon receipt and evaluation of the submittals the Successful Bidder does not pass the evaluations to Owner's satisfaction, Owner reserves the right to reject the Bid.

ARTICLE 23 - INTERPRETATION OF QUANTITIES

In the case of unit price items, the quantities of work to be done and materials to be furnished under this Contract, as given in the Proposal, are to be considered as approximate only and are to be used solely for the comparison of Bids received. The OWNER and/or his ENGINEER do not expressly or by implication represent that the actual quantities involved shall correspond exactly therewith; nor shall the Bidder plead misunderstanding or deception because of such estimate or quantities or of the character, location or other conditions pertaining to the work. Payment to the CONTRACTOR shall be made only for the actual quantities of Work performed or material furnished in accordance with the Drawings and other Contract Documents, and it is understood that the quantities may be increased or diminished as provided in the General Conditions without in any way invalidating any of the unit or lump sum prices bid.

ARTICLE 24 - UNIT PRICES INFORMATION

N/A

ARTICLE 25 - CONSTRUCTION SAFETY

- 25.1 In instances where such is applicable due to the nature of the Work matter with which this Bid is concerned; all materials, equipment, etc., as proposed and offered by Bidders must meet and conform to all Occupational Safety and Health Act (OSHA) requirements. The Bidders' signature upon the Bid Form (Section 00400) is considered certification of conformance to such requirements.
- 25.2 In the event this contract requires trench excavation, the requirement of Florida Statutes 553.60, et seq., shall be adhered to by all Bidders.

ARTICLE 26 - SPECIAL WARRANTY, PERFORMANCE BOND, INSURANCE AND CORRECTION PERIOD REQUIREMENTS

There are special requirements pertaining to Warranty, Performance Bond, Insurance, and the Correction Period which are described in the Bidding Documents. The Bidder must include in his Bid the consideration to be paid by the Owner for the Special Warranty, Performance Bond, Insurance and Correction Period requirements as set forth in the Contract Documents.

ARTICLE 27 - SIGNING OF AGREEMENT

- 27.1 When Owner gives a Notice of Award to the Successful Bidder, it shall be accompanied by at least six (6) unsigned counterparts of the Agreement (Section 00520) and all other Contract Documents. Within ten (10) days of receipt thereafter, Successful Bidder shall sign and deliver four (4) counterparts of the Agreement to the Owner together with the required Bonds, Insurance Certificates and Endorsements. Within ten (10) days after receipt of the properly executed and completed submittals, Owner shall deliver a fully signed counterpart to Successful Bidder.
- 27.2 A Successful Bidder who is awarded the Contract and fails to execute the Agreement or furnish the required Bonds or insurance certificates and endorsements within the period specified in 27.1 above, shall have its Notice of Award rescinded and shall forfeit its Bid Security to Owner as liquidated damages for its failure to enter into a contract with the Owner.

ARTICLE 28 - PROTESTS

The Owner is responsible for the resolution of protests by Bidders for contract award, claims, disputes, alleged patent infringements, alleged license fee(s) and other related procurement matters. The following procedures SHALL be used for all such protests.

- 28.1 Any party with a direct financial interest adversely affected by Owner's procurement decision SHALL file a protest under this Article, or be barred further relief.
- 28.2 A protest: (a) must be in writing (oral protests shall NOT be acknowledged); (b) adequately state the basis of the protest and the relief requested; and (c) be received by Owner within seven (7) calendar days from the date the basis of the protest was, or should have been, known.
- 28.3 After a protest has been properly filed with the Owner, the Owner shall make a determination on the merits of the protest within thirty (30) calendar days of receipt of the protest. If the Owner denies the protest, the Owner may proceed with award of the Contract unless enjoined by order of a Court of competent jurisdiction.

28.4 A protest SHALL be limited to: (a) issues arising from the procurement provisions of the Project Manual; and (b) state or local law. No protest may be filed with respect to basic project design.

28.5 The Owner's legal counsel shall establish procedures to resolve the protest based on Florida law. If the Florida law is not clearly established, the Owner shall rely on decisions issued by other states, Federal courts, the U.S. Comptroller General or other Federal agencies with related procurement experience.

ARTICLE 29 - APPRENTICES

In the event this Contract is in excess of \$25,000.00, the apprentice employment requirements of Chapter 446.011(3), Florida statutes are hereby incorporated:

29.1 The CONTRACTOR agrees:

29.1.1 That he will make a diligent effort to hire for the performance of the Contract a number of apprentices in each occupation which bears to the average number of the journeyman in that occupation to be employed in the performance of the Contract, the ratio of at least one apprentice to every five journeymen.

29.1.2 That he will, when feasible, assure that twenty-five (25) percent of such apprentices are in their first year of training, except when the number of apprentices to be hired is fewer than four. Feasibility here involves a consideration of the availability of training opportunities for first-year apprentices, the hazardous nature of the work for beginning workers and excessive unemployment of the apprentices in their second and subsequent years of training.

29.1.3 That during the performance of the Contract, he will make diligent efforts to employ the number of apprentices necessary to meet requirements of subparagraphs 1 and 2.

29.2 The CONTRACTOR agrees to return records of employment by trade of the number of apprentices and journeymen by first year of training and of journeymen and the wages paid and hours of work of such apprentices and journeymen, on a form as prescribed by the Bureau of Apprenticeship of the Division of Labor and Employment Opportunities at three-month intervals. Submission of duplicate copies of forms submitted to the United States Department of Labor shall be sufficient compliance with the provisions of this section.

29.3 The CONTRACTOR agrees to supply to the Bureau of Apprenticeship of the Division of Labor and Employment Opportunities, at three-month intervals, a statement describing steps taken toward making a diligent effort and containing a breakdown by craft of hours worked and wages paid for first-year apprentices, other apprentices and journeymen.

29.4 The CONTRACTOR agrees to insert in any subcontract under this Contract the requirements contained in this section. The term "Contractor," as used in such clauses and any subcontract, shall mean the subcontractor."

ARTICLE 30 - DRUG-FREE WORKPLACE

Every Bidder shall provide a certification on the form provided (Section 00401A) indicating whether the Bidder has implemented a drug-free workplace program pursuant to the requirements of Florida Statute Section 287.087. Preference in the award process shall be given, according to the statutory requirements, to a business that certifies it has implemented a drug-free workplace program.

ARTICLE 31 - LICENSES AND PERMITS

- 31.1 Permits for this Construction Project obtained by the Owner are limited to those permits listed in Division 1 of the Contract Documents. The Contractor shall be required to comply with all provisions of such permits regarding workmanship, schedules, notification of starting construction, and any other conditions under which the permits are issued.
- 31.2 The Town of Windermere, Orange County, Florida will waive all permit fees, however, the Contractor shall obtain all necessary building permits, if required, from the Town.
- 31.3 The Contractor shall obtain and pay for all other federal, state, and county permits, licenses, and other authorizations required for the prosecution of the Work, including the cost of all Work performed in compliance with the terms and conditions of such permits, licenses, and authorizations, whether by himself or others.

ARTICLE 32 - CONTINGENCY ALLOWANCES

A contingency allowance may be included as part of the Schedule of Bid Prices. This allowance is included to cover Contract items identified in Section 01025 - Measurement and Payment. Prior to the initiation of any expenditure of any contingency allowance, an executed formal Change Order is necessary for the utilization of contingency funds. The method for computing Change Order dollar amounts shall be as specified in the General Conditions.

ARTICLE 33 - RETAINAGE

Provisions concerning retainage and Contractors' rights to deposit securities in lieu of retainage are set forth in the Agreement.

ARTICLE 34 - PRE-BID CONFERENCE

A non-mandatory pre-bid conference will be held at the time and place indicated in the "Invitation to Bid." Representatives of Owner and Engineer will be present to discuss the Project. Bidders are required to attend and participate in the conference. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

END OF SECTION

SECTION 00300

INFORMATION AVAILABLE TO BIDDERS

1. The Engineer has relied upon the following information. This information is for general information only and shall not be considered a part of the Bidding or Contract Documents.

LISTING OF INFORMATION AVAILABLE TO BIDDERS

- A. Reports and Investigations
 1. *REPORT OF GEOTECHNICAL INVESTIGATION – WEST 2ND AVENUE ROADWAY IMPROVEMENTS* (prepared by GEC, Inc., March 2017)
- B. Drawings and Data
 1. Construction Plans for *WEST SECOND AVENUE ROADWAY AND DRAINAGE IMPROVEMENTS*
 2. Utilities: It is the Contractor's responsibility to preserve all existing utilities whether shown on the Drawings or not. If utility conflicts are encountered by the Contractor during construction, the Contractor shall give sufficient notice to the Owners so that they may make the necessary adjustments. Damage to any utilities which, in the opinion of the Owner and Engineer, is caused by carelessness on the part of the Contractor shall be repaired at the Contractor's expense. Any delays ensuing from this damage will be considered as inexcusable.
 3. The plans include the stamped APPROVED water main improvement plans, as issued by the Orange County Utilities Division. The Contractor shall abide by these plans and provide the required partial and final clearances for the implementation of the water main improvements. Contractor shall also abide by the OCU specification included in the Project Manual.
3. Permits: SFWMD Environmental Resource Permit No. 48-106682-P.
FDEP No Permit Required (NPR) determination under State 404 Program.

END OF SECTION

DATE SUBMITTED: _____

NAME OF BIDDER: _____

SECTION 00400

BID FORM

SUBMITTED: _____
(Date)

PROJECT IDENTIFICATION: **TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA
BID #2023-02
WEST SECOND AVENUE ROADWAY AND
DRAINAGE IMPROVEMENTS**

NAME OF BIDDER: _____

BUSINESS ADDRESS: _____ PHONE NO.: _____

CONTRACTOR'S FLORIDA LICENSE NO.: _____

THIS BID IS SUBMITTED TO: Town of Windermere, Orange County, Florida (hereinafter called Owner).

1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Contract Documents, to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid Form and the Agreement, and in accordance with the other terms and conditions of the Contract Documents.
2. Bidder accepts all of the terms and conditions of the Bidding Documents including without limitation those dealing with the disposition of Bid Bond. This Bid will remain open for sixty (60) calendar days after the day of Bid opening. BIDDER will sign and deliver the required number of counterparts of the Agreement with the Bonds and other documents required by the Bidding Requirements within ten (10) days after the date of OWNER'S Notice of Intent to Award.
3. In submitting this Bid, Bidder makes all representations required by the Instructions to Bidders and the Agreement and further warrants and represents that:
 - A. Bidder has examined copies of all the Bidding Documents and of the following Addenda:

No. _____ Dated _____	No. _____ Dated _____
No. _____ Dated _____	No. _____ Dated _____

(Receipt of all which is hereby acknowledged) and also copies of the Invitation to Bid and the Instructions to Bidders.

DATE SUBMITTED: _____

NAME OF BIDDER: _____

- B. Bidder has familiarized itself with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing the Work.
- C. BIDDER has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing surface of subsurface structures at or contiguous to the site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.2.1 of the General Conditions. BIDDER accepts the determination set forth in paragraph SC-4.2 of the Supplementary Conditions of the extent of the "technical data" contained in such reports and drawings upon which BIDDER is entitled to rely as provided in paragraph 4.2 of the General Conditions. BIDDER acknowledges that such reports and drawings are not Contract Documents and may not be complete for BIDDER's purposes. BIDDER acknowledges that OWNER and Engineer do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Bidding Documents with respect to Underground Facilities at or contiguous to the site.
- D. BIDDER has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect cost progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by BIDDER and safety precautions and programs incident thereto. BIDDER does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the determination of this Bid for performance and furnishing of the Work in accordance with the times, price and other terms and conditions of the Contract Documents.
- E. BIDDER is aware of the general nature of Work to be performed by OWNER and others at the site that relates to Work for which this Bid is submitted as indicated in the Contract Documents.
- F. BIDDER has correlated the information known to BIDDER, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies and date with the Contract Documents.

DATE SUBMITTED: _____

NAME OF BIDDER: _____

- G. BIDDER has given ENGINEER written notice of all conflicts, errors, ambiguities or discrepancies that BIDDER has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to BIDDER, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.
- H. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a farce or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.
- I. BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE TO PROCEED and to fully complete all work of the PROJECT within the Contract Time specified in the Agreement (Section 00520). BIDDER further accepts the provisions of the Agreement as to liquidated damages and agrees to pay as liquidated damages the amount stated in the Agreement (Section 00520), for each consecutive calendar day completion of the Work is delayed.

Completion Schedule:

- 1) The project will be completed within **five hundred forty nine (549)** consecutive calendar days of the date of the official Notice to Proceed in accordance with provisions contained in "Article 3 Contract Time" of "Section 00520 Agreement between Owner and Contractor."
4. All bid items shall include all materials, equipment, labor, permit fees, taxes, tests, miscellaneous costs of all types, overhead, and profit for the item to be complete, in place, and ready for operation in the manner contemplated by the Contract Documents. Bidder submits the following **TOTAL BID** to perform all the Work as required by the Drawings and Specifications.
5. In accordance with Article 17 of the Instructions to Bidders, if the Contract is awarded, it will be awarded after adjustments for additive or deductive alternates (if any). Additive or deductive alternates (if any) will be considered in determining the lowest qualified, responsive, and responsible Bidder. The Owner reserves the right to accept any or all additive or deductive alternates, in his sole discretion, prior to the award of the Contract. The Owner also reserves the right to delete any portion of the Work as shown in the bid schedule prior to award and adjust each bidder's "Total Bid" accordingly.

DATE SUBMITTED: _____

NAME OF BIDDER: _____

6. The following documents are attached to and made a condition of this Bid:
- A. Bid Form (Sections 00400, 00400A, 00401, and 00401A).
 - B. Bid Bond (surety bond or cashier's check). (Section 00430). (Original and one (1) copy).
 - C. Power of Attorney (for surety bond only).
 - D. Non-collusion Affidavit (Bidding Documents) (Section 00450).
 - E. Certification of Non-segregated Facilities (Section 00451).
 - F. Sworn Statement on Public Entity Crimes (Section 00452).
 - G. Certification of Non-discriminatory Labor Practices (Section 00453).
 - H. Corporate Authority to Execute Bid (required only when documents are executed by a corporate employee other than President or Vice-President) (Section 00501).

(Remainder of This Page Left Blank Intentionally.)

DATE SUBMITTED: _____

NAME OF BIDDER: _____

**ROADWAY AND DRAINAGE IMPROVEMENTS
BID ITEMS**

DATE SUBMITTED: _____

NAME OF BIDDER: _____

**SCHEDULE OF BID ITEMS
TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

BID #2023-02

WEST SECOND AVENUE ROADWAY AND DRAINAGE IMPROVEMENTS

Base Bid Item No.	Description	Estimated Quantity	Unit	Unit Price (in Words)	Unit Price (in Numbers)	Extended Summary Total Price (in Numbers)
BASE BID						
101-1	MOBILIZATION (5% OF STORMWATER IMPROVEMENTS)	1	LS			
101-2	SURVEY, CONSTRUCTION LAYOUT AND CERTIFIED AS-BUILT	1	LS			
102-1	MAINTENANCE OF TRAFFIC	1	LS			
104-14	PREVENTION, CONTROL AND ABATEMENT OF EROSION AND WATER POLLUTON	1	LS			
110-1-1	CLEARING AND GRUBBING	1	LS			
110-7-1	MAILBOX, F&I, SINGLE	46	EA			
120-9	EXCAVATION, EMBANKMENT AND GRADING	1	LS			
106-4	TYPE B STABILIZATION (12")(MIN LBR 40)	12,646	SY			

DATE SUBMITTED: _____

NAME OF BIDDER: _____

**SCHEDULE OF BID ITEMS
TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

BID #2023-02

WEST SECOND AVENUE ROADWAY AND DRAINAGE IMPROVEMENTS

Base Bid Item No.	Description	Estimated Quantity	Unit	Unit Price (in Words)	Unit Price (in Numbers)	Extended Summary Total Price (in Numbers)
285-704	GRADED CRUSHED CONCRETE AGGREGATE BASE COURSE (8")	12,646	SY			
327-70-6	MILLING EXISTING ASPHALT PAVEMENT (1-1/2")(165 LB PER SY)(TRAFFIC LEVEL C)	1,440	SY			
334-1-13	TYPE SP 9.5 ASPHALTIC CONCRETE (1-1/2")(165 LB PER SY)(TRAFFIC LEVEL C)	817	TN			
400-15	CONCRETE CLASS NS, MISCELLANEOUS	10	CY			
425-1-351	INLETS, CURB, TYPE P-5, <10'	14	EA			
425-1-451	INLETS, CURB, TYPE J-5, <10'	1	EA			
425-1-521	INLETS, DITCH BOTTOM, TYPE C, <10'	11	EA			
425-1-541	INLETS, DITCH BOTTOM, TYPE D, <10'	1	EA			
425-1-549	INLETS, DITCH BOTTOM, TYPE D, MODIFY	1	EA			

DATE SUBMITTED: _____

NAME OF BIDDER: _____

**SCHEDULE OF BID ITEMS
TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

BID #2023-02

WEST SECOND AVENUE ROADWAY AND DRAINAGE IMPROVEMENTS

Base Bid Item No.	Description	Estimated Quantity	Unit	Unit Price (in Words)	Unit Price (in Numbers)	Extended Summary Total Price (in Numbers)
425-1-711	INLETS, GUTTER TYPE V, <10'	12	EA			
425-2-41	MANHOLE, P-7, <10'	2	EA			
430-175-118	PIPE CULVERT, CONCRETE, CLASS III, ROUND 18"	893	LF			
430-175-124	PIPE CULVERT, CONCRETE, CLASS III, ROUND 24"	47	LF			
430-94-1	DESILT PIPE (0TO 24")	1,766	LF			
432-4	STORM SEWER VIDEO	1	LS			
443-70-4	FRENCH DRAIN (24" SLOTTED RCP)(COMPLETE)	873	LF			
520-1-7	CONCRETE CURB AND GUTTER, TYPE E	123	LF			
520-1-10	CONCRETE CURB AND GUTTER, TYPE F	126	LF			

DATE SUBMITTED: _____

NAME OF BIDDER: _____

**SCHEDULE OF BID ITEMS
TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

BID #2023-02

WEST SECOND AVENUE ROADWAY AND DRAINAGE IMPROVEMENTS

Base Bid Item No.	Description	Estimated Quantity	Unit	Unit Price (in Words)	Unit Price (in Numbers)	Extended Summary Total Price (in Numbers)
520-1-13	CONCRETE CURB AND GUTTER TYPE DROP	6,888	LF			
520-2-4	CONCRETE CURB, TYPE D	44	LF			
520-2-6	CONCRETE CURB (12"X12" RIBBON CURB	916	LF			
520-3	VALLEY GUTTER - CONCRETE	391	LF			
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4" THICK	64	SY			
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 6" THICK	1,044	SY			
522-3	BRICK PAVER DRIVEWAY	232	SY			
522-4	CURB, RAMP, ADA, 6" THICK CONCRETE	16	SY			
522-6	SPEED HUMP (COMPLETE WITH THERMOPLASTIC MARKING)	7	EA			

DATE SUBMITTED: _____

NAME OF BIDDER: _____

**SCHEDULE OF BID ITEMS
TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

BID #2023-02

WEST SECOND AVENUE ROADWAY AND DRAINAGE IMPROVEMENTS

Base Bid Item No.	Description	Estimated Quantity	Unit	Unit Price (in Words)	Unit Price (in Numbers)	Extended Summary Total Price (in Numbers)
527-2	DETECTABLE WARNING	66	SF			
570-1-2	PERFORMANCE TURF (SOD)(MATCH EXISTING)	8,265	SY			
580-911	REMOVE EXISTING TREE, INCLUDING STUMP 8"-24" DIAMETER	4	EA			
700-1-11	SINGLE POST SIGNE, F&I, GROUND MOUNT, UP TO 12 SF	22	AS			
700-1-50	SINGLE POST SIGN, RELOCATE	5	AS			
706-3	RETRO-REFLECTIVE PAVEMENT MARKERS	5	EA			
711-11-123	THERMOPLASTIC, STANDARD, WHITE, SOLID, 12"	49	LF			
711-11-125	THERMOPLASTIC, STANDARD, WHITE, SOLID, 24"	148	LF			

DATE SUBMITTED: _____

NAME OF BIDDER: _____

**OCU WATER MAIN IMPROVEMENTS
BID ITEMS**

DATE SUBMITTED: _____

NAME OF BIDDER: _____

**SCHEDULE OF BID ITEMS
TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

BID #2023-02

WEST SECOND AVENUE OCU WATER MAIN IMPROVEMENTS

Base Bid Item No.	Description	Estimated Quantity	Unit	Unit Price (in Words)	Unit Price (in Numbers)	Extended Summary Total Price (in Numbers)
1050-11-221	F&I WATER MAIN, 4" RESTRAINED JOINT, COMPLETE INCLUDING FITTINGS	440	LF			
1050-11-423	F&I WATER MAIN, 8" DUCTILE IRON, COMPLETE INCLUDING FITTINGS	2,341	LF			
1050-16-221	REMOVE AND DISPOSE OF EXISTING 4" WATER MAIN	368	LF			
1050-16-222	REMOVE AND DISPOSE OF EXISTING 6" WATER MAIN	1,859	LF			
1050-16-223	REMOVE AND DISPOSE OF EXISTING 8" WATER MAIN	466	LF			
1051-4	REPLACE 1" WATER SERVICE LATERAL, SHORT SIDE	22	EA			
1051-5	REPLACE 1" WATER SERVICE LATERAL, LONG SIDE	19	EA			
1080-24-104	F&I GATE VALVE ASSEMBLY, 4" COMPLETE	2	EA			
1080-24-106	F&I GATE VALVE ASSEMBLY, 6" COMPLETE	3	EA			

DATE SUBMITTED: _____

NAME OF BIDDER: _____

**SCHEDULE OF BID ITEMS
TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

BID #2023-02

WEST SECOND AVENUE OCU WATER MAIN IMPROVEMENTS

Base Bid Item No.	Description	Estimated Quantity	Unit	Unit Price (in Words)	Unit Price (in Numbers)	Extended Summary Total Price (in Numbers)
1080-24-108	F&I GATE VALVE ASSEMBLY, 8" COMPLETE	38	EA			
1080-25-104	F&I 4" BLOWOFF ASSEMBLY, COMPLETE (PERMANENT)	1	EA			
1080-25-108	F&I 8" BLOWOFF ASSEMBLY, COMPLETE (TEMPORARY)	9	EA			
1080-25-600	BLOWOFF ASSEMBLY, REMOVE	1	EA			
1080-26-108	F&I AIR RELEASE VALVE ASSEMBLY, 8" COMPLETE	3	EA			
1080-27-104	UTILITY FIXTURE – LINE STOP ASSEMBLY, FURNISH AND INSTALL, 4"	1	EA			
1080-27-106	UTILITY FIXTURE – LINE STOP ASSEMBLY, FURNISH AND INSTALL, 6"	2	EA			
108-27-108	UTILITY FIXTURE – LINE STOP ASSEMBLY, FURNISH AND INSTALL 8"	10	EA			
1080-28-108	CUT-IN CONNECTION TO EXISTING 4" WM	1	EA			

DATE SUBMITTED: _____

NAME OF BIDDER: _____

**SCHEDULE OF BID ITEMS
TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

BID #2023-02

WESTSECOND AVENUE OCU WATER MAIN IMPROVEMENTS

Base Bid Item No.	Description	Estimated Quantity	Unit	Unit Price (in Words)	Unit Price (in Numbers)	Extended Summary Total Price (in Numbers)
1080-28-108	CUT-IN CONNECTION TO EXISTING 8" WM	10	EA			
1644-116-08	F&I FIRE HYDRANT ASSEMBLY, COMPLETE WITH 6" GV AND BOX	3	AS			
1644-900	FIRE HYDRANT, REMOVE EXISTING FIRE HYDRANT	3	AS			

DATE SUBMITTED: _____

NAME OF BIDDER: _____

**SCHEDULE OF BID ITEMS
TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

BID #2023-02

WEST SECOND AVENUE ROADWAY AND DRAINAGE IMPROVEMENTS

ROADWAY AND DRAINAGE IMPROVEMENTS BASE, OUC WATER MAIN IMPROVEMENTS BASE BID AND TOTAL BID COMPULATION

ROADWAY AND DRAINAGE IMPROVEMENTS BASE BID	\$		
		(Figures)	(Words)
OCU WATER MAIN IMPROVEMENTS BASE BID	\$		
		(Figures)	(Words)
TOTAL BID	\$		
		(Figures)	(Words)

DATE SUBMITTED: _____

NAME OF BIDDER: _____

(This Page Left Blank Intentionally.)

DATE SUBMITTED: _____

NAME OF BIDDER: _____

7. The terms used in this Bid, which are defined in the General Conditions or Instructions of the Construction Contract, included as part of the Contract Documents have the meanings assigned to them in the General Conditions or Instructions.
8. The work shall be performed under a Florida Contractor's License. Contract shall not be awarded unless proof of valid license(s) is provided.
9. It is understood that where quantities for unit price work have been presented in the foregoing Schedule of Bid Items, they are approximate only and are solely for purpose of facilitating the comparison of bids, and that the Contractor's compensation will be computed upon the basis as described in the measurement and payment clauses in the specifications contained herein.

10. BASE BID - SCHEDULE OF MANUFACTURERS/SUPPLIERS

The undersigned as Bidder agrees that the Contract, if awarded, will be on the basis of the materials and equipment named in the Contract Documents in accordance with Article 9 of the Instructions to Bidders. The undersigned as Bidder also agrees that the Bidder will provide one of the listed manufacturers/suppliers. If the Bidder desires to propose an alternate manufacturer/supplier, he may write in the name of such alternate in the substitution list included within this Bid Form. If the proposed alternate manufacturer/supplier is determined "not equivalent" by the Engineer, the Bidder must furnish the specified equipment.

11. SUBSTITUTIONS AND "OR EQUAL"

The undersigned as Bidder agrees that substitutions or "or-equal" items will not be considered until after the "Effective Date of the Agreement" and will be evaluated in accordance with paragraphs 6.7.1, 6.7.2, and 6.7.3 of the General Conditions. In addition to the reimbursement required under the General Conditions, the Contractor shall also reimburse the Owner for any engineering costs directly attributable to the change in manufacturers/suppliers, caused by the acceptance of proposed alternates, such as; additional field trips for the Engineer, additional redesign costs, and additional review costs, etc. Other costs directly attributable to the change in manufacturers/suppliers caused by the acceptance of proposed alternates, such as; increased electrical requirements, larger building, additional pumps or tankage, etc., shall be borne by others and not the Owner. The Owner may request, and the undersigned Bidder shall supply, complete information on proposed substitutions. Such information shall be the manufacturer's current published or preprinted information for the specific substitution.

(Remainder of This Page Left Blank Intentionally.)

DATE SUBMITTED: _____

NAME OF BIDDER: _____

Instructions: Strike out (X) non-applicable signature block and complete applicable block. (ALL SIGNATORIES MUST HAVE THEIR NAMES PRINTED OR TYPED BELOW THEIR SIGNATURES.)

If Bidder is:

A CORPORATION

(Corporation Name)

(State of Incorporation)

By _____
(Name of person authorized to sign)

(Title)

(Authorized Signature)

(Corporate Seal)

Attest _____
(Secretary)

Business Address: _____

Phone No.: _____

Corporation President: _____

Florida License No.: _____

DATE SUBMITTED: _____

NAME OF BIDDER: _____

Instructions: Strike out (X) non-applicable signature block and complete applicable block. (ALL SIGNATORIES MUST HAVE THEIR NAMES PRINTED OR TYPED BELOW THEIR SIGNATURES.)

If Bidder is:

A JOINT VENTURE

By _____
(Name)

(Address)

By _____
(Name)

(Address)

Business Address: _____

Phone No.: _____

Florida License No.: _____

(Each joint ventures must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

Florida License No.: _____

DATE SUBMITTED: _____

NAME OF BIDDER: _____

12. As BIDDER, I hereby certify that I am aware and understand that the Town of Windermere at its sole discretion reserves the right to waive technicalities or irregularities, to reject any or all Bids, and/or to accept the lowest qualified, responsive and responsible Bid.
13. List the following in connection with the Surety which is providing the Bid Bond:

Surety's Name: _____

Surety's Address: _____

Name and address of Surety's resident agent for service of process in Florida:

END OF SECTION

SECTION 00400A

LOCAL AGENCY PROGRAM

The Bidder hereby declares that the undersigned is the person or persons responsible within the firm for the final decision as to the price(s) and amount of this bid and the Bidder further declare that:

1. The price(s) and amount of this bid have been arrived at independently, without consultation, communication, or agreement for the purpose of restricting competition with any other contractor, bidder or potential bidder.
2. Neither the price(s) nor the amount of this bid have been disclosed to any other firm or person who is a bidder or potential bidder on this project, and will not be so disclosed prior to the bid opening.
3. No attempt has been made or will be made to solicit, cause, or induce any firm or person to refrain from bidding on this project, or to submit a bid higher than the bid of this firm, or any intentionally high or non-competitive bid or other form of complementary bid.
4. The bid is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any other firm or person to submit a complementary bid.
5. The Bidder has not offered or entered into a subcontract or agreement regarding the purchase of materials or services from any other firm or person, or offered, promised, or paid cash or anything of value to any other Bidder or person, whether in connection with this or any other project in consideration for an agreement or promise by any other firm or person to refrain from bidding or to submit a complementary bid on this project.
6. The Bidder has not accepted or been promised any subcontract or agreement regarding the sale of materials or services to any other firm or person, and has not been promised to paid cash or anything of value by any other firm or person, whether in connection with this or any other project, in consideration for the firm's submitting a complementary bid, or agreeing to do so, on this project.
7. The Bidder has made a diligent inquiry of all members, officers, employees, and agents of the Bidder with responsibilities relating to the preparation, approval or submission of the firm's bid on this project and have been advised by each of them that he or she has not participated in any communication, consultation, discussion, agreement, collusion, act, or other conduct inconsistent with any of the statements and representations made in this Declaration.
8. As required by Section 337.165, Florida Statutes, the Bidder has fully informed the TOWN in writing of all convictions of the firm, its affiliates (as defined in Section 337.165(1)(a), Florida Statutes), an all directors, officers, and employees of the firm and its affiliates for violation of federal antitrust laws with respect to a public contract or for violation of any state or federal law involving fraud, bribery, collusion, conspiracy, or material representation with respect to a public contract. This includes disclosure of the names of current employees of the firm or affiliates who were convicted of contract crimes while in the employ of another company.
9. The Bidder certifies that, except as noted below, neither the firm nor any person associated therewith in the capacity of owner, partner, director, officer, principal, investigator, project director, manager, auditor, and/or position involving the administration of federal funds:
 - a. Is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions, as defined in 49 CFR s29.110(a), by any federal department or agency;

- b. Has within a three-year period preceding this certification has been convicted of or had a civil judgment rendered against it for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a federal, state or local government transaction or public contract; violation of federal or state antitrust statutes; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
 - c. Is presently indicted for or otherwise criminally or civilly charged by a federal, state or local governmental entity with commission of any of the offenses enumerated in paragraph 9(b) of this certification; and
 - d. Has within a three-year period preceding this certification had one or more federal, state or local government public transactions terminated for cause or default.
10. The Bidder certifies that it shall not knowingly enter into any transaction with any subcontractor, material supplier, or vendor who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this project by any federal agency unless authorized by the TOWN.
11. The firm certifies that the bidder is not a nonresident alien, or a foreign corporation/entity formed under the laws of a country other than the United States.

Where the Bidder is unable to declare or certify as to any of the statements contained in the above stated paragraphs numbered (1) through (12), the Bidder has provided an explanation by attached separate sheet.

Company Name

Authorized Signature

Printed Name

Date

END OF SECTION

SECTION 00401A

DRUG-FREE WORKPLACE CERTIFICATION

IDENTICAL TIE BIDS: Preference shall be given to businesses with drug-free workplace programs. Whenever two or more bids which are equal with respect to price, quantity, and service are received by the State or by any political subdivision for the procurement of commodities or contractual services, a bid received from a business that certifies that it has implemented a drug-free workplace program shall be given preference in the award process. Established procedures for processing tie bids will be followed if none of the tied vendors have a drug-free workplace program (Florida Statutes Section 287.037). In order to have a drug-free workplace program, a business shall:

1. Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.
2. Inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, and available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.
3. Give each employee engaged in providing the commodities or contractual services that are under bid a copy of the statement specified in subsection (1).
4. In the statement specified in subsection (1), notify the employees that, as a condition of working on the commodities or contractual services that are under bid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or pleas of guilty or nolo contendere to, any violation of Chapter 893 or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction.
5. Impose a sanction on, or require the satisfactory participation in a drug abuse assistance or rehabilitation program is such is available in the employee's community, by any employee who is so convicted.
6. Make a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

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

Bidder: _____

Signed: _____

By: _____
(Print or Type Name)

Title: _____

Date: _____

END OF SECTION

SECTION 00401

QUESTIONNAIRE

DATE: _____

PROJECT IDENTIFICATION: **TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA
BID #2023-02
WEST SECOND AVENUE ROADWAY AND
DRAINAGE IMPROVEMENTS**

NAME OF BIDDER: _____

BUSINESS ADDRESS: _____

_____ Phone No.: _____

CONTRACTOR'S FLORIDA LICENSE NO.: _____

The undersigned warrants the truth and accuracy of all statements and answers herein contained. Include additional sheets if necessary.

1. How many years has your organization been in business as a (circle one) General Contractor/Subcontractor?

2. Describe and give the date and owner of the last project that you have completed similar in type, size, and nature as the one proposed?

3. Have you ever failed to complete work awarded to you? If so, where and why?

4. Have you personally inspected the site of the proposed Work? Describe any anticipated problems with the site and your proposed solutions.

5. Will you Subcontract any part of this Work? If so, describe which portions and approximate dollar value.

6. Disclosure (Section 00200, Article 20). Complete and attach "Sworn Statement on Public Entity Crimes" (Section 00452).

7. State the true and exact, correct, and complete name under which you do business. BIDDER IS:

8. Complete the following Table regarding experience with projects similar to the work proposed under this Contract.

Date of Contract	Name of Project & Location	Client's Name & Address (Include Contact Name and Phone #)	Amount of Contract

Date of Contract	Name of Project & Location	Client's Name & Address (Include Contact Name and Phone #)	Amount of Contract

END OF SECTION

SECTION 00430

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____
as Principal, and _____
as Surety, are hereby held and firmly bound unto the Town of Windermere, Orange County, Florida as
Owner in the penal sum of, (5 percent of the Contract Bid) _____

(written amount in dollars and cents)

(\$ _____)

(figures)

for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves,
successors and assigns.

Signed, this _____ day of _____, 2023. The Condition of the
above obligation is such that whereas the Principal has submitted to the Town of Windermere, Orange
County, Florida a certain Bid, attached hereto and hereby made a part hereof to enter into a contract in
writing, for **BID #2023-02, WEST SECOND AVENUE ROADWAY AND DRAINAGE IMPROVEMENTS,
TOWN OF WINDERMERE, ORANGE COUNTY, FLORIDA.**

NOW THEREFORE

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 and
responsive bidder as determined by Owner for the Work required by the Contract Documents,
provided that:
 - 1.1 If there is no such next lowest, responsible and responsive 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.
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
Amendment to the Agreement required by the Bidding Documents and any performance and
payment bonds required by the Bidding Documents and Contract 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
Amendment to the Agreement required by the Bidding Documents and any performance
and payment bonds required by the Bidding Documents and Contract Documents, or
 - 3.2 All bids are rejected by Owner, or
 - 3.3 Owner fails to issue a Notice of Intent to Award to Bidder within ninety (90) days from the
time and date fixed for the opening of Bids (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 by 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 and 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 provision of 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.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

BIDDER:	Strike out (X) non-applicable signature block and complete applicable block. All signatures must have their names printed or type below their signature.
---------	--

If Bidder is SOLE PROPRIETORSHIP , complete this signature block.	
<p style="text-align: center;">_____</p> <p style="text-align: center;">(Individual's Signature)</p> <p style="text-align: center;">_____</p> <p style="text-align: center;">(Individual's Signature)</p> <p>doing business as _____</p> <p style="text-align: center;">_____</p> <p style="text-align: center;">(Business Address)</p> <p>_____ _____</p> <p>(Telephone No.) (Florida License No.)</p>	<p>(1) _____</p> <p style="text-align: center;">(Witness)</p> <p>(2) _____</p> <p style="text-align: center;">(Witness)</p> <p style="text-align: center; margin-top: 20px;">(SEAL)</p>

If Bidder is **PARTNERSHIP**, complete this signature block.

(Partnership Name)

(General Partner's Signature)

(General Partner's Name)

(Business Address)

(Telephone No.)

(Florida License No.)

(1) _____
(Witness)

(2) _____
(Witness)

(SEAL)

If Bidder is **CORPORATION**, complete this signature block.

(Corporation Name)

(State of Incorporation)

By: _____
(Name of Person Authorized to Sign - See Note 1)

(Title)

(Authorized Signature)

(Corporation President)

(Business Address)

(Telephone No.)

(Florida License No.)

(1) _____
(Witness)

(2) _____
(Witness)

(SEAL)

SURETY

<p>_____</p> <p style="text-align: center;">(Surety Business Name)</p> <p>_____</p> <p style="text-align: center;">(Principal Place of Business)</p> <p>By: _____</p> <p style="text-align: center;">(Surety Agent's Signature - See Note 2)</p> <p>_____</p> <p style="text-align: center;">(Surety Agent's Name)</p> <p>_____</p> <p style="text-align: center;">(Surety Agent's Title)</p> <p>_____</p> <p style="text-align: center;">(Business Name of Local Agent for Surety)</p> <p>_____</p> <p style="text-align: center;">(Business Address)</p> <p>_____</p> <p style="text-align: center;">(Telephone No.) _____</p> <p style="text-align: center;">(Bond No.)</p>	<p>Witness: (If agency is not a Corporation)</p> <p>(1) _____</p> <p style="text-align: center;">(Witness)</p> <p>(2) _____</p> <p style="text-align: center;">(Witness)</p> <p>Attest: (If Agency is a Corporation)</p> <p>_____</p> <p style="text-align: center;">(Corporate Secretary Signature)</p> <p>_____</p> <p style="text-align: center;">(Corporate Secretary Name)</p> <p style="text-align: center; margin-top: 20px;">(Corporate Seal)</p>
---	---

NOTES:

- (1) Complete and attach "Corporate Authority to Execute Documents" if executed by any corporate employee other than president or vice-president.
- (2) Complete and attach a certified copy of "Power-of-Attorney" prepared by Surety appointing individual "Attorney-in-Fact" for execution of Bid Bond on behalf of Surety and corresponding notarized "Attorney-in-Fact".
- (3) Above addresses are to be used for giving required notice.
- (4) Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.
- (5) Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

ATTORNEY-IN-FACT AFFIDAVIT

STATE OR COMMONWEALTH OF _____)
COUNTY OR TOWN OF _____) ^{ss}

Before me, a Notary Public, personally came _____ known to me, and known to be the Attorney-in-Fact of _____,

(Surety Company)

a _____ Corporation, which executed the attached bond as surety, who (State)

deposed and said that his signature and the corporate seal of said _____

(Surety Company)

were affixed by order and authority of said Company's Board of Directors, and that the execution of the attached bond is the free act and deed of _____.

(Surety Company)

Given under my hand and seal this _____ day of _____, 2023.

(Notary Public)

My Commission Expires _____

END OF SECTION

SECTION 00450

NON-COLLUSION AFFIDAVIT

STATE OF _____)

ss

COUNTY OF _____)

_____, being first duly sworn deposes and says that:

1. He (it) is the _____
(Owner, Partner, Office, Representative or Agent)
of _____, the Bidder that has submitted the attached Bid;
2. He is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;
3. Such Bid is genuine and is not a collusive or sham Bid;
4. Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees, or parties in interest, including this affidavit, have in any way, colluded, conspired, connived or agreed, directly or indirectly, with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted; or to refrain from bidding in connection with such Contract; or have in any manner, directly or indirectly, sought by agreement or collusion, or communication, or conference with any Bidder, firm, or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit, or cost elements of the Bid price or the Bid price in any other Bidder, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against (Recipient), or any person interested in the proposed Contract; and
5. The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance, or unlawful agreement on the part of the Bidder or any other of its agents, representatives, owners, employees or parties in interest, including this affidavit.

By: _____

Title: _____

Sworn and subscribed to before me
this ___ day of _____, 2023.

in the State of _____,

County of _____.

(Notary Public)

My Commission Expires: _____

END OF SECTION

SECTION 00451

CERTIFICATION OF NONSEGREGATED FACILITIES

The Bidder certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under this control, where segregated facilities are maintained. The Bidder certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location under his control where segregated facilities are maintained. The Bidder agrees that a breach of this certification will be a violation of the Equal Opportunity clause in any contract resulting from acceptance of this Bid. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage and dressing areas, parking lots, drinking fountains, recreation or entertainment area, transportation, and housing facilities provided for employees on the basis of race, color, religion, or national origin, because of habit, local custom, or otherwise. The Bidder agrees that (except where he has obtained identical certification from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause, and that he will retain such certifications in his files.

The nondiscriminatory guidelines as promulgated in Section 202, Executive Order 11246, and as amended by Executive Order 11375 and as amended, relative to Equal Opportunity for all persons and implementations of rules and regulations prescribed by the United States Secretary of Labor are incorporated herein.

Note:

The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

Date _____, 2023. _____

Official Address (including Zip Code): _____ By: _____

(Title)

ATTACH AND INCLUDE AS PART OF PROPOSAL FORM; FAILURE TO DO SO MAY BE CAUSE FOR DISQUALIFICATION OF YOUR BID.

END OF SECTION

SECTION 00452
(Page 1 of 2)

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

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

1. This sworn statement is submitted to the Town of Windermere, Orange County, Florida by _____

(Print individual's Name & Title)

whose business address is _____

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

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

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

a. A predecessor or successor of a person convicted of a public entity crime; or

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

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

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

_____ Neither the entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in management of the entity, nor any affiliate of the entity have been charged with and convicted of a public entity crime subsequent to July 1, 1989.

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

_____ The entity submitting this sworn statement, or one or more of the officers, directors, executives, partners, shareholders, employees, members, or agents who are active in management of the entity, or an affiliate of this entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989. However, there has been a subsequent proceeding concerning the conviction before a Hearing Officer of the State of Florida, Division of Administrative Hearings. The final order entered by the Hearing Officer determined that it was not in the public interest to place the entity submitting this sworn statement on the convicted vendor list. (Please attach a copy of the final order.)

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

(Signature)

Date: _____

Name of Bidder (Contractor)

STATE OF _____

COUNTY OF _____

PERSONALLY, APPEARED BEFORE ME, the undersigned authority, _____

(Name of Individual Signing)

who, after first being sworn by me, affixed his/her signature in the place provided above on this _____

_____ day of _____, 2023.

Notary Public _____

My Commission Expires: _____

END OF SECTION

SECTION 00453

CERTIFICATION OF NONDISCRIMINATORY LABOR PRACTICES

This certification relates to a construction contract proposed by the Town of Windermere, Orange County, Florida.

Equal Opportunity Employment: The Contractor shall not discriminate on the basis of race, color, national origin, gender, age, handicapped status, veteran status, and/or religion in performing the work governed by this contract. The Town is an Equal Opportunity Employer (EOE) and as such encourages all contractors to comply with EOE regulations. Any subcontract the Contractor may enter into shall include this clause with the same degree of application being encouraged.

I am the undersigned prospective construction contractor or subcontractor. I certify that...

- (1) I _____ have/_____ have not participated in a previous contract or subcontract subject to the Equal Opportunity Clause and
- (2) If I have participated in a previous contract or subcontract subject to the Equal Opportunity Clause, I _____ have/ _____ have not filed with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance Programs, or the Equal Employment Opportunity Commission all reports due under the applicable filing requirements.

I understand that, if I have participated in a previous contract or subcontract subject to the Equal Opportunity Clause and have failed to file all reports due under the applicable filing requirements, I am not eligible, and will not be eligible, to have my bid or offer considered, or to enter into the proposed contract or subcontract, unless and until I make an arrangement regarding such reports that is satisfactory to the office where the reports are required to be filed.

I agree that I will obtain identical certifications from prospective lower-tier construction subcontractors when I receive bids or offers or initiate negotiations for any lower-tier construction subcontracts with a price exceeding \$10,000. I also agree that I will retain such certifications in my files.

Date: _____, 2023

By: _____
(Signature of Authorized Official)

(Name of Prospective Construction Contractor or Subcontractor)

(Address of Prospective Construction Contractor or Subcontractor)

(Telephone Number)

(Employer Identification Number)

END OF SECTION

SECTION 00501

**CORPORATE AUTHORITY
TO EXECUTE DOCUMENTS
REQUIRED ONLY WHEN DOCUMENTS ARE EXECUTED BY A CORPORATE EMPLOYEE OTHER
THAN A PRESIDENT OR VICE-PRESIDENT**

I HEREBY CERTIFY that a meeting of the Board of Directors of _____
(Contractor's Corporate Name)

a corporation under the laws of the State of _____, held on the _____ day of
_____, 2023, the following resolution was duly passed and adopted:

"RESOLVED, that _____
(signature of individual) (typed name of individual)

as _____ of the corporation, is hereby authorized to execute
(title)

all documents required to be signed by an officer of the Corporation in order to submit a valid bid,
contract and bond for _____
(Project Name) (Bid No.)

between the Town of Windermere, Orange County, Florida, a municipal corporation, and this corporation,
and that his execution thereof, attested by the Secretary of the corporation and with corporate seal affixed
shall be the official act and deed of this corporation."

I FURTHER CERTIFY that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of the corporation this_
_____ day of _____, 2023.

(CORPORATE SEAL)

(Corporate Secretary)

STATE OF _____

TOWN OF _____

The foregoing instrument was acknowledged before me this _____ day of _____, 2023

by _____ (name of officer or agent, title of officer or
agent), of _____ (name of corporation
acknowledging), a _____ (state or place of incorporation) corporation, on
behalf of the corporation. He/She is personally known to me or has produced identification _____
_____ (type of identification) as identification and did/did not take an oath.

(Notary Public)

My Commission Expires: _____



TOWN OF WINDERMERE

614 Main Street
Windermere, FL 34786
(407) 876-2563 (407) 876-0103 (Fax)

NOTICE OF (INTENT TO) AWARD

Date: _____, 2023

Project: **TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA
BID #2023-02
WEST SECOND AVENUE ROADWAY AND
DRAINAGE IMPROVEMENTS**

Date of Bid Opening: _____ You are notified that your bid dated _____
2023 for the above Contract has been considered and the OWNER, Town of Windermere, Orange
County, Florida, expects to award you a contract for the above listed project.

The Contract Price of your contract is _____

(in words)

(in numbers)

Four (4) copies of each of the following proposed Contract Documents (except Project Manual and Drawings) accompany this Notice of Intent to Award:

- Amendment to the Agreement Between Owner and Contractor
- Performance Bond
- Payment Bond
- Certificate of Insurance and Endorsement - Workman's Compensation
- Certificate of Insurance and Endorsement - Comprehensive General Liability
- Notice of Intent to Award
- Indemnification Agreement

You must comply with the following conditions precedent to the award of the contract within ten (10) days of the date of this Notice of Intent to Award, that is by _____, 2023

1. You must deliver to the OWNER four (4) fully executed counterparts of the Amendment Agreement.
2. You must deliver with the executed Agreement, as Amended, the Payment and Performance Bonds in the form specified in the Bidding Documents.
3. You must provide in writing the correct name and address of the surety which is providing the Payment and Performance Bonds and the correct name and address of the surety's resident agent for service of process in Florida.
4. You must deliver with the executed Agreement completed Certificates and Endorsements of Insurance in the forms specified in the Bidding Documents.

Failure to comply with these conditions within the time specified will entitle the OWNER to consider your Bid abandoned, to annul this Notice of Intent to Award, and to declare our Bid Security forfeited.

Within ten (10) days after you comply with these conditions, the OWNER will return to you one fully signed counterpart of the Agreement with the Contract Documents attached.

<p>OWNER: TOWN OF WINDERMERE</p> <p>_____</p> <p>(Authorized Signature)</p> <p>Robert Smith _____</p> <p>Town Manager _____</p> <p>(title)</p>	<p style="text-align: center;"><u>Acknowledge Receipt of Notice</u></p> <p>CONTRACTOR: _____</p> <p>By: _____</p> <p>(Signature)</p> <p>_____</p> <p>(Print or Type Name)</p> <p>_____</p> <p>(Title)</p> <p>_____</p> <p>(Date)</p>
---	---

END OF SECTION

SECTION 00520

AGREEMENT BETWEEN OWNER AND CONTRACTOR

THIS AGREEMENT is dated as of the _____ day of _____ in the year 2023 by and between the Town of Windermere, Orange County, Florida, a municipal corporation, hereinafter called the OWNER, and _____, hereinafter called the CONTRACTOR.

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

ARTICLE 1. WORK

CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

TOWN OF WINDERMERE ORANGE COUNTY, FLORIDA

BID # 2023-02

WEST SECOND AVENUE ROADWAY AND DRAINAGE IMPROVEMENTS

The project includes roadway, drainage infrastructure and potable water utility construction , as described in the bid form and other contract documents.

ARTICLE 2. ENGINEER

The Project has been designed by MGEC/Michael Galura Engineering Consultants, LLC (PE) who is hereinafter called ENGINEER and who 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 3. CONTRACT TIME

- 3.1 The Work shall be Finally Completed and ready for final payment in accordance with paragraph 14.07 of the General Conditions within **five hundred forty-nine (549)** consecutive calendar days from the effective date of the Notice to Proceed as provided in paragraph 2.3 of the General Conditions (Commencement of Contract Time; Notice to Proceed). A mobilization period is being provided within the above one-hundred fifty (150) day time of completion to provide advance time for materials (i.e., inlets, manholes, pipe, etc.) ordering and shipment.
- 3.2 As provided in paragraphs 3.1 and 3.2 above, the Work will be substantially completed on or before **Tuesday, June 3, 2025**, and completed and ready for final payment on or before **Tuesday, July 3, 2025**.
- 3.3 OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in paragraph 3.3 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions (Final Payment and Acceptance). They also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof,

OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER Five Hundred dollars (\$500.00) for each day that expires beyond the time specified in paragraph 3.3 above for final completion (readiness for final payment).

ARTICLE 4. CONTRACT PRICE

- 4.1 OWNER shall pay CONTRACTOR for performance of the Work in accordance with the Contract Documents in current funds at the unit prices and lump sum prices (if any) presented on the Bid Form, Schedule of Bid Items attached to this Agreement.
- 4.2 The CONTRACTOR agrees that the Contract Price is a stipulated sum except with regard to those items in the Bid which are subject to unit prices and agrees to perform all of the WORK as described in the CONTRACT DOCUMENTS, subject to additions and deductions by Change Order, and comply with the terms therein for the prices stated in the attached Bid Schedule of the Bid Form.

ARTICLE 5. PAYMENT PROCEDURES

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

- 5.1 *Progress Payments.* OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR'S Applications for Payment as recommended by ENGINEER on or before the tenth day after the end of each month for which payment is requested as provided in paragraphs 5.1.1 and 5.1.2 below. All such progress payments will be on the basis of the progress of the Work measured by the Schedule of Values established in paragraph 2.9 of the General Conditions (Finalizing Schedules) (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.
- 5.1.1 Prior to Substantial Completion (paragraph 3.3 above), progress payments will be made in an amount equal to the percentage indicated below, but, in each case, less the aggregate of payments previously made and less such amounts as ENGINEER shall determine, or OWNER may withhold, in accordance with paragraph 14.7 of the General Conditions (Review of Application for Progress Payments).

Ninety percent (90%) of the value of Work completed, and ninety percent (90%) of the value of materials and equipment not incorporated into the Work but delivered and suitably stored and accompanied by documentation satisfactory to OWNER as provided in paragraph 14.2 of the General Conditions; with the balance of the value of the Work being retainage. At the sole discretion of the Owner, after fifty percent (50%) of the Work is completed, further monthly progress payments may be made in full, with no additional retainage, provided that: (a) Contractor is making satisfactory progress, and (b) Contractor is in full compliance with the currently accepted progress schedule, and (c) there is no specific cause for greater withholding. However, the Owner may subsequently resume retaining a percentage (not-to-exceed the amount allowed by Florida Statutes) of the value of Work completed and materials delivered if, in the sole determination of the Owner, the Contractor is not performing according to the Contract Documents or not complying with the current progress schedule.

- 5.2 Final Payment - Upon final completion and acceptance of the Work in accordance with Paragraph 14.13 of the General Conditions (Final Payment and Acceptance), as supplemented, OWNER shall pay Contractor an amount sufficient to increase total payments to 100 percent of the Contract Price. However, not less than two percent (2%) of the contract price shall be retained until Record Drawings, specifications, addenda, modifications and shop drawings, including any required manufacturers instructional and parts manuals, are delivered to and accepted by the ENGINEER.

ARTICLE 6. INTEREST

All monies not paid when due as provided in Article 14 of the General conditions shall bear interest pursuant to Section 218.70, Florida Statutes.

ARTICLE 7. CONTRACTOR'S REPRESENTATIONS

In order to induce OWNER to enter into this Agreement CONTRACTOR makes the following representations:

- 7.1 CONTRACTOR has examined and carefully studied the Contract Documents (including the Addenda listed in paragraph 8) and the other related data identified in the Bidding Documents including "technical data."
- 7.2 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, performance and furnishings of the Work.
- 7.3 CONTRACTOR is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, performance and furnishing of the Work.
- 7.4 CONTRACTOR has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities) which have been identified in Section 00300 "Information Available to Bidders". CONTRACTOR accepts the determination set forth in paragraph SC-4.2 of the Supplementary Conditions of the extent of the "technical data" contained in such reports and drawings upon which CONTRACTOR is entitled to rely as provided in paragraph 4.2 of the General Conditions. CONTRACTOR acknowledges that such reports and drawings are not Contract Documents and may not be complete for CONTRACTOR's purposes. CONTRACTOR acknowledges that OWNER and ENGINEER do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Contract Documents with respect to Underground Facilities at or contiguous to the site.
- 7.5 CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all such additional supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect costs, progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR and safety precautions and programs incident thereto. CONTRACTOR does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the performance and furnishing of the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents.
- 7.6 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.

- 7.7 CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies and data with the Contract Documents.
- 7.8 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, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
- 7.9 CONTRACTOR shall perform work with a value of not less than fifty percent (50%) of the Contract Price with his own forces.

ARTICLE 8. CONTRACT DOCUMENTS

The Contract Documents which comprise the entire agreement between OWNER and CONTRACTOR concerning the Work are attached to this Agreement, made a part hereof and consist of the following:

- 8.1 This Amended Agreement (Section 00520) (pages 1 to 7, inclusive).
- 8.2 Exhibits to this Amended Agreement (sheets to , inclusive).
- 8.3 Performance Bond, Payment Bonds and Certificate of Liability Insurance (Sections 00610, 00611 and 00620, respectively).
- 8.4 Notice to Award and Notice to Proceed (Sections 00510 and 00550, respectively).
- 8.5 General Conditions (Section 00700 – EJCDC - ASCE - ACEC Document STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT (2013 Edition) as modified and supplemented.
- 8.6 Supplementary Conditions (Section 00800).
- 8.7 Project Manual bearing the general title “**TOWN OF WINDERMERE, ORANGE COUNTY, FLORIDA, BID # 2023-02, WEST SECOND AVENUE ROADWAY AND DRAINAGE IMPROVEMENTS**”, and dated December 2017” and consisting of Divisions listed in the Table of Contents thereof.
- 8.8 Drawings consisting of a cover sheet and the sheets bearing the following general title:
TOWN OF WINDERMERE, ORANGE COUNTY, FLORIDA
BID #2023-02
WEST SECOND AVENUE ROADWAY AND DRAINAGE IMPROVEMENTS
- 8.9 Addenda numbers 1 to 3, inclusive.

- 8.10 CONTRACTOR's Bid Documents
- 8.11 Documentation submitted by CONTRACTOR prior to Notice of Award.
- 8.12 The following which may be delivered or issued after the Effective Date of the Agreement and are not attached hereto: All applicable provisions of State and Federal Law, all Written Amendments and other documents amending, modifying or supplementing the Contract Documents pursuant to paragraphs and the General Conditions.

The documents listed in paragraphs 8.2 et seq. above are attached to this Agreement (except as expressly noted otherwise above).

There are no Contract Documents other than those listed above in this Article 8. The Contract Documents may only be amended, modified or supplemented as provided in Article 3 of the Standard General Conditions.

ARTICLE 9. PUBLIC RECORDS

Pursuant to Florida Statute 287.05701, Owner is prohibited from requesting documentation of or considering a vendor's social, political, or ideological interests when determining if the vendor is a responsible vendor. Owner may not give preference to a vendor based on the vendor's social, political, or ideological interests.

- 9.1 To the extent Contractor is acting on behalf of the Town as provided under Subsection 119.011(2) of the Florida Statutes, Contractor shall:
- 9.2 Keep and maintain public records required by the Town to perform the services under this Agreement.
- 9.3 Upon request from the Town's custodian of public records, provide the Town with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the costs provided in Chapter 119 of the Florida Statutes or otherwise provided by law.
- 9.4 Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the Agreement term and following completion of the Agreement if the Contractor does not transfer the records to the Town.
- 9.5 Upon completion of the Agreement, transfer, at no cost, to the Town all public records in possession of Contractor or keep and maintain public records required by the Town to perform the service. If the Contractor transfers all public records to the Town upon completion of the Agreement, the Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the Contractor keeps and maintains public records upon completion of the Agreement, the Contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the Town, upon request from the Town's custodian of public records, in a format that is compatible with the information technology systems of the Town.
- 9.6 If the Contractor fails to provide the public records to the Town within a reasonable time the Contractor may be subject to penalties under Section 119.10 of the Florida Statutes. Further, the Town may exercise any remedies at law or in equity, including, without limitation, the right to (i) impose sanctions and assess financial consequences, (ii) withhold and/or reduce payment, and (iii) terminate this Agreement in accordance with the terms hereof.

- 9.7 Contractor shall defend, at its own cost, indemnify, and hold harmless the Town, their officers, directors, and employees from and against all claims, damages, losses, and expenses, (including but not limited to fees and charges of attorneys or other professionals and court and arbitration or other dispute resolution costs) arising out of or resulting from Contractor's failure to comply with the terms of this Section.
- 9.8 IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS AGREEMENT, CONTACT OWNER'S CUSTODIAN OF PUBLIC RECORDS FOR THIS PROJECT, , D. BURKHALTER AT 407-876-2563 X 5323, DBURKHALTER@TOWN.WINDERMERE.FL.US , 614 MAIN STREET, WINDERMERE, FLORIDA 34786.

ARTICLE 10. MISCELLANEOUS

- 10.1 Terms used in this Amended Agreement which are defined in Article 1 (Definitions) of the General Conditions shall have the meanings indicated in the General Conditions, as modified in the Supplementary Conditions.
- 10.2 No assignment by a party hereto of any rights under, or interests in, the Contract Documents 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. Notwithstanding the foregoing, the Owner may assign this contract to the State of Florida or any political subdivision, municipality, special district or authority thereof without Contractor's consent and without recourse.
- 10.3 OWNER and CONTRACTOR each binds himself, his partners, successors, assigns and legal representatives to the other party hereto, his partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.
- 10.4 Waiver of Jury Trial; Legal Costs. It is mutually agreed by and between the Contract and Owner that each of the parties do hereby waive trial by jury in any action, proceeding or claim which may be brought by either of the parties hereto against the other on any matters concerning or arising out of this Agreement.
- 10.5 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.

IN WITNESS WHEREOF, the parties hereto have signed this Amended Agreement. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or by ENGINEER on his behalf.

This Agreement will be effective on _____, 2023.

OWNER:

CONTRACTOR:

**THE TOWN OF WINDERMERE
IN ORANGE COUNTY, FLORIDA**

By: _____
(Authorized Signature)

By: _____

(Title)

Name: _____
(Type)

Title: _____

(SEAL)

Attest: _____

Attest: _____

Title: _____

Title: _____

(If CONTRACTOR is a corporation, attach evidence of authority to sign).

FOR USE AND RELIANCE ONLY BY THE TOWN OF WINDERMERE, ORANGE COUNTY, FL	
Address for giving notices: (Owner) _____ _____ _____ (Phone) _____	Address for giving notices: (Contractor) _____ _____ _____ _____
Approved as to form and legality _____, 2023. _____ Town Attorney Town of Windermere	Florida State Contractor's License No. _____ Agent for Service of Process: _____ _____

SECTION 00540

INDEMNIFICATION AGREEMENT

Town: **TOWN OF WINDERMERE, ORANGE COUNTY, FLORIDA**

Engineer: **MICHAEL GALURA ENGINEERING CONSULTANTS, LLC
ORLANDO, FLORIDA**

Contract
Description: **TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA
BID #2023-02
WEST SECOND AVENUE ROADWAY AND
DRAINAGE IMPROVEMENTS**

Hold Harmless/Indemnification: The Contractor hereby agrees that 5 percent of its total bid price for this contract represents the consideration which is being paid to the Contractor for this Hold Harmless / Indemnification of the Town and Town's Engineer. To the fullest extent permitted by laws and regulations, for the above referenced consideration included in Contractor's total bid price, the Contractor shall defend, indemnify, and hold harmless the Town and Town's Engineer (Michael Galura Engineering Consultants, LLC), its officers, directors, agents, guests, invitees, and employees from and against all claims, damages, losses, and expenses, direct, indirect, or consequential (including but not limited to fees and charges of engineers, architects, attorneys, and other professionals and court and arbitration costs) arising out of or resulting from any acts of commission, omission or negligence in the performance of the Work by the Contractor, any subcontractor, or any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable.

In any and all claims against the Town or Engineer, or any of their officers, directors, agents, or employees by any employee of the Contractor, any subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, this indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Contractor or any such subcontractor or other person or organization under workers' or workmen's compensation acts, disability benefit acts, or other employee benefit acts, nor shall this indemnification obligation be limited in any way by any limitation on the amount or type of insurance coverage provided by the Town or Engineer, the Contractor, or any of his subcontractors.

Subrogation: The Contractor and his subcontractors shall require their insurance carriers, with respect to all insurance policies, to waive all rights of subrogation against the Town and the Town's Engineer.

Nothing in this Indemnification Agreement shall be deemed to affect the rights, privileges and immunities of the Town as set forth in Florida Statutes 768.28.

The Indemnifications contained herein shall survive the expiration or earlier termination of the Contract Agreement.

Name of Organization (Contractor)

By: _____
Owner or Officer

Date

END OF SECTION

SECTION 00550
NOTICE TO PROCEED

(Contractor)

DATE: _____

RE: Notice to Proceed on Project:

TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA
BID #2022-XXX
WEST SECOND AVENUE ROADWAY AND
DRAINAGE IMPROVEMENTS

You are notified that the Contract Time under the above contract will commence to run on _____, 2022. On that date you are to start performing the Work and your other obligations under the Contract Documents. Based on the Contract Time stated in the Agreement, we calculate that the dates of Substantial Completion and Final Completion are _____, 2024 and _____, 2024, respectively.

Work at the site must be started by _____, 2023 as indicated in the Contract Documents.

Enclosed is one (1) set of Conformed Drawings and one (1) bound copy of the Conformed Project Manual.

<p>OWNER: TOWN OF WINDERMERE, ORANGE COUNTY, FL</p> <p>_____</p> <p style="text-align: center;">(Authorized Signature)</p> <p style="text-align: center;">Robert Smith</p> <p style="text-align: center;">(print or type name)</p> <p style="text-align: center;">Town Manager</p> <p style="text-align: center;">(Title)</p> <p>Acct. No.: _____</p>	<p style="text-align: center;"><u>Acknowledge Receipt of Notice</u></p> <p>CONTRACTOR: _____</p> <p>By: _____</p> <p style="text-align: center;">(Signature)</p> <p style="text-align: center;">_____</p> <p style="text-align: center;">(print or type name)</p> <p style="text-align: center;">_____</p> <p style="text-align: center;">(Title)</p> <p style="text-align: center;">_____</p> <p style="text-align: center;">(Date)</p>
---	--

Copy to Engineer (Use Certified Mail, Return Receipt Requested)

END OF SECTION

SECTION 00600

100% PERFORMANCE AND PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, that _____,
_____, Florida, hereinafter referred to
as the CONTRACTOR, as Principal, and _____,
_____, State of Florida, hereinafter
called SURETY, as Surety, are held and firmly bound unto the Town of Windermere, Orange County,
Florida, A Political Subdivision of Orange County, State of Florida, as obligee in the full and just sum of
\$ _____,
_____ DOLLARS, representing one hundred percent
(100%) of the amount of the total Contract Price, lawful money of the United States of America, to the
payment of which sum, well and truly to be made, the CONTRACTOR and SURETY bind themselves,
their representatives, and each of their heirs, executors, administrators, successors and assigns, jointly
and severally, firmly by these presents.

WHEREAS, the CONTRACTOR has entered into a certain written Contract with the "TOWN"
dated the _____ for the _____
_____ with the conditions and provisions as are further described in the aforementioned Contract, which
Contract is by reference made a part hereof for the purpose of explaining this Bond.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS such that if Contractor shall
fully, promptly and faithfully perform said Contract and all obligations thereunder, including all obligations
imposed by the Contract Documents (which include the Notice to Bidders, Instructions to Bidders,
Proposal Bid Form, General Conditions and Detail Specifications, Form(s) of Contract Bond(s), Plans and
Specifications, and such alterations thereof as may be made as provided for therein) and shall promptly
make payments to all claimants for any and all labor and material used or reasonably required for use or
furnished in connection with the performance of said Contract, and shall perform all other covenants and
obligations of this Bond, then this obligation shall be void; otherwise, it shall remain in full force and effect.

1. The undersigned shall indemnify and save harmless said Owner against and from all
costs, expenses and damages, including litigation costs and attorney's fees arising out of,
or in connection with the neglect, default or want of care or skill, including patent
infringement on the part of said Contractor, his agents, servants or employees in the
execution or performance of said Contract.

2. The undersigned shall promptly make payment to all persons supplying services, labor, material or supplies used directly or indirectly by said Contractor, or any subcontractor or subcontractors, in the prosecution of the work provided for in said Contract.
3. The undersigned agree to promptly pay to the Owner any difference between the sum to which the Contractor would be entitled on the completion of the Contract and the sum which the Owner may be obligated to pay for the completion of said work by Contract or otherwise, including any damages, direct or indirect, or consequential, which the Owner may sustain by reason of the failure of the Contractor to properly and promptly perform and abide by all of the provisions of said Contract.
4. The undersigned covenant and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder, or the specifications accompanying the same shall in any way affect their obligation under this Bond and they do hereby expressly waive notice of any such change, extension of time, alteration or addition.
5. Subject to the Owner's priority, any claimant furnishing labor or materials for said job, whose claim remains unpaid for more than ninety (90) days after the due date, shall have a direct right of action against the Principal and Surety under this obligation, after the written notice of the performance or work, labor or delivery of such materials and non-payment thereof to the Contract.
6. The Contractor shall save the Town harmless from any and all damages, expenses and costs which may arise by virtue of any defects in said work or materials within a period of two years from the date of initial acceptance. The Principal and Surety acknowledges that Section 255.05 of the Florida Statutes states:

Any person entering into a formal contract with the State or any county, city, town, or political subdivision thereof, or other public authority for the construction of any public building, for the prosecution and completion of any public work, or for repairs upon any public building or public work shall be required, before commencing the work, to execute a payment and performance bond with a surety insurer authorized to do business in this state as surety.

A claimant, except a laborer, who is not in privity with the Contractor and who has not received payment for his labor, materials, or supplies shall, within forty-five (45) days after beginning to furnish labor, materials, or supplies for the prosecution of the work, furnish the Contractor with a notice that he intends to look to the bond for protection.

A claimant who is not in privity with the Contractor who has not received payment for his labor, materials, or supplies shall, within ninety (90) days after the performance of the labor or after complete delivery of the materials or supplies, deliver to the Contractor and to the Surety written notice of the performance of the labor or delivery of the materials or supplies and of the non-payment.

No action for the labor, materials, or supplies may be instituted against the Contractor or the Surety unless both notices have been given.

No action shall be instituted against the Contractor or the Surety on the bond after one (1) year from the performance of the labor or completion of delivery of the materials or supplies.

The payment provisions of all bonds furnished for public work contracts described above shall, regardless of form, be construed and deemed statutory bond provisions, subject to all requirements as stated above.

All bonds executed pursuant to this section shall make reference to this section by number, and shall contain reference to the notice and time limitation provisions of this section.

The above statutory requirement language shall not reduce or otherwise limit the Contractor's and Surety's liabilities and obligations to the Town as otherwise provided herein.

Signed and sealed this the ____ day of _____, 2023.

WITNESS:

_____ (SEAL)
_____ (SEAL)

WITNESS:

_____ (SEAL)
_____ (SEAL)

COUNTERSIGNED:

(Title)

STATE OF)
COUNTY OF) ss
TOWN OF)

Before me, a Notary Public duly commissioned, qualified and acting personally, appeared:

to me well known, who being by me first duly sworn upon oath says that he is the attorney-in-fact for _____ as Surety, and that he has been authorized by said Surety to execute the foregoing Performance and Payment Bond on behalf of the (Contractor) Principal named therein in favor of the Owner.

Subscribed and sworn to before me this ____ day of _____; A.D., 2023.

Notary Public, State of Florida

My Commission expires:

END OF SECTION

SECTION 00611

CONSTRUCTION PAYMENT BOND

**TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

BID #2023-02

**WEST SECOND AVENUE ROADWAY AND
DRAINAGE IMPROVEMENTS**

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

Secretary

(Corporate Seal)

Attach a Certificate of Insurance and/or Policy Binder indicating that Contractor has obtained Comprehensive General Liability, Automobile Liability, Worker's Compensation Insurance and all other required insurance.

(SURETY COMPANY LETTERHEAD)

_____, 2023

RE: Authority to Date Bond and Power of Attorney

Bond No.: _____

Project Name:

**TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

BID # 2023-02

**WEST SECOND AVENUE ROADWAY AND
DRAINAGE IMPROVEMENTS**

Dear Sir/Madam:

Please be advised that as Surety, on the above referenced bond, executed in your behalf, for the captioned project, you are hereby authorized, to date the bonds and the powers of attorney concurrent with the date of the contract.

Best Regards,

(Surety Company's Name)

Attorney-in-Fact and
Florida Resident Agent

END OF SECTION

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YY):

PRODUCER:

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGES AFFORDED BY THE POLICIES BELOW

Phone No.

COMPANIES AFFORDING COVERAGE

COMPANY
A

INSURED:

COMPANY
B

COMPANY
C

COMPANY
D

COVERAGES

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED, NOTWITHSTANDING ANY REQUIREMENT., TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES, LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EFFECTIVE DATE (MM/DD/YY)	LIMITS	
	GENERAL LIABILITY				GENERAL AGGREGATE	\$ 2,000,000
	<input type="checkbox"/> COMMERCIAL GENERAL LIABILITY				PRODUCTS - COMP/OP AGG	\$ 1,000,000
	<input type="checkbox"/> ~ CLAIMS MADE ~ OCCUR				PERSONAL & ADVERT. INJURY	\$ 1,000,000
	<input type="checkbox"/> OWNER'S & CONTRACTORS PROT				EACH OCCURRENCE	\$ 1,000,000
					FIRE DAMAGE (Any one fire)	\$ 500,000
					MED EXP (Any one person)	\$ 10,000
	AUTOMOBILE LIABILITY				COMBINED SINGLE LIMIT	\$ 1,000,000
	<input type="checkbox"/> ANY AUTO				BODILY INJURY (Per person)	\$ 1,000,000
	<input type="checkbox"/> ALL OWNED AUTOS				BODILY INJURY (Per accident)	\$ 1,000,000
	<input type="checkbox"/> SCHEDULED AUTOS				PROPERTY DAMAGE	\$ 1,000,000
	<input type="checkbox"/> HIRED AUTOS					
	<input type="checkbox"/> NON-OWNED AUTOS					
	GARAGE LIABILITY				AUTO ONLY - EACH ACCIDENT	\$
	<input type="checkbox"/> ANY AUTO				OTHER THAN AUTO ONLY:	
					EACH ACCIDENT	\$
					AGGREGATE	\$
	EXCESS LIABILITY				EACH OCCURRENCE	\$ 1,000,000
	<input type="checkbox"/> UMBRELLA FORM				AGGREGATE	\$ 2,000,000
	<input type="checkbox"/> OTHER THAN UMBRELLA FORM					\$
	WORKERS COMPENSATION & EMPLOYERS LIABILITY				<input checked="" type="checkbox"/> WC STATUTORY LIMITS	
					<input type="checkbox"/> OTHER	
	THE PROPRIETOR / PARTNERS / EXECUTIVE OFFICERS ARE:	INCL <input type="checkbox"/>			EL EACH ACCIDENT	\$ 100,000
		EXCL <input type="checkbox"/>			EL DISEASE - POLICY LIMIT	\$ 500,000
					EL DISEASE - EACH EMPLOYEE	\$ 100,000
					EMPLOYERS LIABILITY	\$ 1,000,000
	OTHER					
	<input type="checkbox"/> BUILDERS RISK COVERAGE				AT ANY ONE LOCATION	\$ 25,000
	<input type="checkbox"/> EXPLOSION, COLLAPSE, & UNDERGROUND COVERAGES				AT ANY ONE LOCATION	\$1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES / SPECIAL TERMS:

CERTIFICATE HOLDER, OFFICERS, EMPLOYEES, ENGINEERS & CONSULTANTS ARE LISTED AS AN ADDITIONAL INSURED AS RESPECTS TO GENERAL LIABILITY, AUTOMOBILE, AUTOMOBILE LIABILITY AND BUILDERS RISK.

ADDITIONAL INSURED:

MICHAEL GALURA ENGINEERING CONSULTANTS

CERTIFICATE HOLDER:

CANCELLATION:
SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL ENDEAVOR TO MAIL 5 (CALENDAR) DAYS WRITTEN NOTICE OF THE CERTIFICATE HOLDER NAMED TO THE LEFT. BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE COMPANY, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE:

SECTION 00621

CERTIFICATE OF SUBSTANTIAL COMPLETION

OWNER's Project No. _____

ENGINEER's Project No. _____

**TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

BID # 2023-02

**WEST SECOND AVENUE ROADWAY AND
DRAINAGE IMPROVEMENTS**

CONTRACTOR _____

Contract For _____

Contract Date _____

This Certificate of Substantial Completion applies to all Work under the Contract Documents or to the following specified parts thereof:

To _____
Owner

And To _____
Contractor

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR and ENGINEER, and that Work is hereby declared to be substantially complete in accordance with the Contract Documents on

Date of Substantial Completion

A tentative list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include an item in it does not alter the responsibility of CONTRACTOR to complete all the Work in accordance with the Contract Documents. When this Certificate applies to a specified part of the Work the items in the tentative list shall be completed or corrected by CONTRACTOR within _____ days of the above date of Substantial Completion.

The date of Substantial Completion is the date upon which all guarantees and warranties begin, except as follows:

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities and insurance shall be as follows:

RESPONSIBILITIES:

OWNER

CONTRACTOR

The following documents are attached to and made a part of this Certificate:

Executed by ENGINEER on _____, 2025.

(Engineer)

By: _____

The CONTRACTOR accepts this Certificate of Substantial Completion on:

_____, 2025.

(Contractor)

By: _____

END OF SECTION

* Adjustment as of
Change Order No. _____

(Short title of Change Order)

SECTION 00622
CHANGE ORDER FORM
TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA
BID # 2023-02

**WEST SECOND AVENUE ROADWAY AND
DRAINAGE IMPROVEMENTS**

DATE: _____

CHANGE ORDER NO.: _____
CONTRACTOR: _____

OWNER: TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA

AGREEMENT DATE: _____

The following changes are hereby made to the CONTRACT DOCUMENTS:

Original CONTRACT PRICE	\$ _____
Current CONTRACT PRICE ADJUSTED by previous CHANGE ORDER*	\$ _____
Net (Increase)(Decrease) Resulting from this CHANGE ORDER	\$ _____
The current CONTRACT PRICE including this CHANGE ORDER	\$ _____
ORIGINAL CONTRACT TIME: _____ Date _____	
Current CONTRACT TIME adjusted by previous CHANGE ORDERS*	Date _____
Net (Increase)(Decrease) Resulting from this CHANGE ORDER	Days _____
Current CONTRACT TIME Including this CHANGE ORDER	Date _____

CHANGES ORDERED:

I. GENERAL

This Change Order is necessary to cover changes in the Work to be performed under this Contract. The GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, SPECIFICATIONS and all parts of the Project Manual listed in Article 1, Definitions, of the GENERAL CONDITIONS apply to and govern all Work under this Change Order.

Change Order No. _____

II. REQUIRED CHANGES

III. JUSTIFICATION

IV. PAYMENT

V. NARRATIVE OF NEGOTIATIONS

VI. APPROVAL AND CHANGE AUTHORIZATION

Acknowledgements:

The aforementioned change, and work affected thereby, is subject to all provisions of the original contract not specifically changed by this Change Order; and,

It is expressly understood and agreed that the approval of the Change Order shall have no effect on the original contract other than matters expressly provided herein.

CONTRACTOR acknowledges, by its execution and acceptance of this Change Order, that the adjustments in Contract Price and Time shown hereon constitute full and complete compensation and satisfaction for all costs and modifications of performance time incurred by the CONTRACTOR as a result of this Change Order. No other claim for increased costs of performance or modifications of time will be granted by the OWNER for the Work covered by this Change Order. The CONTRACTOR hereby waives and releases any further claims for cost or time against the OWNER arising from or relating to the matters or Work set forth or contemplated by this Change Order.

Change Order Request by: Town of Windermere, Orange County, Florida

Change(s) Ordered by: _____

RECOMMENDED BY: _____

ACCEPTED BY: _____

Michael Galura Engineering Consultants, LLC
Engineer

By: _____
Signature

Date: _____

Title: _____

APPROVED BY:

Town of Windermere, Orange County, Florida
Owner

By: _____
Signature

Contractor

By: _____
Signature

Date: _____

Title: _____

Date

Change Order No. _____

END OF SECTION

NOTE: FORM (00623) WILL BE PROVIDED TO CONTRACTOR AT THE PRE-CONSTRUCTION CONFERENCE IN MICROSOFT WORD FORMAT ON CD OR FLASH DRIVE.

PERIODIC ESTIMATE FOR PARTIAL PAYMENT

Owner: _____ Project Name: _____ Project No: _____	Name of Contractor: _____ Address: _____ Contractor's Project No.: _____	FOR PAY PERIOD _____ to _____	PERIODIC ESTIMATE NO.
--	--	--	-----------------------------

2. Schedule of Contract Change Orders				Additions to Original Contract Price		Deductions From Cont. Price As Shown On Change Orders (7)
Contract Change Order		Related Item	Description (4)	Cost of Items Added By C.O. (5)	Cost of C.O. Items Completed to Date (6)	
No.	Date (2)					
TOTALS						

3.	ANALYSIS OF ADJUSTED Contract AMOUNT TO DATE	
	A. Original Contract Amount (Subtotal Col. 5 PART 1)	\$
	B. Plus: Additions Scheduled in Column 5 Above.	+
	C. Less: Deductions Scheduled in Column 7 Above.	-
	D. Adjusted Contract Amount to Date.	\$
4.	ANALYSIS OF Work PERFORMED	
	A. Cost of Original Contract Work Performed to Date (Subtotal Col. 7 PART 1)	\$
	B. Extra Work Performed to Date (Total Col. 6 above)	\$
	C. Total Cost of Work Performed to Date	\$
	D. Less: Amount Retained: <input type="checkbox"/> % Cost of Work Performed to Date (Line 4c) <input type="checkbox"/> Fixed Amount	-
	F. Net Amount Earned on Contract Work to Date.	\$
	Add: Material Stored at Close of this Period (90% of _____)	+
	G. Subtotal of E. and F.	\$
	H. Less: Amount of Previous Certificates for Payment.	-
	I. Balance Due this Payment.	\$

5. CERTIFICATE OF CONTRACTOR

According to the best of my knowledge and belief, I certify that all items and amount shown on the face of the Periodic Estimate for partial Payment are correct; that all Work has been performed and/or material supplied in full accordance with the requirements of the referenced Contract, and/or duly authorized deviations, substitutions, alternations, and/or additions; that are foregoing is a true and correct statement of the Contract account up to and including the last day of the period covered by this Periodic Estimate that no part of the "Balance Due This Payment" has been received, and that the undersigned and his Sub Contractors have - (check applicable line).

Complied with all the labor provisions of said Contract.

Complied with all the labor provisions of said Contract except in those instances where an honest dispute exists with respect to said labor provisions.

Contractor: _____ **By:** _____ **Date:** _____

6. CERTIFICATION OF ARCHITECT OR ENGINEER

I certify that I have checked and verified the above and foregoing Periodic Estimate for Partial Payment; that to the best of my knowledge and believe it is a true and correct statement of Work performed and/or material supplied by the Contractor;

that all Work and/or material included in this Periodic Estimate has been inspected by me and/or duly authorized representative or assistants and that it has been performed and/or supplied in full accordance with requirements of the referenced Contract;

all Work and/or material included in this Periodic Estimate has been inspected and verified by the Town's Field Representative.

And that partial payment claimed and requested by the Contractor is correctly computed on the basis of Work performed and/or material supplied to date.

Company Name: _____ **Signed:** _____ **Date:** _____
(Architect or Engineer)

7. PREPAYMENT CERTIFICATION BY FIELD ENGINEER

I certify that to the best of my knowledge and belief that all Work and/or materials under the Contract has been inspected by me and that it has been performed and or supplied in full accordance with the requirements of the Contract. Further, I have checked this estimated against the notes and reports of my inspections of the project, and the periodic reports submitted by the Architect/Engineer. It is my opinion that the statement of Work performed and/or materials supplied is accurate, that the Contractor is observing the requirements of the Contract, and that the Contractor should be paid the amount requested above.

Town's Field Representative: _____ **Date:** _____

8. APPROVED FOR PAYMENT

By: _____ **Date:** _____

SECTION 00640A

**RELEASE OF LIEN
(PROGRESS PAYMENT)**

**WAIVER OF RIGHT TO CLAIM AGAINST
THE PAYMENT BOND (PROGRESS PAYMENT)
(Section 255.05)**

The undersigned, in consideration of the sum of \$ _____, hereby waives its right to claim against the payment bond for labor, services, or materials furnished through (insert date) to _____ (insert the name of your customer) on the job of _____ (insert name of the owner), for improvements to the following described project:

(Description of project)

This waiver does not cover any retention or any labor, services, or materials furnished after the date specified.

DATED on _____, 2025.

(Claimant)

By: _____

END OF SECTION

SECTION 00640B

**RELEASE OF LIEN
(FINAL PAYMENT)**

**WAIVER OF RIGHT TO CLAIM AGAINST
THE PAYMENT BOND (FINAL PAYMENT)
(Section 255.05)**

The undersigned, in consideration of the final payment in the amount of \$_____ hereby waives its right to claim against the payment bond for labor, services, or materials furnished to _____
_____ (insert the name of your customer) on the job of
_____ (insert name of the owner), for improvements to the following described project:

(Description of Project)

DATED on _____, 2025.

(Claimant)

By: _____

END OF SECTION

SECTION 00650

FINAL CONTRACTOR'S AFFIDAVIT

STATE OF _____
COUNTY OF _____

Before me, the undersigned authority, personally appeared _____ who, after being duly sworn, deposes and says that:

1. Affiant is the _____ of _____ hereinafter called "Contractor" and as such makes this affidavit upon personal knowledge.
2. This affidavit is made pursuant to Section 713.06(3)(d)(1) Florida Statutes for the purpose of inducing final payment from to Contractor for work done at (legal description):

pursuant to the contract or invoice dated _____.

3. All laborers, material, men and subcontractors who worked for Contractor under said contract have been paid in full, except for those listed below:

Contractor
By: _____
Print Name: _____
Print Title _____
Address: _____

SWORN TO and subscribed before me this _____ day of _____, 2025, by _____ (name), as _____ (title) of _____ (name of corporation), a (State) corporation, on behalf of the corporation. He/She [please check as applicable] /_____/ is personally known to me, or has produced /_____/ his/her _____ (state) driver's license, or /_____/ his/her _____ (type of identification) as identification.

(Signature)

(Printed Name)
NOTARY PUBLIC, STATE OF _____

(Commission Expiration Date)

END OF SECTION

SECTION 00670

CERTIFICATE OF OWNER'S ATTORNEY

I, the undersigned, _____, the duly authorized and acting legal representative of the Town of Windermere in Orange County, Florida do hereby certify as follows:

I have examined the attached contract(s) and surety bonds and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with the terms, conditions, and provisions thereof.

Signed: _____(SEAL)

Date: _____

END OF SECTION

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by



Issued and Published Jointly by



Endorsed by



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

To prepare supplementary conditions that are coordinated with the General Conditions, use EJCDC's Guide to the Preparation of Supplementary Conditions (EJCDC® C-800, 2013 Edition). The full EJCDC Construction series of documents is discussed in the Commentary on the 2013 EJCDC Construction Documents (EJCDC® C-001, 2013 Edition).

Copyright © 2013:

National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314-2794
(703) 684-2882
www.nspe.org

American Council of Engineering Companies
1015 15th Street N.W., Washington, DC 20005
(202) 347-7474
www.acec.org

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
(800) 548-2723
www.asce.org

The copyright for this document is owned jointly by the three sponsoring organizations listed above. The National Society of Professional Engineers is the Copyright Administrator for the EJCDC documents; please direct all inquiries regarding EJCDC copyrights to NSPE.

NOTE: EJCDC publications may be purchased at www.ejcdc.org, or from any of the sponsoring organizations above.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

	Page
Article 1 – Definitions and Terminology.....	1
1.1 Defined Terms	1
1.2 Terminology.....	5
Article 2 – Preliminary Matters	6
2.1 Delivery of Bonds and Evidence of Insurance.....	6
2.2 Copies of Documents.....	6
2.3 Before Starting Construction	6
2.4 Preconstruction Conference; Designation of Authorized Representatives	7
2.5 Initial Acceptance of Schedules	7
2.6 Electronic Transmittals	7
Article 3 – Documents: Intent, Requirements, Reuse	8
3.1 Intent.....	8
3.2 Reference Standards	8
3.3 Reporting and Resolving Discrepancies	8
3.4 Requirements of the Contract Documents.....	9
3.5 Reuse of Documents	10
Article 4 – Commencement and Progress of the Work	10
4.1 Commencement of Contract Times; Notice to Proceed	10
4.2 Starting the Work	10
4.3 Reference Points	10
4.4 Progress Schedule	10
4.5 Delays in Contractor’s Progress	11
Article 5 – Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental Conditions	12
5.1 Availability of Lands	12
5.2 Use of Site and Other Areas	12
5.3 Subsurface and Physical Conditions	13
5.4 Differing Subsurface or Physical Conditions	14
5.5 Underground Facilities	15

5.6	Hazardous Environmental Conditions at Site	17
Article 6 – Bonds and Insurance		19
6.1	Performance, Payment, and Other Bonds	19
6.2	Insurance—General Provisions	19
6.3	Contractor’s Insurance	20
6.4	Owner’s Liability Insurance	23
6.5	Property Insurance	23
6.6	Waiver of Rights	25
6.7	Receipt and Application of Property Insurance Proceeds	25
Article 7 – Contractor’s Responsibilities		26
7.1	Supervision and Superintendence	26
7.2	Labor; Working Hours	26
7.3	Services, Materials, and Equipment	26
7.4	“Or Equals”	27
7.5	Substitutes	28
7.6	Concerning Subcontractors, Suppliers, and Others	29
7.7	Patent Fees and Royalties	31
7.8	Permits	31
7.9	Taxes	32
7.10	Laws and Regulations	32
7.11	Record Documents	32
7.12	Safety and Protection	32
7.13	Safety Representative	33
7.14	Hazard Communication Programs	33
7.15	Emergencies	34
7.16	Shop Drawings, Samples, and Other Submittals	34
7.17	Contractor’s General Warranty and Guarantee	36
7.18	Indemnification	37
7.19	Delegation of Professional Design Services	37
Article 8 – Other Work at the Site		38
8.1	Other Work	38
8.2	Coordination	39
8.3	Legal Relationships	39

Article 9 – Owner’s Responsibilities	40
9.1 Communications to Contractor	40
9.2 Replacement of Engineer	40
9.3 Furnish Data	40
9.4 Pay When Due	40
9.5 Lands and Easements; Reports, Tests, and Drawings	40
9.6 Insurance	40
9.7 Change Orders	40
9.8 Inspections, Tests, and Approvals	41
9.9 Limitations on Owner’s Responsibilities	41
9.10 Undisclosed Hazardous Environmental Condition	41
9.11 Evidence of Financial Arrangements	41
9.12 Safety Programs	41
Article 10 – Engineer’s Status During Construction	41
10.1 Owner’s Representative	41
10.2 Visits to Site	41
10.3 Project Representative	42
10.4 Rejecting Defective Work	42
10.5 Shop Drawings, Change Orders and Payments	42
10.6 Determinations for Unit Price Work	42
10.7 Decisions on Requirements of Contract Documents and Acceptability of Work	42
10.8 Limitations on Engineer’s Authority and Responsibilities	42
10.9 Compliance with Safety Program	43
Article 11 – Amending the Contract Documents; Changes in the Work	43
11.1 Amending and Supplementing Contract Documents	43
11.2 Owner-Authorized Changes in the Work	44
11.3 Unauthorized Changes in the Work	44
11.4 Change of Contract Price	44
11.5 Change of Contract Times	45
11.6 Change Proposals	45
11.7 Execution of Change Orders	46
11.8 Notification to Surety	47
Article 12 – Claims	47

12.01	Claims	47
Article 13 – Cost of the Work; Allowances; Unit Price Work		48
13.1	Cost of the Work	48
13.2	Allowances	50
13.3	Unit Price Work	51
Article 14 – Tests and Inspections; Correction, Removal or Acceptance of Defective Work		52
14.1	Access to Work	52
14.2	Tests, Inspections, and Approvals	52
14.3	Defective Work	53
14.4	Acceptance of Defective Work	53
14.5	Uncovering Work	53
14.6	Owner May Stop the Work	54
14.7	Owner May Correct Defective Work	54
Article 15 – Payments to Contractor; Set-Offs; Completion; Correction Period		55
15.1	Progress Payments	55
15.2	Contractor’s Warranty of Title	58
15.3	Substantial Completion	58
15.4	Partial Use or Occupancy	59
15.5	Final Inspection	59
15.6	Final Payment	59
15.7	Waiver of Claims	61
15.8	Correction Period	61
Article 16 – Suspension of Work and Termination		62
16.1	Owner May Suspend Work	62
16.2	Owner May Terminate for Cause	62
16.3	Owner May Terminate For Convenience	63
16.4	Contractor May Stop Work or Terminate	63
Article 17 – Final Resolution of Disputes		64
17.01	Methods and Procedures	64
Article 18 – Miscellaneous		64
18.1	Giving Notice	64
18.2	Computation of Times	64
18.3	Cumulative Remedies	64

18.4	Limitation of Damages	65
18.5	No Waiver	65
18.6	Survival of Obligations	65
18.7	Controlling Law	65
18.8	Headings	65

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.1 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer

has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5101 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Engineer*—The individual or entity named as such in the Agreement.
21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner’s acceptance of the Bid.
27. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor’s plan to accomplish the Work within the Contract Times.
30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or “RPR” includes any assistants or field staff of Resident Project Representative.
33. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals and the performance of related construction activities.
35. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

37. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.
38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
39. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.2 Terminology

- A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:*
1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:*
1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:*
1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).
- E. *Furnish, Install, Perform, Provide:*
1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.1 *Delivery of Bonds and Evidence of Insurance*

- A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner’s Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.2 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.3 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.4 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.5 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

2.6 *Electronic Transmittals*

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

computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.1 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.2 *Reference Standards*

- A. Standards Specifications, Codes, Laws and Regulations
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.3 *Reporting and Resolving Discrepancies*

- A. *Reporting Discrepancies:*
 - 1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict,

error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.4 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.5 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.1 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Contract, whichever date is earlier.

4.2 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to such date.

4.3 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.4 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.5 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 2. abnormal weather conditions;
 3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 4. acts of war or terrorism.
- D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.
- E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.

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

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

5.1 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.2 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

- 1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
- 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part

by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.3 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and
 - 3. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.4 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site either:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
 2. is of such a nature as to require a change in the Drawings or Specifications; or
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

- c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or
 - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 5.04.A.
3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

5.5 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after

becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Possible Price and Times Adjustments:*
 - 1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
 - d. Contractor gave the notice required in Paragraph 5.05.B.
 - 2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
 - 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.6 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings*: The Supplementary Conditions identify:
1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 2. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.
- H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.
- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.1 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.2 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is

maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

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

6.3 *Contractor's Insurance*

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

4. Foreign voluntary worker compensation (if applicable).
- B. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 2. claims for damages insured by reasonably available personal injury liability coverage.
 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage:
 - a. Such insurance shall be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.
 4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
 8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. *Automobile liability:* Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.
- E. *Umbrella or excess liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor's pollution liability insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result

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

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

6.4 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.5 *Property Insurance*

- A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
 - 1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
 - 2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.
 - 3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
 - 4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).

5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
 6. extend to cover damage or loss to insured property while in transit.
 7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
 8. allow for the waiver of the insurer's subrogation rights, as set forth below.
 9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
 10. not include a co-insurance clause.
 11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
 12. include performance/hot testing and start-up.
 13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change*: All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.
- C. *Deductibles*: The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. *Additional Insurance*: If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.6 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.7 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the

policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.1 Supervision and Superintendence

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.2 Labor; Working Hours

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.3 Services, Materials, and Equipment

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and

guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.4 "Or Equals"

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) it has a proven record of performance and availability of responsive service; and
 - 4) it is not objectionable to Owner.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense:* Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

- D. *Effect of Engineer's Determination:* Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer considered the proposed item as a substitute pursuant to Paragraph 7.05.

7.5 Substitutes

- A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.
 - 1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.
 - 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
 - 3. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - a. shall certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design,
 - 2) be similar in substance to that specified, and
 - 3) be suited to the same use as that specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from that specified, and

- 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
 - C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
 - D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
 - E. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
 - F. *Effect of Engineer's Determination:* If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.6 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.

- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

O. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.7 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.8 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work

7.9 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.10 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.12 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
 - C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
 - D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
 - E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
 - F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
 - G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *Safety Representative*

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

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or

exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements:*

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

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

1. *Shop Drawings:*

- a. Contractor shall submit the number of copies required in the Specifications.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to

provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

2. *Samples:*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.
3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.
- D. *Engineer's Review:*
 1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.
 5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.
 6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
 7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.
2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal;
 6. the issuance of a notice of acceptability by Engineer;
 7. any inspection, test, or approval by others; or
 8. any correction of defective Work by Owner.

- D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

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

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

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

ARTICLE 8 – OTHER WORK AT THE SITE

8.1 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.2 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 2. an itemization of the specific matters to be covered by such authority and responsibility; and
 3. the extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.3 *Legal Relationships*

- A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner for whom the Owner is responsible causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.
- C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.

- D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.1 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.2 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

9.3 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.4 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.5 *Lands and Easements; Reports, Tests, and Drawings*

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.6 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.7 *Change Orders*

- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.8 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.9 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.1 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.2 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during

or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.3 *Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.4 *Rejecting Defective Work*

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

10.5 *Shop Drawings, Change Orders and Payments*

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

10.6 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.7 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.8 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 15.06.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.9 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs (if any) of which Engineer has been informed.

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

11.1 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
 - 1. *Change Orders:*
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
 - 2. *Work Change Directives:* A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an

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

3. *Field Orders*: Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.2 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.3 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.4 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:
 1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on

the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).

- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.04.C.2.a and 11.04.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.5 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.6 *Change Proposals*

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

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

1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.
 3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *Resolution of Certain Change Proposals:* If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.7 Execution of Change Orders

- A. Owner and Contractor shall execute appropriate Change Orders covering:
1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and
 4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

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

11.8 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12 – CLAIMS

12.1 *Claims*

- A. *Claims Process:* The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:
 - 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 - 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and
 - 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.
- B. *Submittal of Claim:* The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution:* The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation:*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim

submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

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

13.1 Cost of the Work

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
 2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:
 1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable

thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes

other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
- 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee:* When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

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

13.2 Allowances

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

- B. *Cash Allowances*: Contractor agrees that:
 - 1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

13.3 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

14.1 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

14.2 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
 - 1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 - 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 - 3. by manufacturers of equipment furnished under the Contract Documents;
 - 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 - 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to

cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.3 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.4 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.5 *Uncovering Work*

- A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.6 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.7 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will

include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

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

15.1 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments:*
1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.
- C. *Review of Applications:*
1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
 2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

- a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
- a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
- a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
- a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

- e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due:*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner:*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
 - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. the Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. the Contract Price has been reduced by Change Orders;
 - i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - l. there are other items entitling Owner to a set off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount

remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.2 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

15.3 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.4 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.
 - 2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.5 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.6 *Final Payment*

- A. *Application for Payment:*
 - 1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of

inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
 - d. a list of all disputes that Contractor believes are unsettled; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

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

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

15.7 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.8 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such other adjacent areas;
 - 2. correct such defective Work;
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.1 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.2 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses,

and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.3 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.4 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (2) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for

expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.1 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this Article:
 - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and
 - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this Article, Owner or Contractor may:
 - 1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or
 - 2. agree with the other party to submit the dispute to another dispute resolution process; or
 - 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.1 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
 - 1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
 - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.2 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.3 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.4 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.5 *No Waiver*

- A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.6 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

18.7 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.8 *Headings*

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

SECTION 00800A

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC, ACEC, ASCE, NSPE, 2013 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

ARTICLE 1. DEFINITIONS AND TERMINOLOGY

SC-1.101.A Add the following sentence at the end of Paragraph 1.01.A of the General Conditions:

"The terms used in these Supplementary Conditions will have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings indicated below, which are applicable to both the singular and plural thereof."

SC-1.101.A.12 Add the following language at the end of the first sentence of Paragraph 1.101.A.12.

", including the Invitation To Bid and the Instructions to Bidders."

SC-1.01.A.40 Insert the following at the end of the definition:

"For the purposes of this Work, Substantial Completion shall mean the successful completion of Demonstration Testing."

Add the following new paragraphs at the end of Article 1.01.A of the General Conditions:

SC-1.01.A.49 Apparent Successful Bidder - The Bidder submitting the lowest Bid at the Bid Opening without correction of numerical discrepancies or determination of responsiveness or responsibility.

SC-1.01.A.50 Approve, Approval, Approved - A limited, conditional or qualified permission to use material, equipment or methods and which interprets the work depicted on a submittal (i.e. shop drawings) from the Contractor to be in general conformance with the design concept and in general compliance with the contract document requirements.

SC-1.01.A.51 Bidder - An individual, firm or corporation submitting a proposal and bid for the Work contemplated, acting directly or through a duly authorized representative.

SC-1.01.A.52 Owner - Same as OWNER

SC-1.01.A.53 Compensable Delay - Any delay beyond the control and without the fault or negligence of the Contractor resulting from Owner-caused changes in the Work, differing site conditions, suspensions of the Work, or termination for convenience by Owner.

SC-1.01.A.54 Conditions of the Contract - The combined General Conditions and Supplementary Conditions.

- SC-1.01.A.55 Correction Period - The time during which the CONTRACTOR must correct defective Work or remove defective Work from the site and replace it with nondefective Work, all at no cost to the OWNER, pursuant to Paragraph 13.07 of the General Conditions, as supplemented.
- SC-1.01.A.56 Demonstration Testing - A predefined trial period required as a condition and prerequisite of substantial completion during which CONTRACTOR is to operate the entire Work (or any part thereof agreed to by the OWNER) under actual and simulated operating conditions for the purpose (i) of making such minor adjustments and changes to the Work as may be necessary for the Work to comply with the Contract Documents and (ii) of complying with the field test requirements in the Contract Documents.
- SC-1.01.A.57 Excusable Delay - Any delay beyond the control and without the fault or negligence of the Contractor, the Owner, or any other contractor caused by events or circumstances such as, but not limited to, acts of God or of the public enemy, acts of intervenors, acts of government other than the Owner, fires, floods, epidemics, quarantine restrictions, freight embargoes, and hurricanes, tornadoes, or new sink holes. Labor disputes and above average rainfall shall give rise only to inexcusable delays.
- SC-1.01.A.58 Final Completion - Acceptance of the Work by the Owner as evidenced by its signature upon final Certificate of Completion. The final Certificate of Completion shall be signed only after the OWNER has assured itself by tests, inspection or otherwise that all of the provisions of the Contract Documents have been completely satisfied.
- SC-1.01.A.59 Float or Slack Time - The time available in the progress schedule during which an unexpected activity can be completed without delaying the substantial completion of the Work.
- SC-1.01.A.60 Inexcusable Delay - Any delay caused either (i) by events or circumstances within the control of the Contractor, such as inadequate crewing, slow submittals, etc., which might have been avoided by the exercise of care, prudence, foresight, or diligence on the part of the Contractor, or (ii) by weather conditions (other than hurricanes and tornadoes) or labor disputes.
- SC-1.01.A.61 Low Bidder - Bidder who has submitted the lowest bid proposal for the Work contemplated.
- SC-1.01.A.62 Nonprejudicial Delay - Any delay impacting a portion of the Work within the available total float or slack time in the progress schedule, and not necessarily preventing completion of the Work within the Contract Time.
- SC-1.01.A.63 Prejudicial Delay - Any excusable or compensable delay impacting the Work and exceeding the total float available in the progress schedule, thus preventing completion of the Work within the Contract Time unless the Work is accelerated.
- SC-1.01.A.64 Project Manual - The Invitation for Bids, Instructions to Bidders, Bid Form, Agreement, Amendment to Agreement, Bonds, General Conditions, Supplementary Conditions, Local Agency Program/Federal-Aid Contract Requirements, Specifications, Addendum and Appendix.
- SC-1.01.A.65 Start-Up Testing - All field inspections, installation checks, water tests, performance tests, and necessary corrections required of Contractor to demonstrate that individual components of the Work have been properly constructed and do operate in accordance with the Contract Documents for their intended purposes.

- SC-1.01.A.66 Successful Bidder - The Bidder submitting the lowest Bid at the Bid Opening corrected for numerical discrepancies and determined by Owner to be qualified responsive and responsible, and to whom the Owner expects to award the Bid.
- SC-1.01.A.67 Unfavorable Weather Conditions - Local weather conditions which directly prevent the Contractor from performing critical path work for a period of more than four (4) hours on each specific work day.
- SC-1.01.A.68 Utility Coordination Day - A contract day in which the coordination of utilities prevents the Contractor from performing critical path work for a period of more than four (4) hours on each specific work day.

ARTICLE 2. PRELIMINARY MATTERS

- SC-2.01.C Delete paragraph 2.05.C of the General Conditions in its entirety and insert the following in its place:
- "C. Evidence of Insurance: Before any Work at the site is started, the Contractor shall deliver to the Owner, with a copy to the Engineer, certificates (and other evidence of insurance requested by the Owner) which the Contractor is required to purchase and maintain in accordance with Article 5 of these General Conditions."
- SC-2.02.A Delete Paragraph 2.02.A of the General Conditions in its entirety and insert the following in its place:
- "A. After the Contract has been executed, the Contractor will be furnished one (1) complete set of reproducible Drawings and one (1) complete set of the Project Manual (Contract Requirements and Specifications) and all addenda. The Contractor shall furnish each of the subcontractors, manufacturers, and material men such copies of the Contract Documents as may be required for their work. All copies of the Contract Documents shall be printed from the reproducible sets furnished to the Contractor. All costs of reproduction and printing shall be borne by the Contractor.
- SC-2.03.A Insert Paragraph 2.03. of the General Conditions in its entirety and insert the following in its place:
- " A notice to proceed may be given at any time within thirty (30) days after the Effective Date of the Agreement. The Contract Time will commence at the time specified in such notice or if no notice is given, thirty (30) days following the Effective Date of Agreement, provided that the Notice to Proceed may not specify a time of commencement later than sixty (60) days after the Effective Date of the Agreement."
- SC-2.03.A Amend the first sentence of Paragraph 2.03.A of the General Conditions to read as follows:
- "A. Preliminary Schedules: Within ten (10) working days or twenty (20) calendar days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), CONTRACTOR shall submit to ENGINEER for its timely review:"

SC-2.05.A.1 Add the following at the end of Paragraph 2.05.B.1 of the General Conditions:
 "The CONTRACTOR expressly acknowledges that unfavorable working conditions will exist at the site of the Work as a result of normal local weather and the anticipated number of unfavorable weather days per respective month are as follows:"

ANTICIPATED UNFAVORABLE WEATHER DAYS									
Month	No. Days in Normal Work Week				Month	No. Days in Normal Work Week			
	7-Day	6-Day	5-Day	4-Day		7-Day	6-Day	5-Day	4-Day
Jan	2	2	1	1	July	6	5	4	3
Feb	3	3	2	2	Aug	6	5	4	3
March	3	3	2	2	Sept	5	4	4	3
Apr	2	2	1	1	Oct	3	3	2	2
May	3	3	2	2	Nov	2	2	1	1
June	5	4	4	3	Dec	2	2	1	1

Contract "Unfavorable Weather Days" shall be determined from the above "Anticipated Unfavorable Weather Days" table and shall be counted from the date of Contract Notice to Proceed through the date of Contract Final Completion. To-be-anticipated unfavorable weather days shall be prorated through partial months and shall be rounded up or down as per standard practice (i.e., 0.1 through 0.4 days shall be rounded down to the next whole number and 0.5 through 0.9 shall be rounded up to the next whole number).

As a direct result of unfavorable local weather conditions, the CONTRACTOR will not be able to perform critical path work for a period of more than four (4) hours on each specific day.

The CONTRACTOR shall take reasonable precautions to mitigate the impact of such unfavorable weather conditions and shall diligently attempt to perform the Work."

ARTICLE 3. CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

SC-3.01.F Add the following new paragraph immediately after Paragraph 3.01.E of the General Conditions which is to read as follows:

"F. Each and every provision of law and clause required by law to be inserted in these Contract Documents shall be deemed to be inserted herein, and they shall be read and enforced as though it were included herein, and if through mistake or otherwise, any such provision is not inserted, or if not correctly inserted, then upon the application of either party, the Contract Documents shall forthwith be physically amended to make such insertion."

SC-3.05.C Add the following new paragraphs after Paragraph 3.05.B of the General Conditions which are to read as follows;

"C. Correlation of Contract Documents. In resolving such conflicts, errors, and discrepancies, the documents shall be given precedence in the following order:

- a. Agreement Modifications
 - b. Agreement
 - c. Change Orders
 - d. Addenda
 - e. Local Agency Program / Federal-Aid Contract Requirements
 - f. Supplementary Conditions
 - g. Instruction to Bidders
 - h. General Conditions
 - i. Specifications
 - j. Drawings
 - 1. Dimensions
 - 2. Full-size Drawing
 - 3. Large-scale Drawing
 - 4. Small-scale Drawing
 - k. Invitation to Bid
 - l. Bid
 - m. Bonds
 - n. Insurance Certificates
 - o. Insurance Endorsements
 - p. Affidavits
- C. Field Verification. When measurements are affected by conditions already established or where items are to be fitted into constructed conditions, it shall be the CONTRACTOR's responsibility to verify all such dimensions at the site and the actual job dimensions shall take precedence over scale and figure dimensions on the Drawings."

ARTICLE 5. AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

SC-5.01.D Add a new paragraph immediately after Paragraph 5.01.C of the General Conditions which is to read as follows:

"D. If all lands and rights-of-way are not obtained as herein contemplated before construction begins, CONTRACTOR shall begin the Work upon such land and rights-of-way as OWNER has previously acquired and no claim for damages whatsoever will be allowed by reason of the delay in obtaining the remaining lands and rights-of-way. Should OWNER be prevented or enjoined from proceeding with the Work, or from authorizing its prosecution, either before or after the commencement, by reason of any litigation, or by reason of its inability to procure any lands or rights-of-way for the Work, CONTRACTOR shall not be entitled to make or assert claim for damage by reason of said delay, or to withdraw from the Agreement except by consent of OWNER. Time for completion of the Work will be extended as provided in Article 11, to such time as OWNER determines will compensate for the time lost by such delay."

SC-5.04 The investigations, reports and drawings upon which the Engineer has relied upon are identified in Section 00300.

SC-5.05.A.3 Add a new paragraph after Paragraph 5.05.A.2 of the General Conditions which is to read as follows:

"3. No claim of the CONTRACTOR under Paragraphs 5.03 and 5.04 shall be allowed unless (1) CONTRACTOR has given the notice required in subparagraph above, and (2) within forty-five (45) days after CONTRACTOR has given the written notice, CONTRACTOR submits to OWNER a detailed claim setting forth CONTRACTOR'S right to an increase in Contract Price or extension of Contract Time as provided in Articles 11 and 12 of the General Conditions. No claim by the CONTRACTOR hereunder shall be allowed if asserted after final payment under this Contract."

SC-5.07.A Add a new paragraph entitled "5.07 A – Reference Points" immediately after paragraph 5.06.K of the General Conditions which is to read as follows:

"A. ENGINEER may check the lines, elevations, reference marks, batter boards, etc., set by Contractor, and Contractor shall correct any errors disclosed by such check. Such a check shall not be considered as approval of Contractor's work and shall not relieve Contractor of the responsibility for accurate construction of the entire Work. Contractor shall furnish personnel to assist Engineer in checking lines and grades."

ARTICLE 6. BONDS AND INSURANCE

SC-6.03.K Add the following new paragraph immediately after Paragraph 6.03.K of the General Conditions:

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

1. Workers' Compensation, and related coverages under paragraphs 6.03.A.1 and A3 of the General Conditions:

- a. State: Statutory
- b. Applicable Federal (e.g., Longshoreman's): Statutory
- c. Employer's Liability: \$1,000,000

2. Contractor's General Liability under paragraphs 5.04.A.3 through A.6 of the General Conditions which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody and control of Contractor:

- a. General Aggregate \$2,000,000
- b. Products - Completed Operations Aggregate \$2,000,000
- c. Personal and Advertising Injury \$1,000,000
- d. Each Occurrence (Bodily Injury and Property Damage) \$1,000,000
- e. Property Injury Liability Coverage will include Claims arising out of Employment.
- f. Property Damage liability insurance will provide Explosion, Collapse, and Underground coverages where applicable.
- g. Excess or Umbrella Liability

- | | |
|--|-------------|
| 1) General Aggregate | \$2,000,000 |
| 2) Each Occurrence | \$1,000,000 |
| 3. Automobile Liability under paragraph 5.04.A.6 of the General Conditions: | |
| a. Bodily Injury: | |
| Each Person | \$1,000,000 |
| Each Accident | \$1,000,000 |
| b. Property Damage: | |
| Each Accident | \$1,000,000 |
| OR | |
| c. Combined Single
Limit of | \$1,000,000 |
| 4. The Contractual Liability coverage required by paragraph 5.04.B.4 of the General Conditions shall provide coverage for not less than the following amounts: | |
| a. Bodily Injury: | |
| Each Accident | \$1,000,000 |
| Annual Aggregate | \$2,000,000 |
| b. Property Damage: | |
| Each Accident | \$1,000,000 |
| Annual Aggregate | \$2,000,000 |
| 5. Additional Insureds: | |
| Town of Windermere
614 Main Street
Windermere, FL 34786 | |
| MICHAEL GALURA ENGINEERING CONSULTANTS, LLC
3222 Corrine Drive, Suite H
Orlando, FL 32803 | |

Additional insured shall be issued on Separate Certificates of Insured.

SC-6.04 Delete Paragraph 6.04 of the General Condition in its entirety.

SC-6.05.A Delete paragraph 6.05.A of the General Conditions in its entirety and insert the following in its place:

- "A. The CONTRACTOR shall purchase and maintain until final payment property insurance upon the Work at the site to the full insurable value thereof (subject to such deductible amounts as may be provided in these Supplementary Conditions or required by Laws and Regulations). This insurance shall include the interests of the OWNER the CONTRACTOR, subcontractors, the ENGINEER, and the ENGINEER's consultants in the Work (all of whom shall be listed as insured's or additional insured parties), shall insure against the perils of fire and extended

coverage, shall include "all risk" insurance for physical loss and damage including theft, vandalism and malicious mischief, collapse and water damage, and such other perils as may be provided in these Supplementary Conditions, and shall include damages, losses and expenses arising out of or resulting from any insured loss or incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers, architects, attorneys, and other professionals). If not covered under the "all risk" insurance, the CONTRACTOR shall purchase and maintain similar property insurance on portions of the Work stored on and off the site or in transit when such portions of the Work are to be included in an Application for Payment. The policies of insurance required to be purchased and maintained by the CONTRACTOR in accordance with this paragraph 5.06 shall comply with the requirements of paragraph 5.04 of the General Conditions concerning prior written notice to OWNER and ENGINEER of cancellation, material change, or renewal refusal."

SC-6.05.B Delete Paragraph 6.05.B of the General Conditions in its entirety and insert the following in its place:

"B. The CONTRACTOR shall provide to the OWNER within thirty (30) days after the Effective Date of the Agreement, copies of all insurance policies entered into by the CONTRACTOR to achieve compliance with the insurance requirements of these Contract Documents. Should any policy expire within the Contract Time, or any extension thereof, the CONTRACTOR shall provide to the OWNER not later than thirty (30) days prior to the expiration date of such policy, a copy of an acceptable replacement policy providing the types and limits of coverage not less than that provided in the expiring policy."

ARTICLE 7. CONTRACTOR'S RESPONSIBILITIES

SC-7.03.C Add the following new paragraphs immediately after paragraph 7.03.C in the General Conditions

SC-7.03.D which are to read as follows.

SC-7.03.E

SC-7.03.F

SC-7.03.G

SC-7.03.H

"C. Except in the event of an emergency, no work shall be performed (1) before sunrise and after sunset, (2) nor between the hours of 9:00 p.m. and 7:00 a.m. (3) nor on Saturday and Sunday and (4) nor on any holiday of the OWNER. "Regular Working Hours" shall be between 7:00 a.m. and 9:00 p.m. and shall be established by the CONTRACTOR at the Preconstruction Meeting. If construction or maintenance work requires operations during other than Regular Working Hours, the CONTRACTOR shall obtain written permission of the OWNER at least forty-eight (48) hours in advance of starting such work, and shall set forth the proposed schedule for overtime to give OWNER ample time to arrange for his personnel to be at the site of the work. CONTRACTOR shall pay for the additional charges to the OWNER on account of such overtime work. Such additional charges shall be a subsidiary obligation of CONTRACTOR and no extra payment shall be made by OWNER on account of such overtime work.

D. This Agreement is subject to the applicable provisions of the Contract Work Hours and Safety Standards Act, Public Law 87-581, 87th Congress. No Contractor or Subcontractor contracting for any part of the Work shall require or

permit any laborer or mechanic to be employed on the Work in excess of forty hours in any work week unless such laborer or mechanic receives compensation at a rate not less than one and one-half times his basic rate of pay for all hours worked in excess of forty hours in such work week, as the case may be.

- E. Except as may be otherwise required by law, all claims and disputes pertaining to the classification of labor employed on the project under this Contract shall be decided by Owner's governing body or other duly designated official.
- F. Contractor shall employ only competent persons to do the work and whenever Owner shall notify Contractor, in writing, that any person on the Work appears to be incompetent, unfaithful, disorderly, or otherwise unsatisfactory, such person shall be removed from the Project and shall not again be employed on it except with the consent of Owner.
- G. Contractor shall reimburse the Owner for any additional engineering and/or inspection costs incurred as a result of overtime work in excess of the regular working hours stipulated in Article SC-7.03.B. At Owner's option, overtime costs may either be deducted from the Contractor's monthly payment request or deducted from the Contractor's retention prior to release of final payment. Overtime costs for the Owner's personnel shall be based on the individual's current overtime wage rate. Overtime costs for personnel employed by the Engineer or Owner's independent testing laboratory shall be calculated in accordance with the terms of their respective contracts with the Owner. The hourly overtime rate for the Owner's RPR will be a maximum of \$100.00 per hour.
- H. No work shall be performed on legal holidays of the OWNER, which for the Work are defined as follows:

<u>Holiday</u>	<u>Calendar Date</u>
New Year's Day	January 1
Martin Luther King Day	3rd Monday in January
President's Day	3rd Monday in February
Memorial Day	Last Monday in May
Independence Day	July 4
Labor Day	First Monday in September
Thanksgiving Day	4th Thursday in November
Day after Thanksgiving	4th Friday in November
Christmas Eve	December 24
Christmas	December 25

If Christmas and Christmas Eve fall on a weekend, the preceding Friday and following Monday will be observed as holidays. If Christmas falls on a Monday, the preceding Friday will be observed as a holiday. If Christmas falls on a Saturday, the preceding Thursday will be observed as a holiday."

SC-7.05.A.4.e Add the following new Paragraph 7.05.A.4.e of the General Conditions to read as follows:

"The application will also contain an itemized estimate of all costs and delays or schedule impacts that will result directly or indirectly from reviews, acceptance and provisions of such substitute, including cost of redesign and claims of other contractors

affect by any resulting change, all of which will be considered by ENGINEER in evaluating the proposed substitute item. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute item."

SC-7.05.D Add the following to the end of the last sentence of Paragraph 7.05.D of the General Conditions:

"...and all costs resulting from any delays in the Work while the substitution was undergoing reviews."

SC-7.06.A Delete Paragraphs 7.06.A of the General Conditions and insert the following in its place:

"A. CONTRACTOR shall not employ any Subcontractor, Supplier or other person or organization (including those who are to furnish the principal items of materials and equipment), whether initially or as a substitute, against whom OWNER or ENGINEER may have reasonable objection and shall not be required to employ as a Subcontractor, supplier or any person or organization against whom CONTRACTOR has reasonable objection. A Subcontractor or other person or organization identified in the CONTRACTOR's Bid and not objected to in writing by OWNER or ENGINEER prior to the execution of the Agreement will be deemed acceptable to OWNER and ENGINEER. All other Subcontractors shall be deemed to have been accepted if OWNER or ENGINEER deliver no written objection thereto within forty-five (45) days after CONTRACTOR's written identification of such Subcontractors. However, if within said forty-five (45) day period, OWNER or ENGINEER has reasonable objection to any Subcontractor whether identified in the Bid or subsequently, CONTRACTOR shall submit an acceptable substitute without entitlement to any change in Contract Price. If OWNER or ENGINEER demands the substitution of a Subcontractor at any time without having reasonable objection to such Subcontractor, the CONTRACTOR shall comply and shall be entitled to change in Contract Price (by appropriate Change order or Written Amendment) for the difference in cost occasioned by such substitution. After acceptance by the OWNER or ENGINEER of any particular Subcontractor, the CONTRACTOR shall make no substitution without written approval of the OWNER, which may be granted or withheld at OWNER's sole discretion. No acceptance by OWNER or ENGINEER of any such Subcontractor, Supplier or any other person or organization shall constitute a waiver of any right of OWNER or ENGINEER to reject defective work."

SC-7.06.K.1. Add a new paragraph after paragraph 7.06.K of the General Conditions which is to read as follows:

"1. Owner or Engineer may furnish to any such Subcontractor, Supplier or other person or organization, to the extent practicable, evidence of amounts paid on their behalf to Contractor in accordance with Contractor's Applications for Payment."

SC-7.08 Reference is made to the General Requirements of the Contract Documents (Division 1) for a listing of permits and licenses obtained by the OWNER before the bid advertisement.

SC-7.12.A.4 Add a new paragraph immediately after Paragraph 7.12.A.3 of the General Conditions which is to read as follows:

"4. in the event of temporary suspension of the Work, or during inclement weather, or whenever Engineer may direct; Contractor shall, and shall cause Subcontractors, to protect carefully the Work and materials against damage or injury from the weather. If, in the opinion of Engineer, any portion of Work or materials shall have been damaged or injured by reason of failure on the part of the Contractor or any Subcontractors to so protect the Work, such Work and materials shall be removed and replaced at the expense of Contractor."

SC-7.12.B Add the following sentence to the end of the first sentence of Paragraph 7.12.B in the General Conditions:

"Contractor shall comply with the Trench Safety Act, Florida Law, Chapter 90-96 (CS/SB2626); OSHA (P.L. 91-596); the Contract Work Hours and Safety Standards Act (P.L. 91-54); and the Federal Register 29 CFR part 1926, OSHA Subpart P as well as all other local, state and federal ordinances, laws, and regulations regarding safety."

SC-7.16.E.1 Add the following sentence to the end of Paragraph 7.16.E.1 of the General Conditions:

"Shop drawings and submittal data shall be reviewed by the ENGINEER for each original submittal and first and second resubmittal; thereafter review time for subsequent resubmittals shall be charged to the CONTRACTOR in accordance with the terms of ENGINEER's Agreement with OWNER."

SC-7.18.A.1 Add the following paragraph immediately after Paragraph 7.18.A. of the General Conditions which is to read as follows:

"1. If, through acts of neglect on the part of Contractor, any other contractor or any subcontractor shall suffer loss or damage on the Work, Contractor shall settle with such other contractor or subcontractor by agreement or arbitration if such other contractor or subcontractor will so settle. If such other contractor or subcontractor shall assert any claim against Owner on such account of any damage alleged to have been sustained, Owner shall notify Contractor, who shall indemnify and save harmless Owner against any such claim."

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

SC-11.02.A.1 &
SC-11.02.A.2

Add the following new paragraphs after Paragraph 10.01.A of the General Conditions which are to read as follows:

"1. At anytime, ENGINEER may request a quotation from CONTRACTOR for a proposed change in the Work. Within three (3) calendar days after receipt of a request for a quotation for a proposed change, CONTRACTOR shall submit a written and detailed proposal for an increase or decrease in the Contract Price or Contract Time for the proposed change. ENGINEER shall have three (3) calendar days after receipt of the detailed proposal to respond in writing. The proposal shall include an itemized estimate of all costs and time for performance that will result directly or indirectly from the proposed change. Unless otherwise directed, itemized estimates shall be in accordance with Articles 11 and 12 and in sufficient detail reasonably to permit an analysis by ENGINEER of all material, labor, equipment, subcontract, and overhead costs and fees and shall cover all Work involved in the change, whether such Work was deleted, added, changed, or impacted. Any amount claimed for subcontracts shall be similarly supported. Itemized schedule adjustments shall be in sufficient detail to permit an analysis of impact as required in Division 1. Notwithstanding the request for quotation, CONTRACTOR shall carry on the Work and maintain the progress schedule."

Delays in the submittal of the written and detailed quotation will be considered non-prejudicial."

2. The adjustment in Contract Price and/or Contract Time stated in a Change Order shall comprise the total price and/or time adjustment due or owed the CONTRACTOR for the work or changes defined in the Change Order. By executing the Change Order, the CONTRACTOR acknowledges and agrees that the stipulated price and/or time adjustments include the costs and delays for all work contained in the Change Order, including costs and delays associated with the interruption of schedules, extended overheads, delay, and cumulative impacts or ripple effect on all other non-affected work under this contract. Signing of the Change Order constitutes full and mutual accord and satisfaction for the adjustment in contract price or time as a result of increases or decreases in costs and time of performance caused directly and indirectly from the change, subject to the current scope of the entire work as set forth in the Contract Documents. Acceptance of the waiver constitutes an agreement between OWNER and CONTRACTOR that the Change Order represents an equitable adjustment to the Contract, and that CONTRACTOR will waive all rights to file a claim on this Change Order after it is properly executed."

ARTICLE 15. PAYMENTS TO THE CONTRACTOR AND COMPLETION

SC-15.01.A.1 Add the following language to the end of Paragraph 15.02.A.1 of the General Conditions:

"The Contractor shall furnish evidence that payment received on the basis of materials and equipment not incorporated and suitably stored, has in fact been paid to the respective supplier(s) within sixty days of payment by Owner. Failure to provide such evidence of payment shall result in the withdrawal of previous approval(s) and removal of the related equipment from the next submitted Application for Payment."

SC-15.01.D.1 Amend the first sentence of Paragraph 14.02.C.1 of the General Conditions to read as follows:

"Twenty (20) days after presentation of the Application for Payment ..."

SC-15.01.D.2 Add four new paragraphs immediately after paragraph 14.02.C.1 of the General Conditions

SC-15.01.D.3 which are to read as follows:

SC-15.01.D.4
SC-15.01.D.5

2. Should Contractor neglect to pay any undisputed claims, made in writing to Owner within thirty (30) days after completion of the Work, but continuing unsatisfied for a period of ninety (90) days, Owner may pay such undisputed claim and deduct the amount thereof from the balance due Contractor. Owner may also, with the written consent of Contractor, use any monies retained, due, or to become due under this Contract for the purpose of paying for both labor and materials for the Work, for disputed claims or claims have not been filed.
3. Security is provided both by the Payment Bond and the power of Owner to retain any monies for claims, but payment by one shall in no way impair or discharge the liability of the other.
4. Any and all liens for work and materials may be paid off by Owner within a reasonable time after filing for record in accordance with State and local laws, a notice of such liens except where the claim on which the lien is filed is being litigated by Contractor, and in such case Owner may pay the amount of any final

judgment or decree or any such claim within a reasonable time after such final judgment or decree shall be rendered.

5. All monies paid by Owner in settlement of liens as aforesaid, with the costs and expenses incurred by Owner in connection therewith, shall be charged to Contractor, shall bear interest at the rate of three percentage points above the rediscount rate then charged by the Federal Reserve Bank, and shall be deducted from the next payment due Contractor under the terms of this Contract."

SC-15.01.E.1.m Add a new paragraph after Paragraph 15.01.E.1.l of the General Conditions which is to read as follows:

"m. Liability for liquidated damages has been incurred by the Contractor."

SC-15.02.B Add two new paragraphs immediately after paragraph 15.02.A of the General Conditions which are

SC-15.02.C to read as follows:

"B. No materials or supplies for the Work shall be purchased by Contractor or Subcontractor subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller. Contractor warrants that he has good title to all materials and supplies used by him in the Work, free from all liens, claims or encumbrances.

C. Contractor shall indemnify and save Owner and Owner's Engineer harmless from all claims growing out of the lawful demands of Subcontractors, laborers, workmen, mechanics, materialmen, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in the furtherance of the performance of this Contract. Contractor shall at Owner's request, furnish satisfactory evidence that all obligations of the nature hereinabove designated have been paid, discharged, or waived. If Contractor fails to do so, then Owner may, after having served written notice on the said Contractor either pay unpaid bills, of which Owner has written notice, direct, or withhold from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to Contractor shall be resumed, in accordance with the terms of this Contract, but in no event shall the provisions of this sentence be construed to impose any obligations upon Owner to either Contractor or his Surety. In paying any unpaid bills of the Contractor, Owner shall be deemed the agent of Contractor and any payment so made by Owner, shall be considered as payment made under the Contract by Owner to Contractor and Owner shall not be liable to Contractor for any such payment made in good faith."

SC-15.06.A.4 Add a new paragraph after Paragraph 15.06.A.3 of the General Conditions which is to read as follows:

"4. Notwithstanding any other provision of these Contract Documents to the contrary, OWNER and ENGINEER are under no duty or obligation whatsoever to any Subcontractor, laborer or other party to ensure that payments due and owing by the CONTRACTOR to any of them are or will be made. Such parties shall rely only on the CONTRACTOR'S surety bonds for remedy of nonpayment by him."

SC-15.06.D Amend Paragraph 15.06.D of the General Conditions to read as follows:

"Sixty (60) days after the presentation to OWNER of the final application for Payment and ..."

ARTICLE 16. SUSPENSION OF WORK AND TERMINATION

SC-16.01.B Add a new paragraph after Paragraph 16.01.A of the General Conditions which is to read as follows:

"B. If the OWNER stops Work under Paragraph 14.06 or suspends the CONTRACTOR's services under Paragraph 14.07, or suspends the Work or any portion thereof because of the CONTRACTOR's failure to prosecute the Work without endangering persons and property, the CONTRACTOR shall be entitled to no extension of Contract Time or increase in Contract Price."

SC-16.02.A.5 Add a new paragraph immediately after paragraph 16.02.A.4 of the General Conditions which is to read as follows:

"5. If the Work to be done under this Contract shall be abandoned, or if this Contract or any part thereof shall be sublet without the previous written consent of Owner, or if the Contract or any claim thereunder shall be assigned by Contractor otherwise than as herein specified, or at any time Engineer shall certify in writing to OWNER that the rate of progress of the Work or any part thereof is unsatisfactory or that the work or any part thereof is unnecessarily or unreasonably delayed."

SC-16.02.B.3 Add new paragraph immediately after Paragraph 16.02.B.2 of the General Conditions beginning with the second sentence which is to read as follows:

"In such case, CONTRACTOR shall not be entitled to receive any further payment beyond an amount equal to the value of the Work actually completed and the value of materials and equipment not incorporated in the Work but delivered and suitably stored, less the aggregate of payments previously made. If the direct and indirect costs of completing the Work, including, but not limited to, fee and charges of engineers, architects, attorneys and other professionals, exceed the unpaid balance of the Contract Price, CONTRACTOR shall pay the difference to OWNER. Such costs incurred by OWNER shall be verified by ENGINEER and incorporated in a Change Order, but in finishing the Work, OWNER shall not be required to obtain the lowest price for the Work performed. CONTRACTOR's obligations to pay the difference between such costs and such unpaid balance shall survive termination of the Agreement."

ARTICLE 17. DISPUTE RESOLUTION

SC-17.01.A Delete Paragraph 17.01.A of the General Conditions in its entirety and insert the following in its place:

"A. Disputes between OWNER and CONTRACTOR shall be arbitrated only if and to the extent agreed to by the parties at the time each dispute arises. The CONTRACTOR will carry on the Work and maintain the progress schedule during any dispute, regardless of how resolved, unless otherwise mutually agreed in writing. Venue for any litigation, at law or equity or arbitration, shall lie exclusively in Orange County, Florida. This Contract, or any provision hereof, shall be construed and interpreted, and any litigation arising therefrom, shall be governed by the laws of the State of Florida. The CONTRACTOR and OWNER waive trial by jury in any action, proceeding or claim which may be brought by either of the parties hereto against the other on any matters concerning or arising out of this Contract. In any such action, out of this Contract either party shall bear its own attorney fees at the trial and appellate level, engineers, architects and other professionals and court costs, including those incurred in appellate proceedings.

ARTICLE 18. MISCELLANEOUS

SC-18.09 Add the following new paragraphs after Paragraph 18.08 of the General Conditions:
SC-18.10
SC-18.11
SC-18.12
SC-18.13

"18.09 Both the address given in the Bid Form upon which this Agreement is founded, and Contractor's office at or near the site of the Work are hereby designated as places to either of which notices, letters, and other communications to Contractor shall be certified, mailed, or delivered. The delivering at the above named place, or depositing in a postpaid wrapper directed to the first-named place, in any post office box regularly maintained by the U.S. Postal Department, of any notice, letter or other communication to Contractor shall be deemed sufficient service thereof upon Contractor; and the date of said service shall be the date of such delivery or mailing. The first-named address may be changed at any time by an instrument in writing, executed and acknowledged by Contractor, and delivered to Owner and Engineer. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter, or other communication upon Contractor personally.

18.10 The form of all submittals, notices, change orders, and other documents permitted or required to be used or transmitted under the Contract Documents shall be determined by the ENGINEER. During the preconstruction meeting, the ENGINEER shall provide to the CONTRACTOR one set of such project administration forms to be utilized during the construction of this project. These forms are referenced as follows:

Forms Used by the Engineer

- 00844 Non-Compliance Notice
- 00845 Field Order
- 00846 Work Directive
- 00847 Request for Proposal for Proposed Change (RFP)

00848 Daily Construction Report
00849 Weekly Construction Progress Report
00856 Shop Drawing Log
00858 Shop Drawing Review
00859 O&M Manual Review

Forms Used by the Contractor

00861 Periodic Estimate for Partial Payment
00862 Schedule of Values
00863 Materials Stored On-Site
00864 Shop Drawing Transmittal
00865 Change Proposal Summary
00866 Overtime Authorization
00867 Stop Work Order
00868 Contractor Request for Information
00875 Certificate of Completed Demonstration
00876 Check-Out Form
00878 Contractor Proposed Change
00879 Final Release of Lien

Forms Used by All Parties during Construction

00850 Construction Accident Report
00860 Project Action Report

- 18.11 The CONTRACTOR shall comply with Florida's Archives and Historical Act (Florida Statutes Chapter 267) and the regulations of the local historic preservation board as applicable and protect against the potential loss or destruction of significant, historical or archaeological data, sites, and properties in connection with the project.
- 18.12 If apprentices are required or utilized on this project, then the provisions of Chapter 446, Florida Statutes, shall govern.
- 18.13 If the price of this Agreement/Contract equals or exceeds \$50,000 and if the Contractor has 50 or more employees, the Contractor shall file with the Owner, within 30 calendar days after the award of this Agreement/Contract, a report on Standard Form 100 (EEO-1), which has been promulgated jointly by the Office of Federal Contract Compliance Programs, the Equal Employment Opportunity Commission, and Plans for Progress, unless the Contractor has submitted such a report within 12 months preceding the date of award of this Agreement/Contract. In addition, the Contractor shall ensure that each construction subcontractor having 50 or more employees and a lower-tier construction subcontract with a price equaling or exceeding \$50,000 also files with the Owner, within 30 calendar days after the award to it of the lower-tier construction subcontract, a report on Standard Form 100 (EEO-1) unless the construction subcontractor has submitted such a report within 12 months preceding the date of award of the lower-tier construction subcontract. (Subsequent reports are to be submitted annually in accordance with 41 CFR 60-1.7(a) or at such other intervals as the Director of the Office of Federal Contract Compliance Programs may require.)"

END OF SECTION

ADDENDA

DIVISION 1
GENERAL REQUIREMENTS

**SECTION 01001
GENERAL REQUIREMENTS**

<p>1.01 WORK UNDER THIS CONTRACT..... 1</p> <p> A. Work To Be Done 1</p> <p> B. Drawings and Specifications 1</p> <p> C. Adjacent Lands and Improvements 3</p> <p> D. Weather 3</p> <p> E. Protection and Restoration 3</p> <p>1.02 LABOR 4</p> <p> A. Supervision 4</p> <p> B. Jurisdictional Disputes 4</p> <p> C. Apprenticeship 4</p> <p>1.03 MATERIALS AND EQUIPMENT 5</p> <p> A. Manufacturer 5</p> <p> B. Substitutions 6</p> <p> C. Delivery and Storage 6</p> <p> D. Manufacturer's Instructions for Installation 8</p> <p> E. Operating and Maintenance Data 9</p> <p> F. Manufacturer's Service 9</p> <p> G. Inspection and Testing 9</p> <p> H. Warranties and Bonds 11</p> <p> I. Tools and Accessories 11</p> <p> J. Hauling and Construction Operations 12</p> <p> K. Use of Chemicals 12</p> <p>1.04 PROJECT SITE AND ACCESS 12</p> <p> A. Right-of-Way and Easements 12</p> <p> B. Access 12</p> <p>1.05 PERMITS 12</p> <p>1.06 UTILITIES 12</p> <p> A. Utility Construction 12</p> <p> B. Existing Utilities 13</p> <p> C. Notices 13</p> <p> D. Relocations 13</p> <p>1.07 RELATED CONSTRUCTION REQUIREMENTS 14</p> <p> A. Traffic Maintenance 14</p> <p> B. Barrier and Lights 15</p> <p> C. Dust, Noise and Erosion Control 15</p> <p> D. Lines and Grades 16</p> <p> E. Cutting and Patching 16</p> <p> F. Daily Reports 16</p> <p> G. Cleaning 17</p> <p> H. Project Signs 17</p> <p>1.08 PROJECT MEETINGS 18</p> <p> A. General 18</p> <p> B. Pre-Construction Meeting 18</p> <p> C. Progress Meetings 18</p>	<p>1.10 CONSTRUCTION PROGRESS SCHEDULE 19</p> <p> A. Submit for Approval 19</p> <p> B. Contractor's Responsibility 19</p> <p>1.11 SHOP DRAWINGS, WORKING DRAWINGS AND SAMPLES 19</p> <p> A. General 19</p> <p> B. Contractor's Responsibility 19</p> <p> C. Engineer's Responsibility 20</p> <p> D. Submittal Procedures 20</p> <p> E. Shop Drawings 22</p> <p> F. Samples 22</p> <p>1.12 PROJECT RECORD DOCUMENTS 22</p> <p>1.13 START-UP 23</p> <p> A. Start-up DEMONSTRATION & TESTING Certification 23</p> <p>1.14 CONTRACT CLOSEOUT 23</p> <p> A. Substantial Completion 23</p> <p> B. Final Inspection 23</p> <p> C. Contractor's Close-out Submittals to Engineer 23</p> <p>1.15 SPECIAL PROJECT PROCEDURES 24</p>
---	---

SECTION 01001

GENERAL REQUIREMENTS

1.01 WORK UNDER THIS CONTRACT

In conformance with the requirements of Notice and Service of the General Conditions, all notices or other papers required to be delivered by the Contractor to the Owner and shall be delivered to the office of the Owner: Town of Windermere, 614 Main Street, Windermere, FL 34786; and the Owner's Engineer, Michael Galura Engineering Consultants, LLC, 3222 Corrine Drive, Suite H, Orlando, Florida 32803.

A. WORK TO BE DONE

1. The Contractor shall furnish all labor, materials, equipment, tools services and incidentals to complete all work required by these specifications and as shown on the Drawings, at a rate of progress which will ensure completion of the Work within the Contract Time stipulated.
2. All materials, equipment, skills, tools and labor which is reasonably and properly inferable and necessary for the proper completion of the Work in a substantial manner and in compliance with the requirements stated or implied by these Specifications or Drawings shall be furnished and installed by the Contractor without additional compensation, whether specifically indicated in the Contract Documents or not.
3. The Contractor shall perform the work complete, in place, and ready for continuous service, and shall include repairs, testing, permits, clean-up, replacements, and restoration required as a result of damages caused during this construction.
4. The Contractor shall comply with all Town, City, County, State, Federal, and other codes which are applicable to the proposed construction work.
5. All newly constructed work shall be carefully protected from injury in any way. No wheeling or walking or placing of heavy loads on it shall be allowed and all portions damaged shall be reconstructed by the Contractor at his own expense.

B. DRAWINGS AND SPECIFICATIONS

1. The Work shall be performed in accordance with the Drawings and Specifications prepared by Michael Galura Engineering Consultants, LLC, 3222 Corrine Drive, Suite H, Orlando, Florida 32803.
2. All work items in the plans and Contract Specifications shall be furnished and installed in accordance with the technical portions of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction (Latest Edition), including Supplemental Specifications and Revisions thereto.
3. Where shown, the Contract Specifications and Plans Reference Index Sheets and Standards refer to FDOT Roadway and Traffic Design Standards (latest edition).
4. The Contractor shall verify all dimensions, quantities and details shown on the Drawings, Supplementary Drawings, Schedules, Specifications or other data received from the Engineer, and shall notify same, in writing, of all errors, omissions, conflicts and discrepancies found therein. Failure to discover or correct errors, conflicts or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory Work, faulty construction or improper operation resulting therefrom, nor from rectifying such conditions at his own expense.
5. All schedules are given for the convenience of the Engineer and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the

making of estimates of the size, kind, and quantity of materials and equipment included in the Work to be done under this Contract.

6. Intent

- a. All Work called for in the Specifications applicable to this Contract, but not shown on the Drawings in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified in either the Drawings or in the Specifications, but involved in carrying out their implied intent, or in the complete and proper execution of the Work, is required and shall be performed by the Contractor as though it were specifically delineated or described.
- b. Items of material, equipment, machinery, and the like may be specified on the Drawings and not in the Specifications. Such items shall be provided by the Contractor in accordance with the specification on the Drawings.
- c. The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any Work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, and interpretation of these Specifications shall be made upon that basis.
- d. Reference to the following standards of any technical society, organization or body shall be construed to mean the latest standard, code or specification or tentative specification adopted and published at the date of advertisement for bids, even though reference has been made to an earlier standard. Such reference is hereby made a part of the Contract the same as if herein repeated in full and in the event of any conflict between any of these specifications, standard codes or tentative specifications and the Contract Documents, the most stringent shall govern.

AA	Aluminum Association	APWA	American Public Works Association
AASHTO	American Association of State Highway and Transportation Officials	AREA	American Railway Engineering Association
AASHTO	Officials	ASA	American Standards Association (now ANSI)
ABPA	Acoustical and Board Products Association	ASCE	American Society of Civil Engineers
ACI	American Concrete Institute	ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
AFBMA	Anti-Friction Bearing Manufacturer's Association	ASME	American Society of Mechanical Engineers
AGA	American Gas Association	ASSCBC	American Standard Safety Code for Building Construction
AGMA	American Gear Manufacturer's Association	ASTM	American Society for Testing and Materials
AI	The Asphalt Institute	AWPA	American Wood Preservers Association
AIA	American Institute of Architects	AWBP	American Wood Preservers Board
AIEE	American Institute of Electrical Engineers	AWS	American Welding Society
AIMA	Acoustical and Insulating Materials Association	AWWA	American Water Works Association
AISC	American Institute of Steel Construction	CRSI	Concrete Reinforcing Steel Institute
AISA	American Iron and Steel Institute	NPT	National Pipe Threads
AMCA	American Moving and Conditioning Association	NSF	National Science Foundation
ANSI	American National Standards Institute	OSHA	U.S. Department of Labor,
API	American Petroleum Institute		
CS	Commercial Standard		
DOT Spec	Standard Specification for Road and Bridge Construction Florida		

FS	Department of Transportation Federal Standard		Occupational Safety and Health Administration
IEEE	Institute of Electrical and Electronic Engineers	PCA	Portland Cement Association
IPCEA	Insulated Power Cable Engineers Association	PCI	Prestressed Concrete Institute
NBFU	National Board of Fire Underwriters	PS	United States Products Standards
NBS	National Bureau of Standards	SAE	Society of Automotive Engineers
NEC	National Electrical Code	SDI	Steel Decks Institute
NECA	National Electrical Contractor's Association	SJI	Steel Joists Institute
NEMA	National Electrical Manufacturer's Association	SMACNA	Sheet Metal and Air Conditioning Contractors National Association
NFPA	National Fire Protection Association	SSPC	Structural Steel Painting Council
		UL	Underwriter's Laboratories, Inc.
		UASI	United States of America Standards Institute (now ANSI)
		or	
		USAS	

7. When obtaining data and information from the Drawings, conflicts, errors, and discrepancies shall be resolved from the documents given the following order of precedence:

- | | | | |
|----|--|----|------------------------|
| a. | Agreement Modifications | i. | Drawings |
| b. | Agreement | 1) | Dimensions |
| c. | Change Orders | 2) | Full-size Drawing |
| d. | Addenda | 3) | Large-scale Drawing |
| e. | Local Agency Provisions / Federal-Aid
Contract Agreements | 4) | Small-scale Drawing |
| | Special Conditions | j. | Invitation to Bid |
| | Attachments | k. | Bid |
| e. | Supplementary Conditions | l. | Bonds |
| f. | Instruction to Bidders | m. | Insurance Certificates |
| g. | General Conditions | n. | Insurance Endorsements |
| h. | Specifications | o. | Affidavits |

When measurements are affected by conditions already established or where items are to be fitted into constructed conditions, it shall be the CONTRACTOR'S responsibility to verify all such dimensions at the site and the actual job dimensions shall take precedence over scale and figure dimensions on the Drawings.

C. ADJACENT LANDS AND IMPROVEMENTS

1. Contractor shall be entirely responsible and liable for all damage or injury as a result of his operations to all other adjacent public and private property, landscaping, trees, fences, structures of any kind and appurtenances thereto met with during the progress of the Work.
2. The Contractor shall not enter or occupy private land outside of the project site or right-of-way, except by written permission of the appropriate owners. Contractor shall provide Owner a copy of such written permission.

D. WEATHER

During inclement weather, all work which might be damaged or rendered inferior by such weather conditions shall be suspended. The orders and decisions of the Engineer as to suspensions shall be final and binding. During suspension of the Work from any cause, the Work shall be suitably covered and protected so as to preserve it from injury by the weather or otherwise; and, if the Engineer will so direct, the rubbish and surplus materials shall be removed.

E. PROTECTION AND RESTORATION

1. The Contractor shall be responsible for the preservation of all public and private property, and shall use every means of protection necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the Work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition similar or equal to that existing before the damage was done, or he shall make good the damage in other manner acceptable to the Engineer.
2. Protection of Trees and Shrubs
 - a. Protect with boxes or other barricades.
 - b. Do not place excavated material so as to injure trees or shrubs
 - c. Install pipelines in short tunnels between and under root systems
 - d. Support trees to prevent root disturbance during nearby excavation.
3. Tree and Limb Removal
 - a. Tree limbs which interfere with equipment operation and are approved for pruning shall be neatly trimmed and the tree cut coated with a tree paint.
 - b. The Owner may order the Contractor, for the convenience of the Owner, to remove trees along the line or trench excavation. The Contractor shall obtain any permits required for removal of trees. Ordered tree removal shall be paid for under the appropriate Contract Items or, if not provided in the Bid Schedule, shall be paid under provisions of Article 11 of the General Conditions.
4. Trees or shrubs destroyed by negligence of the Contractor or his employees shall be replaced by him with new stock of similar size and age, at the proper season and at the sole expense of the Contractor.
5. Lawn Areas - All lawn areas disturbed by construction shall be replaced with like kind to a condition similar or equal to that existing before construction. Where sod is to be removed, it shall be carefully removed, and the same resodded, or the area where sod has been removed shall be restored with new sod in the manner described in the applicable section.
6. Fences - Any fence, or part thereof, that is damaged or removed during the course of the work shall be replaced or repaired by the Contractor, and shall be left in as good a condition as before the starting of the work.
7. Where fencing, walls, shrubbery, grass strips or area must be removed or destroyed incident to the construction operation, the Contractor shall, after completion of the work, replace or restore to the original condition all such destroyed or damaged landscaping and improvements.

The cost of all labor, materials, equipment, and work for restoration shall be deemed included in the appropriate Contract Item or items, or if no specific item is provided therefore, as part of the overhead cost of the Work, and no additional payment will be made therefore.

1.02 LABOR

- A. The Contractor shall keep the Contract under his own control and it shall be his responsibility to see that the Work is properly supervised and carried on faithfully and efficiently. The Contractor shall supervise the Work personally or shall have a competent, English speaking superintendent or representative, who shall be on the site of the project at all working hours, and who shall be clothed with full authority by the Contractor to direct the performance of the Work and make arrangements for all necessary materials, equipment, and labor without delay.

- B. Jurisdictional Disputes - It shall be the responsibility of the Contractor to pay all costs that may be required to perform any of the Work shown on the Drawings or specified herein to avoid any work stoppages due to jurisdictional disputes. The basis for subletting work in question, if any, shall conform to precedent agreements and decisions on record with the Building and Construction Trades Department, AFL-CIO, dated June, 1973, including any amendments thereto.
- C. Apprenticeship - The Contractor shall comply with all of the requirements of Section 446, Florida Statutes, for all contracts in excess of \$25,000 excluding roadway, highway or bridge contracts and the Contractor agrees to insert in any subcontract under this Contract the requirements of this Article.

1.03 MATERIALS AND EQUIPMENT

A. MANUFACTURER

1. All transactions with the manufacturers or subcontractors shall be through the Contractor, unless the Contractor shall request and at the Engineer's option, that the manufacturer or subcontractor communicate directly with the Engineer. Any such transactions shall not in any way release the Contractor from his full responsibility under this Contract.
2. All workmanship and materials shall be of the highest quality. The equipment shall be the product of manufacturers who are experienced and skilled in the field with an established record of research and development. No equipment will be considered unless the manufacturer has designed and manufactured equipment of comparable type and size for at least five years.
3. All materials and equipment furnished by the Contractor shall be subject to the inspection and approval of the Engineer. No material shall be delivered to the work without prior approval of the Engineer.
4. All apparatus, mechanisms, equipment, machinery, and manufactured articles for incorporation into the Project shall be the new (most current production at time of bid) and unused standard products of recognized reputable manufacturers.
5. Manufactured and fabricated products:
 - a. Design, fabricate and assemble in accord with the best engineering and shop practices.
 - b. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
 - c. Any two or more pieces of material or equipment of the same kind, type or classification, and being used for identical types of service, shall be made by the same manufacturer.
 - d. Products shall be suitable for service conditions as specified and as stated by manufacturer.
 - e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
 - f. Do not use material or equipment for any purpose other than that for which it is designed or is specified.
6. Product Standards: Equipment and appurtenances shall be designed in conformity with ANSI (formerly ASA), ASME, IEEE, NEMA, OSHA, AGMA, and other generally accepted applicable standards. They shall be of rugged construction and of sufficient strength to withstand all stresses which may occur during fabrication, testing, transportation, installation, and all conditions or operations. All bearings and moving parts shall be adequately protected against wear by bushings or other approved means. Provisions shall be made for adequate lubrication with readily accessible devices.

7. Safety Requirements

- a. In addition to the components specified and shown on the Drawings and necessary for the specified performance, the Contractor shall incorporate in the design and show on the shop drawings all the safety features required by the current codes and regulations, including but not limited to those of the Occupational Safety and Health Act, and Amendments thereto.

B. SUBSTITUTIONS

1. The substitution requirements of this Section are in addition to the requirements of the General Conditions and Supplementary Conditions.
2. When a particular product is specified or called for, it is intended and shall be understood that the proposal tendered by the Bidder includes those products in his Bid. Should the Bidder desire to provide alternate products equal to those specified, the Bidder shall furnish information as described in the General Conditions or Bid Form. The alternate product or products submitted by the Bidder shall meet the requirements of the specifications and shall, in all respects, be equal to the products specified by name herein.
3. The intent of these specifications is to provide the Owner with a quality facility without discouraging competitive bidding. For products specified only by reference standards, performance and descriptive methods, without naming manufacturer's products, the Contractor may provide the products of any manufacturer complying with the Contract Documents, subject to the review of product data by the Engineer as specified herein. For products specified by naming a manufacturer's product followed by the words "or equal", the Contractor may provide any of the named products. He may substitute a product by another manufacturer as an equal only after review by the Engineer as specified herein. In all cases, any product provided must comply with all of the specified requirements.

C. DELIVERY AND STORAGE

1. General

- a. The Contractor shall be responsible for all material, equipment and supplies sold and delivered to the Owner under this Contract until final inspection of the Work and acceptance thereof by the Owner.
- b. All materials and equipment to be incorporated in the Work shall be handled and stored by the Contractor before, during and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, theft or damage or any kind whatsoever to the material or equipment.
- c. All materials which, in the opinion of the Engineer, have become so damaged as to be unfit for the use intended or specified shall be promptly removed from the site of the Work, and the Contractor shall receive no compensation for the damaged material or its removal.
- d. In the event any such material, equipment and supplies are lost, stolen, damaged or destroyed prior to final inspection and acceptance, the Contractor shall replace same without additional cost to the Owner.

2. Delivery - the Contractor Shall:

- a. Deliver materials in ample quantities to insure the most speedy and uninterrupted progress of the Work so as to complete the Work within the allotted time.
- b. Coordinate deliveries in order to avoid delay in, or impediment of, the progress of the Work of any related Contractor.

- c. Schedule deliveries to the site not more than one month prior to scheduled installation without written authorization from the Engineer.
- d. Arrange deliveries of products in accordance with construction schedules coordinated to avoid conflict with work and conditions at the site.
- e. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
- f. Immediately on delivery, inspect shipments with the Owner's field representative to assure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.
- g. Provide equipment and personnel to handle products by methods recommended by the manufacturer to prevent soiling or damage to products or packaging.
- h. Submit operation and maintenance data to the Engineer for review prior to shipment of equipment.

3. Storage

- a. The Contractor shall be responsible for securing a location for on-site storage of all material and equipment necessary for completion of this project. The location and storage layout shall be submitted to the Owner/Engineer at the preconstruction conference.
- b. All material delivered to the job site shall be protected from dirt, dust, dampness, water, and any other condition detrimental to the life of the material from the date of delivery to the time of installation of the material and acceptance by the Owner.
- c. Store products in accord with manufacturer's instructions, with seals and labels intact and legible.
- d. When required or recommended by the manufacturer, the Contractor shall furnish a covered, weather protected storage structure providing a clean, dry, noncorrosive environment for all mechanical equipment, valves, architectural items, electrical and instrumentation equipment, and special equipment to be incorporated into this project.
- e. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions and free from damage or deterioration.
- f. Manufacturer's storage instructions shall be carefully studied by the Contractor and reviewed with the Engineer by him. These instructions shall be carefully followed and a written record of this kept by the Contractor.
- g. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal "welding". Electric motors provided with heaters shall be temporarily wired for continuous heating during storage. Upon installation of the equipment, the Contractor shall start the equipment, at least half load, once weekly for an adequate period of time to insure that the equipment does not deteriorate from lack of use.
- h. Mechanical equipment to be used in the Work, if stored for longer than ninety (90) days, shall have the bearings cleaned, flushed and lubricated prior to testing and start-up, at no extra cost to the Owner.
- i. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment during start-up and certify that its condition has not been detrimentally affected by the long storage period. Such start-up certification by the

manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed and tested. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

j. Specific Material Storage Requirements

- 1) Loose Granular Materials: Store in a well-drained area on solid surfaces to prevent mixing with foreign matter.
 - 2) Cement, sand and lime: Stored under a roof and off the ground and kept completely dry at all times.
 - 3) Brick, block and similar masonry products: Handle and store in a manner to reduce breakage, chipping, cracking and spilling to a minimum.
 - 4) Precast Concrete Beams: Handle and Store in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking.
 - 5) All structural and miscellaneous steel, and reinforcing steel: Store off the ground or otherwise to prevent accumulations of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical.
3. Should the Contractor fail to take proper action on storage and handling of equipment supplied under this Contract within seven days after written notice to do so has been given, the Owner retains the right to correct all deficiencies noted in previously transmitted written notice and deduct the cost associated with these corrections from the Contractor's Contract. These costs may be comprised of expenditures for labor, equipment usage, administrative, clerical, engineering, and any other costs associated with making the necessary corrections. In any event, equipment and materials not properly stored will not be included in a payment estimate.

D. MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION

1. Comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to all parties involved in the installation, including two copies for the Engineer's use. Maintain one set of complete instructions at the job site during installation and until completion.
2. Handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements. Should job conditions or specified requirements conflict with the manufacturer's instructions, consult with Engineer for further instructions. Do not proceed with Work without clear instructions.
3. Perform Work in strict accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.
4. The Contractor shall have on hand sufficient proper equipment and machinery of ample capacity to facilitate the installation of the Work and to handle all emergencies normally encountered in Work of this character.
5. Equipment shall be installed in a neat and workmanlike manner on the foundations at the locations and elevations shown on the Plans, unless directed otherwise by the Engineer during installation.
6. All equipment shall be correctly aligned, leveled and adjusted for satisfactory operation and shall be installed so that proper and necessary connections can be made readily between the various units.

7. The Contractor shall furnish, install and protect all necessary anchor and attachment bolts and all other appurtenances needed for the installation of the devices included in the equipment specified. Anchor bolts shall be as approved by the Engineer and made of ample size and strength for the purposes intended. Substantial templates and working drawings for installation shall be furnished by the manufacturer.

E. OPERATING AND MAINTENANCE DATA

1. The Contractor shall furnish one (1) set of preliminary manufacturers' operation and maintenance materials and manuals for review by the Engineer in the same manner as shop drawing submittals. The Contractor shall furnish one (1) set of final equipment manufacturer's operation and maintenance materials and manuals for use by the Owner, after incorporating Engineers' review comments.

F. MANUFACTURER'S SERVICE

1. Where service by the manufacturer is specified to be furnished as part of the cost of the item of equipment, the Work shall be at the Contractor's expense.
2. The services provided shall be by a qualified manufacturer's service representative to check the completed installation, place the equipment in operation, and instruct the Owner's operators in the operation and maintenance procedures. Such services are to be for period of time and for the number of trips specified. A working day is defined as a normal 8-hour working day on the job and does not include travel time.
3. The services shall further demonstrate to the Engineer's complete satisfaction that the equipment will satisfactorily perform the functions for which it has been installed. See also Article 1.13; Start-up.

G. INSPECTION AND TESTING

1. General
 - a. If, in the testing of any material or equipment, it is ascertained by the Engineer that the material or equipment does not comply with the Contract, the Contractor shall be notified thereof, and he will be directed to refrain from delivering said material or equipment, or to remove it promptly from the site or from the Work and replace it with acceptable material, without cost to the Owner.
 - b. Tests of electrical and mechanical equipment and appliances shall be conducted in accordance with recognized test codes of the ANSI, ASME, or the IEEE, except as may otherwise be stated herein.
2. Cost
 - a. Owner shall employ and pay for the services of an independent testing laboratory to perform testing specifically indicated on the Contract Documents or specified in the Specifications and may at any other time elect to have materials and equipment tested for conformity with the Contract Documents.
 - b. The cost of any shop tests of materials and equipment specifically called for in the Contract Documents shall be borne by the Contractor, and such costs shall be deemed to be included in the Contract price.
 - c. Notify Owner employed-laboratory sufficiently (a minimum of 48 hours) in advance of operations to allow for laboratory assignment of personnel and scheduling of tests. When tests or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred.
 - d. Contractor shall employ and pay for the services of the same or a separate, equally qualified independent testing laboratory to perform additional inspections, sampling

and testing required for the Contractor's convenience and as approved by the Owner.

- e. If the test results indicate the material or equipment complies with the Contract Documents, the Owner shall pay for the cost of the testing laboratory. If the tests and any subsequent retests indicate the materials and equipment fail to meet the requirements of the Contract Documents, the Contractor shall pay laboratory costs of such failed tests. The total of such costs shall be deducted from any payments due to the Contractor.
- f. The Contractor shall pay for all Work required to uncover, remove, replace, retest, etc. any Work not tested due to the Contractor's failure to provide the minimum 48 hours advance notice or due to failed tests.

3. Field Testing

- a. The Owner shall employ and pay for services of an independent testing laboratory to perform testing specifically indicated in the Contract Documents. Employment of the laboratory shall in no way relieve Contractor's obligations to perform the Work of the Contract.
- b. The Owner may at any time during the progress of the Work request additional testing beyond that which is specified in the Contract. This testing will be at the Owner's expense. The Contractor shall assist the testing laboratory personnel in all ways so as to facilitate access to the location of the material or equipment to be tested.
- c. Contractor shall:
 - 1) Cooperate with laboratory personnel, provide access to the Project.
 - 2) Secure and deliver to the laboratory adequate quantities of representative samples of materials proposed to be used and which require testing.
 - 3) Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other material mixes which require control by the testing laboratory.
- d. The following schedule summarizes the responsibilities of various tests that may be required by the Contract Documents. Contractor shall notify Owner in advance of work so that arrangements can be made with the testing laboratory.

TEST	NOTES	PAID FOR
Soil Compaction	A. Structures: As a minimum one test per 2,000 SF of fill area per lift, or at least 2 tests per structure, per lift. As specified in material specifications sections.	Owner
Concrete	Slump test each delivery, cylinders every 20 CY	Owner
All Other Testing	As specified in various sections of the Project Manual	As Indicated

- 4. Demonstration Tests: Upon completion of the Work and prior to final payment, all equipment installed under this Contract shall be subjected to acceptance or demonstration tests as specified or required to provide compliance with the Contract Documents. The Contractor shall furnish all labor, fuel, energy, water and all other equipment necessary for the demonstration tests at no additional cost to the Owner. See Article 1.13 - Start-up.

5. Final Inspection: Prior to preparation of the final payment application, a final inspection will be performed by the Owner and the Engineer to determine if the Work is properly and satisfactorily constructed in accordance with the requirements of the Contract Documents. See Article 1.14 - Closeout.
6. Inspection by Other Agencies: The Florida Department of Transportation, the Florida Department of Environmental Protection, Water Management Districts, Orange County EPD, and other authorized governmental agencies shall have free access to the site for inspecting materials and Work, and the Contractor shall afford them all necessary facilities and assistance for doing so. Any instructions to the Contractor resulting from these inspections shall be given through the Owner/Engineer. These rights of inspections shall not be construed to create any contractual relationship between the Contractor and these agencies.

H. WARRANTIES AND BONDS

1. The Contractor shall submit warranties and bonds as specified in the General Conditions and as specified herein. Co-execute submittals when so specified.
2. In the event that the equipment manufacturer or supplier is unwilling to provide a one-year warranty commencing at the time of the Owner acceptance, the Contractor shall obtain from the manufacturer a two (2) year warranty commencing at the time of equipment delivery to the job site. This two-year warranty from the manufacturer shall not relieve the Contractor of the one-year warranty starting at the time of Owner acceptance of the equipment.
3. If an individual specification section requires a particular warranty more stringent than that required by this Section or the General Conditions, the more stringent requirements shall govern for the applicable portion of the Work.
4. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors, and bind into a commercial quality standard three (3) ring binder; submit one (1) copy of the warranties and bonds to the Engineer for review and transmittal to the Owner.
5. The warranties and bonds shall include:
 - a. Equipment or product description
 - b. Manufacturer's name, principal, address and telephone number
 - c. Contractor, name of responsible principal, address and telephone number.
 - d. Local supplier's or representative's name and address
 - e. Scope of warranty or bond
 - f. Proper procedure in case of failure
 - g. Instances which might affect the validity of warranty or bond
 - h. Date of beginning of warranty, bond or service and maintenance contract
 - i. Duration of warranty, bond or service maintenance contract

I. TOOLS AND ACCESSORIES

1. The Contractor shall furnish with each type, kind or size of equipment, one complete set of suitably marked high grade special tools and accessories which may be needed to adjust, operate, maintain or repair the equipment (including special grease guns or other lubricating tools).
2. Such tools and accessories shall be furnished in approved painted steel tool cases, properly labeled and equipped with good grade cylinder locks and duplicate keys no later than upon start-up.
3. Each piece of equipment shall be provided with a substantial stainless steel nameplate, securely fastened in place and clearly inscribed with the manufacturer's name, year of manufacture, serial number, weight and principal rating data.

- J. SPARE PARTS: May be specified for certain equipment in the pertinent sections of the Specifications. The Contractor shall collect and store all spare parts during construction and shall surrender such to the Owner in original boxes or containers upon final inspection. In addition, the Contractor shall furnish to the Owner an inventory listing all spare parts, the equipment they are associated with, the name and address of the supplier, and the delivered cost of each item. Copies of actual invoices for each item shall be furnished with the inventory to substantiate the delivered cost.
- K. HAULING AND CONSTRUCTION OPERATIONS: The Contractor shall conduct access, hauling, filling and storage operations on-site as specified herein and as shown on the Contract Drawings.
 - 1. Unsuitable Material: All unsuitable material shall become the property and responsibility of the Contractor. The Contractor shall properly dispose of all such unsuitable materials off-site in accordance with local, State and Federal Regulations.
- L. USE OF CHEMICALS: All chemicals used during the project construction furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or other classification, must show approval of either the Environmental Protection Agency or the U.S. Department of Agriculture. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.

1.04 PROJECT SITE AND ACCESS

A. RIGHT-OF-WAY AND EASEMENTS

- 1. The use of public streets and alleys shall be such as to provide a minimum of inconvenience to the public and to other traffic. Any earth or other excavated material spilled from trucks shall be removed by the Contractor and the streets cleaned to the satisfaction of the Owner.
- 2. The Contractor shall not enter or occupy private land outside of easements, except by written permission of the property owner.
- 3. At the time of the preconstruction meetings, the Contractor shall fully acquaint himself with the status of all easements required for the Work and the possibility of parcels remaining to be acquired, if any. Should easements not be acquired by the Owner in specific areas of the Work, the Contractor shall sequence and reschedule his work therein so as not to interfere with the progress of work in other areas of the Project. Such rescheduling of Work shall be performed by the Contractor at no additional cost to the Owner. The Owner agrees that it will make every effort to acquire all remaining easements with all speed and diligence possible so as to allow the completion of the Work within the Contract time.

B. ACCESS

- 1. Neither the material excavated nor the materials or equipment used in the construction of the Work shall be so placed as to prevent free access to all fire hydrants, valves or manholes.
- 2. Contractor agrees that representatives of the Owner and any governmental agents will have access to the Work wherever it is in preparation or progress and that the Contractor shall provide facilities for such access and inspection.

1.05 PERMITS

- A. Upon Notice of Award, the Contractor shall immediately apply for all other applicable permits to construct the Work from the Town of Windermere, which will be provided at no cost to the Contractor. No Work shall commence until all applicable permits have been obtained.

1.06 UTILITIES

A. UTILITY CONSTRUCTION

1. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required.

B. EXISTING UTILITIES

1. The locations of all existing underground piping, structures and utilities have been taken from information received from the respective owner. The locations are shown without express or implied representation, assurance, or guarantee that they are complete or correct or that they represent a true picture of underground piping to be encountered.
2. The Contractor shall, at all times in performance of the Work, employ approved methods and exercise reasonable care and skill so as to avoid unnecessary delay, injury, damage or destruction of existing public utility installations and structures; and shall, at all times in the performance of the Work, avoid unnecessary interference with, or interruption of, public utility services; and shall cooperate fully with the owners thereof to that end.
3. The Contractor shall exercise care in any excavation to locate all existing piping and utilities. All utilities which do not interfere with the completed Work shall be carefully protected against damage. Any existing utilities damaged in any way by the Contractor shall be restored or replaced by the Contractor at his expense as directed by the Owner/Engineer. Any existing facilities which require operation to facilitate repairs shall be performed only by the owner of the respective utility.
4. It is the responsibility of the Contractor to ensure that all utility or other poles, the stability of which may be endangered by the proximity of excavation, be temporarily stayed and/or shored in position while Work proceeds in the vicinity of the pole and that the utility or other companies concerned be given reasonable advance notice of any such excavation by the Contractor.

C. NOTICES

1. All governmental utility departments and other owners of public utilities which may be affected by the Work will be informed in writing by the Contractor within two weeks after the execution of the Contract or Contracts covering the Work. Such notice will be sent out in general, and directed to the attention of the governmental utility departments and other owners of public utilities for such installations and structures as may be affected by the Work.
2. The Contractor shall also comply with Florida Statute 553.851 regarding notification of existing gas and oil pipeline company owners. Evidence of such notice shall be furnished to the Owner within two weeks after the execution of the Contract.
3. It shall be the Contractor's responsibility to contact utility companies at least 48 hours in advance of breaking ground in any area or on any unit of the Work so maintenance personnel can locate and protect facilities, if required by the utility company.
4. The Contractor shall, prior to interrupting a utility service (water, sewer, etc.) for the purpose of making cut-ins to the existing lines or for any other purposes, contact the utility owner and make arrangements for the interruption which will be satisfactory to the utility owner.

D. RELOCATIONS

1. Relocations not shown on the Drawings
 - a. Where public utility installations or structures are encountered during the course of the Work, and are not indicated on the Drawings or in the Specifications, and when, in the opinion of the Owner/Engineer, removal, relocation, replacement or rebuilding is necessary to complete the Work under this contract, such Work shall be accomplished by the utility having jurisdiction, or such Work may be ordered, in writing by the Owner/Engineer, for the Contractor to accomplish.
 - b. If such Work is accomplished by the utility having jurisdiction, it will be carried out expeditiously and the Contractor shall give full cooperation to permit the utility to complete the removal, relocation, replacement or rebuilding as required. If such Work is accomplished by the Contractor, it will be paid for as a Change Order.
2. All existing utility castings, including valve boxes, junction boxes, manholes, hand holes, pull boxes, inlets and similar structures in the areas of construction that are to remain in service and in areas of trench restoration and pavement replacement, shall be adjusted by the Contractor to bring them flush with the surface of the finished Work.

1.07 RELATED CONSTRUCTION REQUIREMENTS

A. TRAFFIC MAINTENANCE

1. Maintain public highway traffic within the limits of the project for the duration of the construction period, including any temporary suspensions of Work. Work shall also include construction and maintenance of any necessary detour facilities; furnishing, installing and maintaining of traffic control and safety devices during construction, control of dust, or any other special requirements for safe and expeditious movement of vehicular and pedestrian traffic.
2. Traffic Control shall be provided at the Contractor's expense by the Contractor's personnel or off-duty uniformed police officer, depending on and as required by the applicable traffic control requirements jurisdictional to the construction or road.
3. The Contractor shall prepare a Traffic Control Plan prior to commencing any Work on the site. The Traffic Control Plan shall detail procedures and protective measures for protection and control of traffic affected by the Work consistent with the following applicable standards:
 - a. Standard Specifications for Road and Bridge Construction, (Latest Edition) including all subsequent supplements issued by the Florida Department of Transportation, (FDOT Spec.).
 - b. Manual of Traffic Control and Safe Practices for Street and Highway Construction, Maintenance and Utility Operations, FDOT (Latest Edition).
 - c. Right-of-Way Utilization Regulations, Orange County, Florida, Latest Edition.

All references to the respective agency in the above referenced standards shall be construed to also include the Owner for this Work.
4. Before closing any thoroughfare, the Contractor shall give written notice to and, if necessary, obtain a permit or permits from the duly constituted public authority having jurisdiction over the thoroughfare. Notice shall be given no less than 72 hours in advance of the time when it may be necessary in the process of construction to close such thoroughfare, or as may be otherwise provided in the approved Traffic Control Plan.

5. The Contractor shall sequence and plan construction operations and shall generally conduct his Work in such a manner as not to unduly or unnecessarily restrict or impede existing normal traffic through the streets of the local community.
 6. Insofar as it is practicable, excavated material and spoil banks shall not be located in such a manner as to obstruct traffic. The traveled way of all streets, roads and alleys shall be kept clear and unobstructed insofar as is possible and shall not be used for the storage of construction materials, equipment, supplies, or excavated earth, except when and where necessary.
 7. If required by duly constituted public authority, the Contractor shall, at his own expense, construct bridges or other temporary crossing structures over trenches so as not to unduly restrict traffic. Such structures shall be of adequate strength and proper construction and shall be maintained by the Contractor in such a manner as not to constitute an undue traffic hazard. Private driveways shall not be closed except when and where necessary, and then only upon due advance notice to the Owner/Engineer and for the shortest practicable period of time consistent with efficient and expeditious construction. The Contractor shall be liable for any damages to persons or property resulting from his work.
 8. The Contractor shall make provisions at all "open cut" street crossings to allow a minimum of one lane to be open for vehicular traffic at all times. Lane closing shall be as permitted by the local governing authority and shall be repaired to a smooth, safe driving surface immediately following the installation of pipe or conduit. Flagmen shall be required, in addition to barricades, signs and other protective devices at all lane closings.
 9. The Contractor shall make provisions at cross streets for the free passage of vehicles and pedestrians, either by bridging or otherwise, and shall not obstruct the sidewalks, gutters, or streets, nor prevent in any manner the flow of water in the latter, but shall use all proper and necessary means to permit the free passage of surface water along the gutters.
 10. The Contractor shall immediately cart away all offensive matter, exercising such precaution as may be directed by the Owner/Engineer. All material excavated shall be so disposed of as to inconvenience the public and adjacent tenants as little as possible and to prevent injury to trees, sidewalks, fences and adjacent property of all kinds.
 11. All vehicles and equipment within 10 feet of any roadway shall have flashing strobe lights.
- B. **BARRIER AND LIGHTS:** The Contractor shall exercise extreme care in the conduct of the Work to protect health and safety of the workmen and the public. The Contractor shall provide all protective measures and devices necessary, in conformance with applicable local, state and federal regulations regarding their need and use. Protective measures shall include but are not limited to barricades, warning lights/flashers and safety ropes.
- C. **DUST, NOISE AND EROSION CONTROL**
1. The Contractor shall prevent dust nuisance from his operations or from traffic by the use of water and deliquescent salts.
 2. **Noise Suppression**
 - a. The Contractor shall eliminate noise to as great an extent as practical at all times. Air compressing plants shall be equipped with silencers and the exhaust of all gasoline motors or other power equipment shall be provided with mufflers. In the vicinity of hospitals and schools, special care shall be used to avoid noise or other nuisances. The Contractor shall strictly observe all local regulations and ordinances covering noise control.
 - b. Sound levels measured by the Owner/Engineer's personnel shall not exceed 45 dBA after 8 p.m. or 55 dBA 8 a.m. to 8 p.m. This sound level shall be measured at the exterior of the nearest exterior wall of the nearest residence or building. Levels at the equipment shall not exceed 85 dBA at any time. Sound levels in excess of

these values are sufficient cause to have the Work halted until equipment can be quieted to these levels. Work stoppage by the Owner/Engineer for excessive noise shall not relieve the Contractor of other contractual responsibilities stipulated in the Contract Documents including, but not limited to Contract Price and time.

3. Erosion and Sedimentation Control

- a. Temporary erosion controls include, but are not limited to, grassing, mulching, netting, watering and reseeding on-site surfaces and soil and borrow area surfaces and providing interceptor ditches at ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by the Owner, FDEP and any other agency having jurisdiction.
- b. Temporary sedimentation controls include, but are not limited to, silt dams, traps, barriers, and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the Owner, FDEP and any other agency having jurisdiction.
- c. The construction of temporary erosion and sedimentation control facilities shall be in accordance with the technical provision of section 104-6.4 of the (Latest Edition), FDOT Standard Specifications for Road and Bridge Construction.
- d. Contractor is responsible for providing effective temporary erosion and sediment control measures during construction or until final controls become effective.

D. LINES AND GRADES

1. All Work under this Contract shall be constructed in accordance with the lines and grades shown on the Drawings, or as given by the Engineer. The full responsibility for keeping alignment and grade shall rest upon the Contractor.
2. The Contractor shall, at his own expense, establish all working or construction lines and grades as required from the project control points set by the Owner/Engineer, and shall be solely responsible for the accuracy thereof.

E. CUTTING AND PATCHING

1. The Contractor shall do all cutting, fitting or patching of his portion of the Work that may be required to make the several parts thereof join and coordinate in a manner satisfactory to the Engineer and in accordance with the Drawings and Specifications.
2. Preparation
 - a. Inspect the existing conditions of the project, including elements subject to damage and/or movement during cutting and patching.
 - b. Provide adequate temporary support to assure the structural integrity of all facilities during completion of the Work.
3. Performance
 - a. Execute cutting and demolition by methods which will prevent damage to other existing facilities and will provide proper surfaces to receive installation of equipment and repair.
 - b. Excavation and backfilling shall be performed in a manner which will prevent settlement and/or damage to existing facilities.
 - c. All pipes, sleeves, ducts, conduits and other penetration through surfaces shall be made airtight.

- d. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes.

F. DAILY REPORTS

1. The Contractor shall submit to the Owner's Representative daily reports of construction activities including non-work days. The reports shall be complete in detail and shall include the following information:
 - a. Days from Notice to Proceed; Days remaining to substantial and final completion
 - b. Weather Information;
 - c. Work activities with reference to the CPM schedule activity numbers (including manpower, equipment and daily production quantities for each individual activity);
 - d. Major deliveries;
 - e. Visitors to site;
 - f. Test records;
 - g. New problems, and;
 - h. Other pertinent information.

For each day, the CONTRACTOR shall prepare a "DAILY CONSTRUCTION REPORT" (Form F-00848) or an alternate form approved by Owner/Engineer.

2. A similar report shall be submitted for/by each Subcontractor.
3. The report(s) shall be submitted to the Resident Project Representative's Field Office within two (2) days of the respective report date. Each report shall be signed by the CONTRACTOR's Superintendent or Project Manager.

If a report is incomplete, in error, or contains misinformation, a copy of the report shall be returned by the Resident Project Representative to the CONTRACTOR's Superintendent or Project Manager with corrections noted. When chronic errors or omissions occur, the CONTRACTOR shall correct the procedures by which the reports are produced.

G. CLEANING

1. During Construction
 - a. During construction of the Work, the Contractor shall, at all times, keep the site of the Work and adjacent premises as free from material, debris and rubbish as is practicable and shall remove the same from any portion of the site if, in the opinion of the Owner/Engineer, such material, debris, or rubbish constitutes a nuisance or is objectionable.
 - b. Provide on-site containers for the collection of waste materials, debris and rubbish and remove such from the site periodically by disposal at a legal disposal area away from the site.
 - c. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces. Use only those cleaning materials and methods recommended by the manufacturer of the surface material to be cleaned. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly coated surfaces.
 - d. The Contractor shall remove from the site all surplus materials and temporary structures when no longer necessary to the Work at the direction of the Owner/Engineer.

2. Final Cleaning

- a. At the conclusion of the Work, all equipment, tools, temporary structures and materials belonging to the Contractor shall be promptly taken away, and he shall remove and promptly dispose of all water, dirt, rubbish or any other foreign substances. Employ skilled workmen for final cleaning. Thoroughly clean all installed equipment and materials to a bright, clean, polished and new appearing condition. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.
 - b. The Work shall be left in a condition as shown on the Drawings and the remainder of the site shall be restored to a condition equal or better than what existed before the Work.
- H. PROJECT SIGNS: One project sign shall be furnished and installed on the project site by the Contractor at locations determined by the Owner/Engineer. The utilities project information shall be shown on the project sign. The Contractor may be required to relocate these identifying project signs during the progress of the Work. Each sign shall be approximately 4 x 4 feet in size, and shall contain the project name, construction cost and names of the Owner or governing council, Engineer and Contractor. Wood shall be pressure treated and fasteners galvanized.

1.08 PROJECT MEETINGS

A. GENERAL

1. The Contractor shall attend all meetings to ascertain that work is expedited consistent with the Contract Documents and construction schedules.
2. Representatives of the Owner, Engineer, contractors, subcontractors, suppliers and utility owners attending meeting shall be qualified and authorized to act on behalf of the entity each represents.
3. The Engineer will schedule and administer the preconstruction meeting, periodic progress meetings, and specially called meetings throughout the progress of the work (i.e., prepare agenda for meetings, make physical arrangements for meetings and, preside at meetings, prepare meeting minutes). A copy of the minutes of each progress meeting will be available forty-eight (48) hours before the next scheduled meeting.
4. Contractor shall record the Preconstruction Meeting and each progress meeting in their entirety, and shall provide the Engineer a regular cassette copy of such recording, having good quality and clarity.

B. PRECONSTRUCTION MEETING

1. A preconstruction meeting shall be held after date of Notice of Award and before the date of Notice to Proceed at a central site, convenient for all parties, designated by the Owner/Engineer.
2. Attendance
 - a. Owner's Representative
 - b. Engineer and his professional consultants
 - c. Contractor and his superintendent
 - d. Contractor and his superintendent
 - d. Major subcontractors
 - e. Utilities, if applicable
 - f. Others as appropriate
 - h. Others as appropriate

C. PROGRESS MEETINGS

1. Progress meetings will be held every thirty (30) days or less with the first meeting thirty (30) days after the Preconstruction Meeting or thirty (30) days or less after the date of Notice to Proceed unless otherwise noted.

2. Progress meeting dates and time shall be scheduled at the Preconstruction Meeting for the entire duration of the Work on a monthly calendar basis. All progress meetings shall be held at a place to be determined by the Owner.
3. Attendance:
 - a. Owner's Representative
 - b. Engineer/prof. consultants as needed
 - c. Contractor
 - d. Subcontractors as appropriate to agenda
 - e. Suppliers as appropriate to agenda
 - g. Others as appropriate

1.10 CONSTRUCTION PROGRESS SCHEDULE

- A. Within thirty (30) days after Award of the Contract or before the Preconstruction Meeting, prepare and submit to the Owner/Engineer estimated construction progress schedules for the Work with subschedules of related activities which are essential to its progress. The construction schedule shall be developed by the Critical Path Method (CPM) utilizing Primavera (Primavera Systems, Inc., Bala Cynwyd, PA) computer software, or equal compatible with computers using Windows® operating systems.
- B. Contractor's Responsibility; Contractor shall:
 1. Determine the sequence of activities for the orderly progression of the Work.
 2. Determine appropriate time estimates of the detailed construction activities.
 3. Determine the means, methods, techniques and procedures to be employed in the prosecution of the Work in compliance with the Contract Documents.
 4. Monitor the Construction Schedule in a timely manner.
 5. Accurately update and revise the Construction Schedule as project conditions and the Contract Documents may require.
 6. Consult with his Subconsultant(s) in the preparation and submittal process of the Construction Schedule.
 7. Allow for his cooperation with the operation of the Owner and the work of other separate contractors, as applicable.
 8. Use the schedule to report progress and for determining delays in achieving the project completion date(s).

1.11 SHOP DRAWINGS, WORKING DRAWINGS AND SAMPLES

- A. GENERAL: The Contractor shall submit to the Engineer for review and approval, if any, such working drawings, shop drawings, test reports and data on materials and equipment, and material samples as are specified elsewhere in the specifications and in the Contract Drawings.
- B. CONTRACTOR'S RESPONSIBILITY - The Contractor shall:
 1. Check all drawings, data and samples prepared by or for him before submitting them to the Engineer for review;
 2. Stamp each data submittal with "Contractor's Stamp" indicating that they have been checked. Shop drawings submitted to the Engineer without the "Contractor's Stamp" will be returned for non-conformance with this requirement;
 3. Determine and verify field measurements and construction criteria;

4. Determine and verify specific catalog numbers and similar data (other catalog or manufacturer's data not pertinent to the submittal shall be crossed or marked out).
5. Determine and verify general conformance with Contract Documents.
6. Not begin any work covered by a shop drawing returned for correction until a revision or correction thereof has been reviewed, approved and returned to the Contractor by the Engineer. The Contractor shall be responsible for and bear all costs for damages which may result from the ordering of any material or from proceeding with any part of the work prior to the review and approval by the Engineer of the necessary shop drawings;
7. Carry out the construction in accordance with the Engineer approved shop drawings and shall make no further changes therein except upon written instruction from the Engineer;
8. Submit to the Engineer all shop drawings, samples and schedules sufficiently in advance of construction requirements to provide no less than thirty (30) calendar days for checking, and appropriate action;
9. List exceptions to the specifications taken by the Contractor in the letter of Shop Drawing Transmittal to the Engineer.

C. ENGINEER'S RESPONSIBILITY - the Engineer will:

1. Review shop drawings, data, and samples submitted by the Contractor to interpret the work depicted on such submittal to be in general conformance with the design concept and in general compliance with the Contract Document requirements. The Engineer's review and approval, if any, constitutes a limited, conditional or qualified permission to use such materials, equipment or methods and does not constitute an approval of dimensions, quantities, details of the material, equipment, device or item submitted.
2. Review and return shop drawing submittals within 30 calendar days of receipt.
3. Reject and return shop drawings to the Contractor without action or review with the following applicable notation:
 - a. "Contractor's Stamp required - Incomplete Review by Contractor", or
 - b. "Submittal Not Required by Contract Documents", or
 - c. "Submittal Incomplete - See Section _____", or
 - d. "Contract Variation Not Noted in Transmittal".

D. SUBMITTAL PROCEDURES

1. Preliminary Shop Drawing Data: Within 30 days after the Award of the Contract or before the Preconstruction Meeting, the Contractor shall submit to the Engineer a complete listing of manufacturers for all items for which shop drawings are to be submitted.
2. Shop Drawing Submittal Schedule: Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer a complete schedule of shop drawing submittals fixing the respective dates for submission, the beginning of manufacture, testing, and installation of materials, supplies and equipment, noting those submittals critical to the progress schedule.
3. Submittal Log: An accurate updated log of submittals maintained by the Contractor and subject to review by the Owner/Engineer at each scheduled progress meeting.
4. When reviewed by the Engineer, each of the shop drawings will be identified as having received such review, being so stamped and dated. Shop drawings stamped "REJECTED" will be returned to the Contractor for correction and resubmittal with the required correction indicated on the shop drawing or listed on a "Shop Drawing Review Comment Sheet".

5. If submitted drawings or schedules show a departure or variation from the Contract Requirements which the Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.
6. If the Contractor considers any correction indicated on the drawings to constitute a change to the Contract Drawings or specifications, the Contractor shall give written notice thereof to the Engineer. This does not constitute a change order until approved by the Owner.
7. Resubmittals will be handled in the same manner as first submittals. On resubmittals, the Contractor shall direct specific attention on the transmittal and on resubmitted shop drawings to revisions other than the corrections requested by the Engineer on previous submissions. The Contractor shall make any corrections required by the Engineer.
8. The Engineer will review a submittal/resubmittal a maximum of two (2) times after which the cost of review will be borne by the Contractor at the Engineer's standard hourly rate.
9. No partial submittals will be reviewed. Submittals not complete will be returned to the Contractor, and will be considered "Rejected" until properly resubmitted
10. Contractor shall submit a minimum of five (5) sets, plus additional sets as required by his subcontractors, of each shop drawing submittal for review. The Engineer will distribute shop drawings as follows for the indicated action taken:

SHOP DRAWING SUBMITTAL DISTRIBUTION						
Representative Party	Approved (A) Approved as Noted (AN)			Not Approved (NA)		
	Submittal Transmittal	Shop Drawing	Review Comment Sheet	Submittal Transmittal	Shop Drawing	Review Comment Sheet
Engineer	Original	File Copy	1 Copy	Original	File Copy	1 Copy
Contractor (see Note 1)	1 Copy	1 Copy Each Submittal	1 Copy	1 Copy	All Copies Except Engrs. File Copy	1 Copy
Owner	1 Copy	1 Copy Each Submittal	1 Copy	1 Copy	None	1 Copy
Structural Engineer Subconsultant (see Note 3)	1 Copy	1 Copy Each Submittal	1 Copy	1 Copy	None	1 Copy
NOTES: 1. Contractor shall distribute additional copies to subcontractors as required. 2. Stored by Contractor to be furnished to Owner/Engineer upon closeout. 3. Provide Shop Drawing Submittal set for Division 3 through Division 8. 4. Provide Shop Drawing Submittal set for Division 13 and Division 16, Section 15400 and Section 15800.						

11. All shop drawing submittals shall be accompanied with a transmittal letter (PEC Form 00864 - Shop Drawing Transmittal) providing the following information:
 - a. Project Title and Contract Number

- b. Date
 - c. Contractor's name and address
 - d. The number of each shop drawing, project data, and sample submitted.
 - e. Notification of Deviations from Contract Documents
 - f. Submittal Log Number conforming to specification section numbers
 - 1) Submit each specification section separately.
 - 2) Identify each shop drawing item required under respective specification section.
 - 3) Identify resubmittals using specification section followed by A (first resubmittal), B (second resubmittal) ... etc.
- E. SHOP DRAWINGS: The term "Shop Drawings" shall be construed to mean Contractor's plans for material and equipment which become an integral part of the Project. Shop drawings shall consist of fabrication, erection and setting drawings and schedule drawings, manufacturer's scale drawings, wiring and control diagrams, material and equipment lists, catalog data sheets, cuts, performance curves, diagrams, materials of construction and similar descriptive material.
- 1. Shop drawings shall be prepared in a manner and sufficient detail to enable the Engineer to determine compliance with all stated specification requirements.
 - 2. Drawings and schedules shall be checked and coordinated with the work of all trades involved before they are submitted for review by the Engineer and shall bear the Contractor's stamp of approval as evidence of such checking and coordination.
 - 3. If drawings show variation from Contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in his letter of transmittal. If acceptable, proper adjustment in the Contract shall be implemented where appropriate. If the Contractor fails to describe such variations, he shall not be relieved of the responsibility for executing the Work in accordance with the Contract, even though such drawings have been reviewed.
- F. SAMPLES: The Contractor shall furnish, for the approval of the Engineer, samples required by the Contract Documents or requested by the Engineer.
- 1. Samples shall be delivered to the Engineer as specified or directed. The Contractor shall prepay all shipping charges on samples.
 - 2. Approval of a sample shall be only for the characteristics or use named in such approval and shall not be construed to change or modify any Contract requirements. Materials or equipment for which samples are required shall not be used in work until approved by the Engineer. Materials and equipment incorporated in Work shall match the approved samples.
 - 3. Approved samples not destroyed in testing shall be sent to the site of the Work. Approved samples of the hardware in good condition will be marked for identification and may be used in the Work. Samples which failed testing or were not approved will be returned to the Contractor at his expense, if so requested at the time of submission.

1.12 PROJECT RECORD DOCUMENTS

- A. The Contractor shall maintain at the site, for the Owner, one record copy of the following to be submitted to the Engineer for the Owner at Project Closeout:
1. Conformed Drawings
 2. Conformed Specifications
 3. Addenda
 4. Change Orders and other modifications to the Contract
 5. Progress Photographs
 6. Construction Progress Schedules
 7. Field Orders
 8. Contractor's Requests for Additional Information
 9. Approved Shop Drawings
 10. Field Test Records
- B. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.

1.13 START-UP

- A. Start-Up DEMONSTRATION AND TESTING Certification
1. After all Work components have been constructed, field tested and the start-up CHECK-OUT completed in accordance with the manufacturer requirements, perform Start-up DEMONSTRATION AND TESTING in the presence of the Engineer and the Owner.
 2. The intent of the start-up demonstration and testing is for the Contractor to demonstrate to the Owner and Engineer that the Work will function as a complete and operable system under normal as well as emergency operating conditions and is ready for acceptance. The demonstration shall be conducted upon completion of all systems at a date to be agreed upon in writing by the Owner or his representative.

1.14 CONTRACT CLOSEOUT

A. SUBSTANTIAL COMPLETION

1. When the Contractor considers the Work as substantially complete, he shall submit to the Engineer a written notice stating so and requesting the Engineer to make an inspection to determine the status of completion. This request shall be accompanied by a list of items to be completed or corrected.
2. Should the Engineer determine that the work is not substantially complete, the Engineer will promptly notify the Contractor in writing, given the reasons therefore the Contractor shall remedy the deficiencies in the Work, and send a second written notice of substantial completion to the Engineer for reinspection.

B. FINAL INSPECTION

1. When the Contractor considers the Work complete, he shall submit written certification that:
 - a. Contract Documents have been reviewed.
 - b. Work has been inspected for compliance with Contract Documents.
 - c. Work has been completed in accordance with Contract Documents.
 - d. Equipment and systems have been tested in the presence of the Owner's Representative and are operational.
 - e. Work is completed and ready for final inspection.
2. The Engineer will make a final inspection to verify the status of completion after receipt of such certification.
3. Should the Engineer consider that the Work is incomplete or defective, he will promptly notify the Contractor in writing, listing the incomplete and defective work, to the best of his

knowledge at that time. If the Engineer has inadvertently omitted any items from the list it shall not relieve the Contractor from his obligations shown on the Drawings and specified in the Project Manual. Contractor shall take immediate steps to remedy the stated deficiencies, and send a second written certification to the Engineer that the Work is complete.

4. When the Engineer finds that the Work is acceptable under the Contract Documents, he shall request the Contractor to make closeout submittals.
5. Should the Engineer perform reinspection due to failure of the work to comply with the claims of status of completion made by the Contractor, the Owner will deduct the amount of any compensation or costs paid for additional inspections or tests from the final payment to the Contractor.

C. CONTRACTOR'S CLOSE-OUT SUBMITTALS TO ENGINEER

1. Evidence of compliance with requirement of governing authorities.
2. Project Record Documents.
3. Operating and Maintenance Data.
4. Evidence of Payment and Release of Liens
5. Certificate of Insurance for Products and Completed Operations
6. Warranties and Bonds (required for the Correctional Period and Maintenance Period).
7. Spare Parts and Maintenance Materials.
8. *Supplier and Subcontractor Final Waiver and Release of Lien(s), and Contractor's, Supplier's and Subcontractor's Final Affidavit(s). (Required information shall conform to Chapter 713 of the Florida Statutes, Supplement 1996.)*
9. Final Application for Payment, including "Consent of Surety to Final Payment", "Final Statement of Accounting" and final Change Order, if required. The final Statement of Accounts shall reflect the following adjustments to the Contract Price:
 - a. Previous Change Orders
 - b. Allowances
 - c. Unit prices
 - d. Deductions for uncorrected work
 - e. Penalties and bonuses
 - f. Deductions for liquidated damages
 - g. Deductions for reinspection payments
 - h. Other adjustments

The Engineer will prepare a final Change Order, reflecting approved adjustments to the Contract Price which were not previously made by Change Orders.

1.15 SPECIAL PROJECT PROCEDURES

If construction work requires operations other than Regular Working Hours, the CONTRACTOR shall obtain written permission of the OWNER at least seventy-two (72) hours in advance of starting such work, and shall set forth the proposed schedule for overtime to give OWNER ample time to arrange for his/her personnel to be at the site of the Work. Work outside the Regular Working hours requiring presence of the OWNER's Resident Project Representative (RPR) shall require the CONTRACTOR to reimburse the OWNER for the salary and overtime cost for the RPR.

END OF SECTION

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Work under this Contract is described as:

**TOWN OF WINDERMERE
ORANGE COUNTY, FLORIDA**

BID #2023-02

WEST SECOND AVENUE ROADWAY AND DRAINAGE IMPROVEMENTS

This bid includes a drainage improvement project as follows:

The project involves the construction of additional drainage infrastructure along West Second Avenue and the associated roadway and utility work. The work involves the construction of French drains and non-slotted pipes within the project area to improve the capture and conveyance of stormwater runoff volume; and to provide supplemental treatment of stormwater runoff prior to discharging into Wauseon Bay and Lake Butler. The project outfalls to different locations including an existing grassed swale along the north side of First Avenue, which is controlled by an existing concrete weir prior to discharging into Wauseon Bay. The project construction will be partially funded by the Federal Emergency Management (FEMA) under the disaster declaration under Hurricane Irma (2017). In addition, potable water main improvements will be conducted concurrently with the construction of the roadway and drainage improvements. Water main stub-outs are to be constructed for the side streets east of Pine Street and the existing 6" water main west of Pine Street is to be replaced with an 8" water main pursuant to the Town's Water Plan.

The Specification Divisions and Drawings are an integrated part of the Contract Documents and as such will not stand alone if used independently as individual Sections, Divisions or Drawings sheets.

The Specifications and Drawings establish minimum standards of quality for this project. They do not purport to cover all details entering into the design and construction of materials or equipment.

The CONTRACTOR is advised that the equipment arrangements as shown on the drawings may vary with different manufacturers and the CONTRACTOR is responsible at no cost to the OWNER for making the changes necessary to accommodate the specific equipment installed.

Omission of a specific item or component part of a system obviously necessary for the proper functioning of the system shall not relieve the CONTRACTOR of the responsibility of furnishing the item as part of the work at no additional cost to the OWNER.

B. Contracts

Construct work under a single, unit price contract.

1.02 QUALITY ASSURANCE

A. Laws and Regulations

The CONTRACTOR shall give all notices and comply with all laws, ordinances, rules and regulations applicable to the work. If the CONTRACTOR observes that the Specifications or Drawings are at variance therewith, the CONTRACTOR shall give the ENGINEER prompt written notice thereof, and any necessary changes shall be adjusted by an appropriate modification. If the CONTRACTOR performs any work knowing or having reason to know that it is contrary to such laws, ordinances, rules and regulations, and without such notice to ENGINEER, the CONTRACTOR shall bear all costs arising therefrom; however, it shall not be the CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with such laws, ordinances, rules and regulations.

1.03 JOB CONDITIONS

A. Taxes

The CONTRACTOR shall pay all sales, consumer, use and other similar taxes required to be paid by him in accordance with the law of the place of the project.

B. Labor, Materials and Equipment

The CONTRACTOR shall provide competent, suitably qualified personnel to survey and lay out the work and perform construction as required by the Contract Documents. The CONTRACTOR shall at all times maintain good discipline and order at the site. Except in connection with the safety or protection of persons or the work or property at the site or adjacent thereto, and except as otherwise indicated in the Supplementary Conditions, all work at the site shall be performed during regular working hours, and the CONTRACTOR will not permit overtime work or the performance of work on Saturday, Sunday or any legal holiday without the OWNER's written consent given after prior written notice to the ENGINEER.

Unless otherwise shown, the CONTRACTOR shall furnish all materials, equipment, labor transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water and sanitary facilities and all other facilities and incidentals necessary for the execution, testing, initial operation and completion of the work.

The CONTRACTOR shall be responsible for all materials furnished by him and shall replace at his own expense all such material found to be defective in manufacture or damaged in handling. This shall include the furnishing of all material and labor required for the replacement of installed material discovered defective prior to the final acceptance of the work.

C. Contractor Use of Premises

The CONTRACTOR shall confine construction equipment, the storage of materials and equipment and the operations of workmen to areas permitted by law, ordinances, permits or the requirements of the Contract Documents, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment.

The CONTRACTOR shall not enter upon private property for any purpose without first securing the permission of the property owner in writing and furnishing the ENGINEER with a copy of said permission. This requirement will be strictly enforced, particularly with regard to such vacant properties as may be utilized for material storage.

The CONTRACTOR shall conduct his work in such a manner as to avoid damage to adjacent private or public property. Any damage to existing structures or work of any kind, including permanent reference markers or property corner markers, or the interruption of utility service, shall be repaired or restored promptly at no additional expense to the OWNER.

The CONTRACTOR shall preserve and protect all existing vegetation such as trees, shrubs and grass on or adjacent to the site which do not reasonably interfere with the construction, as determined by the ENGINEER. The CONTRACTOR will be responsible for all unauthorized cutting or damaging of trees and shrubs, including damage due to careless operation of equipment, stockpiling of materials or tracking of grass by equipment. The CONTRACTOR will be liable for, or will be required to replace or restore at no additional expense to the OWNER, all vegetation not protected or preserved as required herein that may be destroyed or damaged.

The CONTRACTOR will not be required to move or remove any utilities except as specifically required by the Drawings and Specifications.

During the progress of the work, the CONTRACTOR shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from work. At the completion of the work, the CONTRACTOR shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery, and surplus materials, and shall leave the site clean and ready for occupancy by the OWNER. The CONTRACTOR shall restore to their original condition those portions of the site not designated for alteration by the Contract Documents.

The CONTRACTOR shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall the CONTRACTOR subject any part of the work or adjacent property to stresses or pressures that will endanger it.

D. Notification of Construction

The CONTRACTOR shall notify, in writing, all residents and businesses adjacent to the project work area of pending construction no later than 48 hours prior to commencement of actual construction. Copies of the written Notice shall be provided to the ENGINEER for approval of wording prior to public distribution.

E. Notification of Street Closure

The CONTRACTOR is required to obtain permission from the Town prior to initiating street closures.

In the event a street closure is required, the CONTRACTOR shall notify, in writing, all emergency services and agencies, residents and businesses directly affected by any partial or full street closure caused by the construction no later than 48 hours prior to actual closure.

If the closure will last longer than 5 days, the CONTRACTOR shall also notify the general public of such closures by placing an advertisement in the "Area" section of the local newspaper no later than 48 hours prior to the closure. The advertisement shall include information describing the extent of the closure (i.e. between which streets; detour routes,

etc.), the date the closure will begin, and estimated date the road will be reopened. Provide a copy of the proposed notification, for approval by the ENGINEER, before placing the advertisement.

The CONTRACTOR shall maintain full compliance with the traffic regulations found in Paragraph 1.06, Section 01500 of this Contract.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

A. Sequence of Operation

The Contractor shall submit a written sequence of operation to the Town of Windermere prior to beginning construction, including Maintenance of Traffic (MOT). This sequence of operation shall address the need for adequate restoration of disturbed areas prior to proceeding on to other areas of work and will require approval by the Town before initiation of construction. The Contractor will be required to submit his phasing plan that will include but is not limited to the following:

- Staging (as required per phase)
- Roadway Improvements
- Drainage Improvements
- Utility Relocations
- Utility Installations
- Restorations
- Punch List/Acceptance

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. General: All schedules and Schedules of Values are given for the convenience of the Engineer, Owner and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quantity of materials and equipment to be included in Work performed under this Contract.
- B. Unit Price Contracts: The quantities of work to be performed and materials to be furnished under a Unit Price Contract, as given in the Bid Form or Schedule, are to be considered as approximate only and are to be used solely for the comparison of Bids received and determining an initial Contract Price. The Owner/Engineer do not expressly or by implication represent that the actual quantities involved will correspond exactly therewith; nor shall the Contractor plead misunderstanding or deception because of such estimate or quantities or of the character, location or other conditions pertaining to the Work. Payment to the Contractor will be made only for the actual quantities of work performed or material furnished in accordance with the Drawings and other Contract Documents, and it is understood that the quantities may be increased or diminished as provided in the General Conditions without in any way invalidating any of the unit prices bid.
- C. Lump Sum Work: The quantities of work to be performed and materials to be furnished, including all labor, equipment and incidentals required to complete any lump sum work items are shown and/or specified for such lump sum work items in the Contract Drawings and specifications. Payment to the Contractor will be made and shall fully compensate the Contractor for the construction of the Work, completed and ready for continuous operation and use, in the manner contemplated by the Contract Documents.

1.02 SCHEDULE OF VALUES

- A. Unit Price Work: For Unit Price Contracts, the Bid Schedule shall be used as the basis for the Schedule of Values. The Contractor shall resubmit the Bid Schedule in the format described herein, and if requested by the Owner/Engineer, shall sub-divide the bid items in the Bid Schedule into sub-items to provide a more detailed basis of payment. Lump sum bid items included within the Bid Schedule shall be separated into major work/activity items and sub-items in a format as required for Lump Sum Contracts.
 - 1. Removal and Replacement of Unsuitable Material: For areas designated on the Drawings, or in Geotechnical Investigations for this project (Section 00200), remove unsuitable material and replace with compacted suitable material in performance of the Work. Measurement shall be made based on actual "in-place" quantities of unsuitable materials for volumes over 1,000 CY or "in-truck" quantities of unsuitable materials for volumes less than 1,000 CY without consideration of a swell factor. Unit Prices for this category are segmented into various excavation depths (i.e., 0 to 6 feet, 6 feet to 8 feet, 8 feet to 10 feet, ... etc.) to allocate cost in proportion to increased construction difficulty. The stage depth of excavation will be measured from the existing ground or pavement surface.

2. Pavement Restoration: Measurement and payment for pavement restoration shall include the temporary patch, subsequent milling and asphaltic overlay for a maximum 10 ft. pay width for single pipe installations (or maximum pay limits indicated on the Drawings). Asphaltic overlay beyond these pay limits for the utility installation shall be measured and paid under the corresponding bid item for Asphaltic Overlay.
- B. Alternate Bid Items: When Additive Alternates have been accepted by the Owner and are included in the Contract Amount indicated in the Notice of Award and the Agreement, each Additive Alternate shall be individually scheduled with the corresponding Unit Price information or Lump Sum Price and sub-item breakdown.

1.03 APPLICATIONS FOR PAYMENT

- A. Applications for Payment shall be submitted by the Engineer in accordance with the schedule established by the General Conditions and Agreement between the Owner and the Contractor.
1. The Contractor shall certify *by affidavit*, for each current pay request, that all previous payments received from the Owner, under his Contract, have been applied by the Contractor to discharge in full all obligations of the Contractor in connection with Work covered by prior applications for payment, and all materials and equipment incorporated into the Work are free and clear of all liens, claims, security interest and encumbrances. Contractor shall attach to each application for payment like affidavits by all Subcontractors and Suppliers. Contractor shall also attach a "Consent of Surety" to each application for payment. Additionally, a "*Waiver and Release of Lien Upon Progress Payment*" from each subcontractor and supplier shall be attached to each application for payment.
 2. Submit three (3) copies of each application to the Engineer. Each copy shall include original signatures. The Engineer shall review the application and verify quantities of installed work and stored materials. When the Engineer finds the application properly completed and correct, he will transmit recommendation of payment to Owner, with copy to Contractor.
- B. The Engineer's recommendation of any payment requested constitutes a representation to the Owner that the Quality of Work is generally in accordance with the Contract Documents subject to the results of any subsequent inspections or tests required by the Contract Documents. Should subsequent inspections or tests indicate that portions of the Work are not installed in accordance with the Contract Documents, the Engineer may nullify any such payment previously recommended to such extent as may be necessary in the Engineer's opinion to protect the Owner from loss because of Defective Work. In this regard, partial payment requests for the installation of materials and equipment shall be supported by acceptable field tests as required by each respective specification section. The supporting test or inspection results shall be submitted with the next scheduled partial payment request.
1. If the test or inspection results indicate Defective Work, the respective partial payment request shall be adjusted to nullify payment for the installation of the defective portion or segment of the Work.
 2. If supporting test or inspection results are not provided for the payment of installed materials or equipment in the subsequent partial payment request, then additional retainage shall be recommended by the Engineer for the Owner's

consideration. The additional retainage shall be equivalent to the value of the tests required to be performed by the Contractor but not provided, or an amount, in the opinion of the Engineer, that maybe necessary to protect the Owner from loss.

- C. The Application for Final Payment shall be prepared in accordance with Article 1.14 of the Section 01001 - General Requirements - Contract Closeout.

1.04 MEASUREMENT AND PAYMENT

A. Methods of Payment

1. Unit Price Contracts: Payment will be made for actual quantities of work properly installed as approved by the **Owner/Engineer**.
2. Lump Sum Work: Payment will be made for each individual item on a percentage of completion basis as estimated by the Contractor and approved by the **Owner/Engineer**.

B. Methods of Measurement

1. Units of measurement shall be defined in general terms as follows:

a. Linear Feet (LF)	e. Each (EA)
b. Square Feet (SF)	f. Tons (TN)
c. Square Yards (SY)	g. Lump Sum (LS)
d. Cubic Yards (CY)	h. Assembly (AS)
2. Unit Price Contracts
 - a. Linear Feet (LF) shall be measured along the horizontal length of the centerline of the installed material, unless otherwise specified.
 - b. Square Feet (SF), Square Yards (SY), Cubic Yards (CY), Each (EA) and Ton (TN) shall be measured as the amount of the unit of measure installed within the limits specified and shown in the Specifications and Drawings. Slope angles and elevations shall be measured using land surveying equipment. Contractor shall provide supporting documentation (i.e. drawings, truck tickets, invoices, etc.) to verify actual installed quantities.
 - c. No measurement is required for Lump Sum (LS) items.
3. Lump Sum Contracts: The Measurement of Work for lump sum work shall be based on the information provided in the Contract Documents and compiled through the Contractor's own field verifications, investigations and testing prior to Bidding.

1.05 COSTS INCLUDED IN PAYMENT ITEMS

- A. No separate payment will be made for the following items unless specifically called out and the cost of such work shall be included in the applicable pay items of work.
- Clearing and grubbing (including disposal of material).

- Trench excavation, including necessary pavement removal and removal of vegetative surfaces.
- Maintenance of Traffic
- Dewatering and disposal of surplus water.
- Structural fill, backfill, and grading.
- Replacement of unpaved roadways, grass and shrubbery plots.
- Cleanup.
- Foundation and borrow materials, except as hereinafter specified.
- Testing and placing system in operation.
- Any material and equipment required to be installed and utilized for tests.
- Pipe, structures, pavement replacement, restoration and/or appurtenances included within the limits of lump sum work, unless otherwise shown.
- Appurtenant work as required for a complete and operable system.
- Surface restoration including removal and replacement of trees (under 4-inch diameter), shrubs, and sod disturbed by construction activities.
- Relocation and/or replacement of irrigation systems disturbed by construction.
- Furnishing adequate sanitary facilities for workers.
- Adjustment of valve boxes.
- Supporting of existing utilities during construction

B. Cleanup

CONTRACTOR's attention is called to the fact that cleanup is considered a part of the work of construction. No payment will be made until cleanup is essentially complete.

At the end of each week of construction, the CONTRACTOR shall perform cleaning of the work site, to the satisfaction of the Owner, before proceeding to the next week's scheduled work.

C. Work Outside Authorized Limits

No payment will be made for work constructed outside the authorized limits of work.

1.06 APPLICATIONS FOR PAYMENT

Applications for payment shall be prepared by the CONTRACTOR and submitted to the ENGINEER in accordance with the schedule established by the Conditions of the Contract and the Agreement. The applications for payment shall be submitted in the number and form established by the ENGINEER at the Preconstruction Conference. The form shall be completely filled out and executed by an authorized representative of the CONTRACTOR. Supporting data such as schedules of stored materials shall be attached to each copy of the application.

1.07 CHANGE ORDER PROCEDURE

A. As defined in the General Conditions, a Change Order is a written order to the CONTRACTOR signed by the OWNER authorizing an addition, deletion or revision in the Work, or an adjustment in the Contract Price or the Contract Time which is issued after the execution of the Agreement.

B. The following procedure shall be used in processing Change Orders:

1. For Additions to the Work

The OWNER shall issue a written order to the CONTRACTOR directing him to accomplish the additional work. The CONTRACTOR shall review the order and if he feels that the additional work entitles him to additional payment or additional time, he may submit a claim as prescribed in the Conditions of the Contract.

2. For Deletions From the Work

The OWNER shall issue a written order to the CONTRACTOR directing him to make the change. If the OWNER feels that the Contract price should be reduced as a result of the change, the OWNER shall make a claim for the reduction as provided in the Conditions of the Contract.

Cost of the changes in the work shall be determined in accordance with the requirements spelled out in the Conditions of the Contract. Modifications to incorporate the changes in cost will be made as the amount of any change is determined.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

3.01 BID ITEMS – BASE BID

A. Bid Item No. 1. - Mobilization/Demobilization (5% of items below)

Definition. Mobilization shall be the preparatory work and operations in mobilizing for beginning work on the project, including, but not limited to, those operations necessary for the movement of personnel, equipment, supplies and incidentals to the project site, and for the establishment of temporary offices, buildings, safety equipment and first aid supplies, sanitary and other facilities, as required by the Contract Documents and applicable laws and regulations. The cost of bonds, required insurance, permits and any other preconstruction expense necessary for the start of work, excluding the cost of construction materials, shall also be included in this item. Demobilization shall be the work of removing temporary facilities from the site.

Payment. Partial payments for this item will be made in accordance with the following schedule:

<u>Percent of Original Contract Amount Earned</u>	<u>Allowable Percent of the Lump Sum Price for the Item</u>
Contract Approval	25
10	50
25	75
50	100

These payments will be subject to the standard retainage provided in the agreement. Payment of the retainage will be made after successful completion of the work and demobilization.

If the total area to be cleared is equal to or exceeds one (1) acre, then the Contractor will be responsible for preparing a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the FDEP and the U.S. EPA's NPDES regulations for *Stormwater*

Discharge from Construction Activities under this pay item. This SWPPP document is not required to be submitted to Florida Department of Environmental Protection (FDEP), but will be required to be retained on the project site. The Contractor will also be responsible for submitting an executed Notice of Intent (NOI) form to the FDEP, along with an application fee of \$250, forty-eight (48) hours prior to beginning construction. Upon substantial completion of the project, the Contractor will be responsible for submitting a Notice of Termination (NOT) to the FDEP, signifying termination of permit coverage for stormwater discharge from construction activities.

B. Bid Item No. 2. - Survey, Construction Layout and Certified As-Built

Payment for this item shall be made at the Contract lump sum (LS) price and shall be full compensation for all surveying and layout necessary for the establishment of construction references for this project. This includes the establishment, as necessary, of any temporary and/or permanent horizontal and vertical control. Should any existing permanent control be disturbed during the construction of this project, then the replacement of the permanent control is to be established by a licensed surveyor in the State of Florida. This pay item also includes conducting and preparing certified As-Builts upon completion of the project construction.

C. Bid Item No. 3. - Maintenance of Traffic

Payment for this item shall be made at the Contract lump sum (LS) price and shall be full compensation for all labor, materials and equipment necessary to provide the Maintenance of Traffic (MOT) required as part of the permit and to provide all other maintenance of traffic required as shown in the Contract Documents, Plans and as required by the Town of Windermere. All Maintenance of Traffic work shall conform to the requirements of Section 102 of the Florida Department of Transportation *Standard Specifications for Road and Bridge Construction* (latest edition) and the *FY 2023-2024 Standard Plans for Road Construction*. The Contractor will not be permitted to isolate residences or places of business. Access shall be provided to all residences and places of business whenever construction interferes with the existing means of access. The Contractor shall furnish, erect and maintain all necessary traffic control devices, including flagmen, in accordance with the Manual of Uniform Traffic Control Devices (MUTCD) for Streets and Highways, published by the U.S. Department of Transportation, Federal Highway Administration. The Contractor shall provide and maintain in a safe condition temporary approaches, crossings, and intersections with trails, roads, streets, business parking lots, residences and garages. The Contractor shall take all necessary precautions for the protection of work and the safety of the public. Maintenance of Traffic shall conform to the Florida Department of Transportation *FY 2023-2024 Standard Plans for Road and Bridge Construction*, Index No. 102-100 through 102-680.

D. Bid Item No. 4. - Prevention, Control and Abatement of Erosion and Water Pollution

Payment for Prevention, Control and Abatement of Erosion and Water Pollution shall be made at the Contract lump sum (LS) price and shall conform to the requirements of Section of the FDEP *Stormwater Erosion and Sedimentation Control* (Inspector's Manual). The Contractor shall present his/her schedules for constructing the project at the pre-construction conference and shall include a complete outline for the proposed construction of all pollution control and erosion abatement items required in the project as detailed in the FDEP *Stormwater Erosion and Sedimentation Control* (Inspector's Manual). The Contractor shall be responsible for implementing the schedule after the Engineer's acceptance.

E. Bid Item No. 5. - Clearing and Grubbing

Payment for Clearing and Grubbing shall be made at the Contract lump sum (LS) price and shall be full compensation for all materials, labor and equipment necessary for complete removal and disposal of all vegetation, debris, concrete curbs, driveways, brick pavement (where indicated on the plans), sidewalks, structures, pipes, landscape walls, brick walls, various types of fencing, asphalt pavement, concrete pavement, roadway base removal, incidental excavation and grading and trimming/protection of trees and shrubs and other protruding objects, and other facilities necessary to prepare the area for construction as required per the plans and the Contract Documents. This pay item also includes the cost for saw cutting of existing pavement and concrete; and their disposal. Payment will be made under 110-1-1 CLEARING AND GRUBBING, per lump sum (LS).

F. Bid Item No. 6. - Mailbox, F&I, Single

Payment shall be measured for payment per each Mailbox, furnished and installed, and accepted by the TOWN. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the mailbox per the plans. The mailbox replacements shall closely match that being removed and shall include full compensation for all materials, labor, including excavation and backfilling; and equipment necessary to construct the subject mailbox(s) and shall follow the General Notes in Index 100-200 (Sheet 1 of 3) of the *FY 2023-2024 Standard Plans* to the extent applicable. Payment will be made under Item No. 110-7-1 MAILBOX, F&I, SINGLE, per Each (EA).

G. Bid Item No. 7. - Excavation, Embankment and Grading

Payment for Excavation, Embankment and Grading shall be made at the Contract lump sum (LS) price and shall be full compensation for grading of shoulders, graded road connections, slopes, compaction, final dressing, subsoil excavation (except in surcharge areas), select and replacement material, and all work required for completing the project that is not paid for under other pay items. Also included is removal and off-site disposal or on-site utilization of all materials, structures, abandoned utilities and obstructions as directed by the Engineer.

H. Bid Item No. 8. - Type B Stabilization (12")(Min LBR 40)

Payment for Type B Stabilization shall be measured for payment by the square yard completed and accepted by the Town. The bid price and shall be full compensation for all materials, labor and equipment necessary to stabilize the top 12" of subbase material to a minimum LBR of 40 per the plans and in accordance with FDOT Section 160 of the *Standard Specifications for Road and Bridge Construction* (latest edition). Any areas that are not feasible to stabilize and mix 12" deep, the Contractor may be allowed to substitute 50% more base thickness in place of stabilization at the same stabilization unit price. Payment will be made under Item No. 160-4 Type B Stabilization (12")(Minimum LBR 40) – per square yard (SY).

I. Bid Item No. 9. - Graded Crushed Concrete Aggregate Base Course (8")

Payment for providing Graded Crushed Concrete Aggregate Base Course, 8", as shown on the Drawings and listed in the bid form, shall be made at the Contract unit price per square yard (SY) and shall be full compensation for all labor, material and equipment necessary to complete the work. Payment shall include full compensation for excavation, removal, grading, mixing, compaction preparation of sub-base, and traffic protection and routing during construction. Payment will be made under Item No. 205-70-8 GRADED CRUSHED CONCRETE AGGREGATE BASE - per square yard (SY).

J. Bid Item No. 10. - Milling Existing Asphalt Pavement, 1-1/2" Avg. Depth

Milling Existing Asphalt Pavement, 1-1/2" average depth shall be measured for payment by the square yard completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to mill and dispose of 1-1/2" average depth of existing pavement per the limits shown on the construction plans. Payment will be made under Item No. 327-70-6 MILLING EXISTING ASPHALT PAVEMENT, 1-1/2" AVG. DEPTH, - Per square yard (SY).

K. Bid Item No. 11. - Type SP 9.5 Asphaltic Concrete (1-1/2")(165 LB per SY)(Traffic Level C)

This pay item shall be measured for payment by the ton completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the Type SP 9.5 Asphaltic Concrete (1-1/2")(Traffic Level C) per the plans and in accordance with the FDOT *Standard Specifications for Road and Bridge Construction* Section 334. Payment will be made under Pay Item No. 331-1-13 Type SP 9.5 Asphaltic Concrete (1-1/2")(Traffic Level C) – per Ton (TN).

L. Bid Item No. 12. - Concrete Class NS, Miscellaneous

This pay item shall be measured for payment by the cubic yard, completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the Concrete Class NS, Miscellaneous, per the plans and in accordance with FDOT *Standard Specifications for Road and Bridge Construction* (latest edition) Section 400 – CONCRETE STRUCTURES. Payment will be made under Item No. 400-0-15 Concrete Class NS, Miscellaneous, - per cubic yard (CY).

M. Bid Item No. 13. - Inlets (Curb Type P-5)(<10')

Payment for Inlets (Curb Type P-5)(<10') shall be measured for payment per each completed and accepted by the TOWN. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the subject storm structure per the plans and accordance with FDOT *Standard Specifications for Road and Bridge Construction* (Latest Edition), Section 425 and FDOT Index 425-010 and 425-021. Payment will be made under Item 425-1-351 Inlets (Curb Type P-5)(<10') – Per Each (EA).

N. Bid Item No. 14. - Inlets (Curb Type J-5)(<10')

Payment for Inlets (Curb Type J-5)(<10') shall be measured for payment per each completed and accepted by the TOWN. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the subject storm structure per the plans and accordance with FDOT *Standard Specifications for Road and Bridge Construction* (Latest Edition), Section 425 and FDOT Index 425-010 and 425-021. Payment will be made under Item 425-1-451 Inlets (Curb Type J-5)(<10') – Per Each (EA).

O. Bid Item No. 15. - Inlets (Ditch Bottom Type C)(<10')

Payment for Inlet (DT Bot Type C)(<10') shall be measured for payment per each completed and accepted by the TOWN. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the subject storm structure per the plans and accordance with FDOT *Standard Specifications for Road and Bridge Construction* (Latest Edition), Section 425 and FDOT Index 425-052. Payment will be made under Item 425-1-521 Inlets (DT Type C)(<10') – Per Each (EA).

P. Bid Item No. 16. - Inlets (Ditch Bottom Type D)(<10')

Payment for Inlets (DT Bot Type D)(<10') shall be measured for payment per each completed and accepted by the TOWN. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the subject storm structure per the plans and accordance with FDOT *Standard Specifications for Road and Bridge Construction* (Latest Edition), Section 425 and FDOT Index 425-052. Payment will be made under Item 425-1-541 Inlets (DT Type D)(<10') – Per Each (EA).

Q. Bid Item No. 17. - Inlets (Ditch Bottom Type D, Modify)

Payment for Inlets (DT Bot Type D, Modify) shall be measured for payment per each completed and accepted by the TOWN. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the subject storm structure per the plans and accordance with *FDOT Standard Specifications for Road and Bridge Construction* (Latest Edition), Section 425 and FDOT Index 425-052. Payment will be made under Item 425-1-549 Inlets (Modify) – Per Each (EA).

R. Bid Item No. 18. - Inlets (Gutter Type V)(<10')

Payment for Inlets (Gutter Type V)(<10') shall be measured for payment per each completed and accepted by the TOWN. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the subject storm structure per the plans and accordance with FDOT *Standard Specifications for Road and Bridge Construction* (Latest Edition), Section 425 and FDOT Index 425-041. Payment will be made under Item 425-1-711 Inlets (Gutter Type V)(<10') – Per Each (EA).

S. Bid Item No. 19. - Manhole (P-7)(<10')

Payment for Manhole (P-7)(<10') shall be measured for payment per each completed and accepted by the TOWN. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the subject storm structure per the plans and accordance with FDOT *Standard Specifications for Road and Bridge Construction* (Latest Edition), Section 425 and FDOT Index 425-001 and 425-010. Payment will be made under Item 425-2-4 Manhole (P-7)(<10') – Per Each (EA).

T. Bid Item No. 20. - Pipe Culvert, Concrete (Class III)(18")

Payment for Pipe Culvert, Concrete (Class III)(18") shall be measured for payment per linear feet completed and accepted by the TOWN. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the Pipe Culvert, Concrete, (Class III)(18") per the plans and accordance with FDOT *Standard Specifications for Road and Bridge Construction* (Latest Edition), Section 430. Payment will be made under Item 430-175-118 Pipe Culvert, Concrete (Class III)((18") – Per Linear Feet (LF).

U. Bid Item No. 21. - Pipe Culvert, Concrete (Class III)(24")

Payment for Pipe Culvert (Class III)(24") shall be measured for payment per linear feet completed and accepted by the TOWN. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the Pipe Culvert, Concrete (Class III)(24")(SS) per the plans and accordance with FDOT *Standard Specifications for Road and Bridge Construction* (Latest Edition), Section 430. Payment

will be made under Item 430-175-124 Pipe Culvert, Concrete (Class III)(24") – Per Linear Feet (LF).

V. Bid Item No. 22. - Desilt Pipe (0 to 24")

Payment for Desilt Pipe (0 to 24") shall be measured for payment per linear feet of particular pipe size desilted, completed and accepted by the TOWN. The bid price and payment shall be full compensation for all materials, labor, equipment, tools and labor, disposal of silt and debris, and all incidentals necessary for satisfactorily performing the work and in accordance with FDOT *Standard Specifications for Road and Bridge Construction* (Latest Edition), Section 430. Payment will be made under Item 430-94-1 Desilt Pipe (0 to 24") – Per Linear Feet (LF).

W. Bid Item No. 23. - Storm Sewer Video

Payment for Storm Sewer Video shall be measured for and paid as a percentage of work completed during the pay period, and the total shall not exceed the lump sum bid pay item amount. The percentage will be based on the number of linear feet completed divided by the total linear feet of storm pipe in the project. The pay item includes furnishing the inspections in DVD forma with all supporting information and documentation as required b the Contract Documents per FDOT *Standard Specifications for Road and Bridge Construction* (latest edition) Section 430. Payment will be made under Item No. 432-4 Storm Sewer Video – Per lump sum (LS).

X. Bid Item No. 24. - French Drains (24" Slotted RCP)(Complete)

Payment for French Drains (24" Slotted RCP)(Complete) shall be measured for payment per linear feet of French Drain, completed and accepted by the TOWN. The bid price and payment shall be full compensation for all materials, labor, equipment, tools and labor, all excavation, and will also include sheeting or shoring, if required, the disposal of surplus material, pavement restoration, backfilling and tamping, in accordance with FDOT *Standard Specifications for Road and Bridge Construction* (Latest Edition), Section 443 and FDOT Index No. 443-001. Payment will be made under Item 443-70-4 French Drains (24" Slotted RCP)(Complete) – Per Linear Feet (LF).

Y. Bid Item No. 25. - Concrete Curb and Gutter, Type E

Payment for Concrete Curb and Gutter, Type E shall be measured for payment by the linear feet completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the Concrete Curb and Gutter, Type E, per the plans and in accordance with FDOT *Standard Specifications for Road and Bridge Construction* (Latest Edition) Section 520 and FDOT Design Standards Index 520-001, including saw cutting; and removal and disposal of any existing pavement and curb necessary to complete the work. Payment will be made under Item No. 520-1-7 Concrete Curb and Gutter, Type E – per linear foot (LF).

Z. Bid Item No. 26. - Concrete Curb and Gutter, Type F

Payment for Concrete Curb and Gutter, Type F shall be measured for payment by the linear feet completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the Concrete Curb and Gutter, Type F, per the plans and in accordance with FDOT *Standard Specifications for Road and Bridge Construction* (Latest Edition) Section 520 and FDOT Design Standards Index 520-001, including saw cutting; and removal and disposal of any existing pavement and curb necessary to complete the work. Payment will be made under Item No. 520-1-10 Concrete Curb and Gutter, Type F – per linear foot (LF).

AA. Bid Item No. 27. - Concrete Curb and Gutter, Type Drop

Payment for Concrete Curb and Gutter, Type Drop shall be measured for payment by the linear feet completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the Concrete Curb and Gutter, Type Drop, per the plans and in accordance with FDOT *Standard Specifications for Road and Bridge Construction* (Latest Edition) Section 520 and FDOT Design Standards Index 520-001, including saw cutting; and removal and disposal of any existing pavement and curb necessary to complete the work. Payment will be made under Item No. 520-1-13 Concrete Curb and Gutter, Type Drop – per linear foot (LF).

BB. Bid Item No. 28. - Concrete Curb , Type D

Payment for Concrete Curb, Type D shall be measured for payment by the linear feet completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the Concrete Curb, Type D, per the plans and in accordance with FDOT *Standard Specifications for Road and Bridge Construction* (Latest Edition) Section 520 and FDOT Design Standards Index 520-001, including saw cutting; and removal and disposal of any existing pavement and curb necessary to complete the work. Payment will be made under Item No. 520-2-4 Concrete Curb, Type D – per linear foot (LF).

CC. Bid Item No. 29. - Concrete Curb (12"x12" Ribbon Curb)

Payment for Concrete Curb (12"x12" Ribbon Curb) shall be measured for payment by the linear feet completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the Concrete Curb (12"x12" Ribbon Curb), per the plans and details illustrated on Sheet 6 of the Contract Documents, including saw cutting; and removal and disposal of any existing pavement and curb necessary to complete the work. Payment will be made under Item No. 520-2-6 Concrete Curb (12"x12" Ribbon Curb) – per linear foot (LF).

DD. Bid Item No. 30. - Valley Gutter - Concrete

Payment for Valley Gutter - Concrete shall be measured for payment by the linear feet completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the Valley Gutter - Concrete, per the plans and in accordance with FDOT *Standard Specifications for Road and Bridge Construction* (Latest Edition) Section 520 and FDOT Design Standards Index 520-001, including saw cutting; and removal and disposal of any existing pavement and curb necessary to complete the work. Payment will be made under Item No. 520-3 Valley Gutter - Concrete – per linear foot (LF).

EE. Bid Item No. 31. - Concrete Sidewalk and Driveways, 4"

Payment for the construction of Concrete Sidewalk, 4" (Driveways) shall be made at the Contract unit price per square yard (SY), and shall include full compensation for all labor, material and equipment required to complete the work. Payment includes full compensation for all materials required, excavation, pouring of concrete and furnishing all equipment, labor and other incidentals as may be necessary to complete the concrete work as specified. The measurement for payment under this item shall be the actual number of square yards of Concrete Sidewalk and Driveway, 4" Thick poured satisfactorily constructed and accepted. Payment will be made under Item No. 522-1 Concrete Sidewalk and Driveway, 4" Thick – per square yard (SY).

FF. Bid Item No. 32. - Concrete Sidewalk and Driveways, 6"

Payment for the construction of Concrete Sidewalk, 6" (Driveways) shall be made at the Contract unit price per square yard (SY), and shall include full compensation for all labor, material and equipment required to complete the work. Payment includes full compensation for all materials required, excavation, pouring of concrete and furnishing all equipment, labor and other incidentals as may be necessary to complete the concrete work as specified. The measurement for payment under this item shall be the actual number of square yards of Concrete Sidewalk and Driveway, 6" Thick poured satisfactorily constructed and accepted. Payment will be made under Item No. 522-2 Concrete Sidewalk and Driveway, 6" Thick – per square yard (SY).

GG. Bid Item No. 33. - Brick Paver Driveway

Payment for the construction of Brick Paver Driveway shall be made at the Contract unit price per square yard (SY), and shall include full compensation for all labor, material and equipment required to complete the work. Payment includes full compensation for all materials required, excavation, pouring of concrete and furnishing all equipment, labor and other incidentals as may be necessary to complete the concrete work as specified. The measurement for payment under this item shall be the actual number of square yards of Brick Paver Driveway installed, satisfactorily constructed and accepted. Payment will be made under Item No. 522-3 Brick Paver Driveway – per square yard (SY).

HH. Bid Item No. 34. - Curb Ramp, ADA, 6" Thick

Payment for the construction of Curb Ramp, ADA, 6" shall be made at the Contract unit price per square yard (SY), and shall include full compensation for all labor, material and equipment required to complete the work. Payment includes full compensation for all materials required, excavation, forming and pouring of concrete and furnishing all equipment, labor and other incidentals as may be necessary to complete the concrete work as specified. The ramp shall also meet the standards specified in the Americans with Disabilities Act (ADA), as set forth in ADA.gov. The measurement for payment under this item shall be the actual number of square yards of Curb Ramp, ADA, 6" Thick poured satisfactorily constructed and accepted. Payment will be made under Item No. 522-4 Curb Ramp, ADA, 6" Thick – per square yard (SY).

II. Bid Item No. 35. - Speed Hump (Complete with Thermoplastic Marking)

Payment for the construction of Speed Hump (Complete with Thermoplastic Marking) shall be made at the Contract unit price per each, and shall include full compensation for all plant, labor, material and equipment required to complete the work. Payment includes full compensation for all materials required, excavation, placement of asphaltic concrete, placement of thermoplastic pavement markings and furnishing all equipment, labor and other incidentals as may be necessary to complete the speed hump work as specified in

the Contract Documents. The measurement for payment under this item shall be the actual number of speed humps, satisfactorily constructed and accepted by the Town. Payment will be made under Item No. 522-6 Speed Hump (Complete with Thermoplastic Marking) – per each (EA).

JJ. Bid Item No. 36. - Detectable Warning

Payment for the construction of Detectable Warning shall be made at the Contract unit price per square feet (SF), and shall include full compensation for all labor, material and equipment required to complete the work. Payment includes full compensation for all materials required, excavation, and furnishing all equipment, labor and other incidentals as may be necessary to complete the concrete work as specified. The measurement for payment under this item shall be the actual number of square feet of Detectable Warning satisfactorily constructed and accepted by the Town. Payment will be made under Item No. 527-2 Detectable Warning – per square feet (SF).

KK. Bid Item Nos. 37. - Performance Turf, Sod (Match Existing)

Payment for Performance Turf, Sod will be made at the Contract unit price per square yard (SY) and shall be full compensation for furnishing all plant, labor and materials and equipment that is necessary to grade the right-of-way, pond area, swales, restore lawn areas (including irrigation systems disturbed during construction), disturbed areas and other areas affected by the proposed work (roadway, drainage and utility improvements). Any costs to match existing sod type shall also be paid for under this pay item. The measurement for payment under this item shall be the actual number of square yards of Performance Turf, Sod (Match Existing) satisfactorily installed and accepted by the Town. Payment will be made under Item No. 570-1-2 Performance Turf – per square yards (SY).

LL. Bid Item No. 38. - Remove Existing Tree, including Stump (8"-24" Diameter)

Payment for the removal of Existing Trees shall be made at the Contract unit price per each (EA), and shall include full compensation for all labor, material and equipment required to properly remove and dispose of existing trees (8"-24" Diameter), including the disposal and grinding of the stump 8-10" below finished grade and the removal of the stump debris. The measurement for payment under this item shall be the actual number of trees satisfactorily removed, disposed and accepted by the Town. Payment will be made under Item No. 580-9-11 Remove Existing Tree, Including Stump, 8"-24" Diameter – Per Each (EA).

MM. Bid Item No. 39. - Single Post Sign, F&I, Ground Mount, up to 12 SF

Payment for the installation of a Single Post Sign shall be measured for payment per assembly (AS) completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to mount a Single Post Sign per the plans and in accordance with MUTCD and FDOT *Standard Specifications for Road and Bridge Construction* (latest edition) Section 700 and FDOT Design Standards Index 11860. Payment will be made under Item No. 700-1-11 Single Post Sign, F&I, Ground Mount, up to 12 SF – Per assembly (AS).

NN. Bid Item No. 40. - Single Post Sign, Relocate

Payment for Single Post Sign, Relocate, shall be measured for payment per assembly, completed and accepted by the TOWN. The bid price and payment shall be full compensation for all materials, labor, equipment necessary to relocate a Single Post Sign per the plans and accordance with FDOT *Standard Specifications for Road and Bridge*

Construction (Latest Edition), Section 700 and FDOT Design Standards Index No. 1186. Payment will be made under Item 700-1-50 Single Post Sign, Relocated – Per Assembly (AS).

OO. Bid Item No. 41. - Retro-Reflective Pavement Markers

Retro-Reflective Pavement Marks shall be measured for payment per each, completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to install Retro-Reflective Pavement Markers (including colors) per the plans and in accordance with FDOT *Standard Specifications for Road and Bridge Construction* (latest edition) Section 706 and FDOT Design Standards Index No. 17346. Payment will be made under Item No, 706-3 Retro-Reflective Pavement Markings – per each (EA)

PP. Bid Item No. 42. - Thermoplastic, Standard, White, Solid, 12”

Payment for Thermoplastic, Standard, White, Solid 12” pavement markings shall be measured for payment by the linear foot completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the pavement markings per the plans and in accordance with the FDOT *Standard Specifications for Road and Bridge Construction* (latest edition) Section 711 and FDOT Design Standards Index 17346. Payment will be made under Item No, 711-11-123 Thermoplastic, Standard, White, Solid, 12” – per linear feet (LF).

QQ. Bid Item No. 43. - Thermoplastic, Standard, White, Solid, 24”

Payment for Thermoplastic, Standard, White, Solid 24” pavement markings shall be measured for payment by the linear foot completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the pavement markings per the plans and in accordance with the FDOT *Standard Specifications for Road and Bridge Construction* (latest edition) Section 711 and FDOT Design Standards Index 17346. Payment will be made under Item No, 711-11-125 Thermoplastic, Standard, White, Solid, 24” – per linear feet (LF).

RR. Bid Item No. 44 – F&I Water Main, 4” Restrained Joint, Complete, Including Fittings shall be measured for payment by linear feet completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the 4” water main and fittings per the plans, pressure test, chlorinate, bacteriologically test for clearance with FDEP; and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1050-11-221 F&I Water Main, 4” Restrained Joint, Complete, Including Fittings – per linear feet (LF).

SS. Bid Item No. 45 – F&I Water Main, 8” Ductile Iron, Complete, Including Fittings shall be measured for payment by linear feet completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct the 8” ductile iron water main and fittings per the plans, pressure test, chlorinate, bacteriologically test for clearance with FDEP; and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1050-11-423 F&I Water Main, 8” Ductile Iron, Complete, Including Fittings – per linear feet (LF).

TT. Bid Item No. 46 – Remove and Dispose of Existing 4” Water Main shall be measured for payment by linear feet completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to remove and dispose of existing 4” water main and fittings per the plans and in accordance with

the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1050-16-221 Remove and Dispose of Existing 4" Water Main – per linear feet (LF).

- UU. Bid Item No. 47 – Remove and Dispose of Existing 6" Water Main shall be measured for payment by linear feet completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to remove and dispose of existing 6" water main and fittings per the plans and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1050-16-222 Remove and Dispose of Existing 6" Water Main – per linear feet (LF).
- VV. Bid Item No. 48 – Remove and Dispose of Existing 8" Water Main shall be measured for payment by linear feet completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to remove and dispose of existing 8" water main and fittings per the plans and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1050-16-223 Remove and Dispose of Existing 8" Water Main – per linear feet (LF).
- WW. Bid Item No. 49 – Replace 1" Water Service Lateral, Short Side shall be measured for payment by each completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct 1" Water Service Lateral, Short Side per the plans and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1051-4 Replace 1" Water Service Lateral, Short Side – per each (EA).
- XX. Bid Item No. 50 – Replace 1" Water Service Lateral, Long Side shall be measured for payment by each completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct 1" Water Service Lateral, Long Side per the plans and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1051-5 Replace 1" Water Service Lateral, Long Side – per each (EA).
- YY. Bid Item No. 51 – F&I Gate Valve Assembly, 4" Complete shall be measured for payment by each completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct 4" Gate Valve Assembly (complete) per the plans and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1080-24-104 F&I Gate Valve Assembly, 4" Complete – per each (EA).
- ZZ. Bid Item No. 52 – F&I Gate Valve Assembly, 6" Complete shall be measured for payment by each completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct 6" Gate Valve Assembly (complete) per the plans and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1080-24-106 F&I Gate Valve Assembly, 6" Complete – per each (EA).
- AAA. Bid Item No. 53 – F&I Gate Valve Assembly, 8" Complete shall be measured for payment by each completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct 8" Gate

Valve Assembly (complete) per the plans and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1080-24-108 F&I Gate Valve Assembly, 8" Complete – per each (EA).

- BBB. Bid Item No. 54 – F&I 4" Blowoff Assembly, Complete (Permanent) shall be measured for payment by each completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct a 4" Blowoff Assembly, Complete (Permanent) per the plans and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1080-25-104 F&I 4" Blowoff Assembly Complete (Permanent) – per each (EA).
- CCC. Bid Item No. 55 – F&I 8" Blowoff Assembly, Complete (Temporary) shall be measured for payment by each completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct an 8" Blowoff Assembly, Complete (Permanent) per the plans and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1080-25-108 F&I 8" Blowoff Assembly Complete (Temporary) – per each (EA).
- DDD. Bid Item No. 56 – Blowoff Assembly, Remove shall be measured for payment by each completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to remove an Existing Blowoff assembly per the plans and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1080-25-600 Blowoff Assembly, Remove – per each (EA).
- EEE. Bid Item No. 57 – F&I Air Release Valve Assembly, 8" Complete shall be measured for payment by each completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct an 8" Air Release Valve Assembly, Complete per the plans and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1080-26-108 F&I Air Release Valve Assembly, 8" Complete – per each (EA).
- FFF. Bid Item No. 58 – Utility Fixture – Line Stop Assembly, Furnish and Install, 4" shall be measured for payment by each completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct and disassemble a 4" Line Stop per the plans and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1080-27-104 Utility Fixture – Line Stop Assembly, Furnish and Install, 4" – per each (EA).
- GGG. Bid Item No. 59 – Utility Fixture – Line Stop Assembly, Furnish and Install, 6" shall be measured for payment by each completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct and disassemble a 6" Line Stop per the plans and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1080-27-106 Utility Fixture – Line Stop Assembly, Furnish and Install, 6" – per each (EA).
- HHH. Bid Item No. 60 – Utility Fixture – Line Stop Assembly, Furnish and Install, 8" shall be measured for payment by each completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct and disassemble an 8" Line Stop per the plans and in accordance with the

Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1080-27-108 Utility Fixture – Line Stop Assembly, Furnish and Install, 8” – per each (EA).

- III. Bid Item No. 61 – Cut-In Connection to Existing 4” WM shall be measured for payment by each completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct Cut-In connections to Existing 4” water mains per the plans and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1080-28-104 Cut-In Connection to Existing 4” WM – per each (EA).
- JJJ. Bid Item No. 62 – Cut-In Connection to Existing 8” WM shall be measured for payment by each completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct Cut-In connections to Existing 8” water mains per the plans and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1080-28-108 Cut-In Connection to Existing 8” WM – per each (EA).
- KKK. Bid Item No. 63 – F&I Fire Hydrant Assembly, Complete with 6”Gae Valve and Box shall be measured for payment by assembly completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to construct a Fire Hydrant Assembly, Complete, with fittings and valves per the plans and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1644-116-08 F&I Fire Hydrant Assembly, Complete with 6” Gate Valve and Box – per assembly (AS).
- LLL. Bid Item No. 64 – Fire Hydrant, Remove Existing Fire Hydrant shall be measured for payment by assembly completed and accepted by the Town. The bid price and payment shall be full compensation for all materials, labor and equipment necessary to remove an Existing Fire Hydrant (complete) per the plans and in accordance with the Orange County Utilities *Standards and Construction Specifications* manual (latest Edition). Payment will be made under Item No. 1644-900 Remove Existing Fire Hydrant – per assembly (AS).

END OF SECTION

SECTION 01027

APPLICATION FOR PAYMENT

PART 1 - GENERAL

- A. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, Submit Schedule, and List of Subcontractors.

1.01 SCHEDULE OF VALUES

- A. Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.
- B. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
- Contractor's Construction Schedule.
 - Application for Payment forms, including Continuation Sheets.
 - List of Subcontractors.
 - List of Products.
 - List of Principal Suppliers and Fabricators.
 - Schedule of submittals.
- C. Submit the Schedule of Values at the earliest possible date, but no later than seven (7) calendar days after the date of the pre-construction conference.

1.02 FORMAT AND CONTENT

- A. Use the Project Manual table of contents as a guide to establish the format for the Schedule of Values. Provide at least one (1) line item for each Specification Section.
- Include the following Project identification.
- Project Name and Location.
 - Name of Engineer.
 - Project Number.
 - Contractor's name and address.
 - Date of Submittal.
- B. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed.
- Related Specification Section or Division.
 - Description of Work.
 - Name of Subcontractor.
 - Change Orders (numbers) that affect the value.
 - Dollar value.
 - Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent.
- C. Provide a breakdown of the Contract Sum in sufficient detail to facilitate evaluation of Applications for Payment. Break subcontract amounts down into several line items. Round amounts to nearest whole dollar; the total shall equal the Contract sum.

- D. Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives change the Contract sum.
- E. Applications for Payment shall be consistent with previous applications and payments as certified by the Engineer and paid for by the Owner.

1.03 PAYMENT – APPLICATION TIMES

- A. Payment dates are indicated in the Agreement. The period covered by each application is the period indicated in the Agreement.

1.04 APPLICATION PREPARATION

- A. Complete every entry, including notarization and execution by a person authorized to sign on behalf of the Contractor. The Engineer will return incomplete applications without action.
- B. Entries shall match data on the Schedule of Values and the Contractor's Construction Schedule. Use updated schedules if revisions were made.
- C. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

1.05 TRANSMITTAL

- A. Submit seven (7) executed original copies of each Application for Payment to the Engineer within twenty-four (24) hours. All copies shall be complete, including waivers of lien and similar attachments.
- B. Transmit each copy with a transmittal listing attachments and recording appropriate information related to the application.

1.06 INITIAL APPLICATION FOR PAYMENT

- A. Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include:
 - List of Subcontractors.
 - List of Principal Suppliers and Fabricators.
 - Schedule of Values.
 - Contractor's Construction Schedule (preliminary, if not final).
 - Submittal Schedule (preliminary, if not final).
 - Copies of building permits.
 - Copies of licenses from governing authorities.
 - Certificate of insurance and insurance policies.
 - Performance and payment bonds.

1.07 APPLICATION FOR PAYMENT AT SUBSTANTIAL COMPLETION

- A. Following issuance of the Certificate of Substantial Completion, submit an Application for Payment. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designation portions of the Work.

B. Administrative actions and submittals that shall precede or coincide with this application include the following:

- Occupancy permits (if applicable).
- Warranties and maintenance agreements.
- Test/Adjust/Balance records.
- Maintenance instructions.

1.08 FINAL PAYMENT APPLICATION

A. Administrative actions and submittals that must precede or coincide with the submittal of the final Application for Payment include the following:

- Completion of Project closeout requirements – see Section 01700.
- Completion of items specified for completion after Substantial Completion.
- Transmittal of Project construction records to the Owner.
- Proof that taxes, fees and similar obligations were paid.
- Removal of temporary facilities and services.

PART 2 – PRODUCTS

(Not applicable)

PART 3 – EXECUTION

(Not applicable)

END OF SECTION

SECTION 01040

COORDINATION

PART 1 - GENERAL

1.01 PROJECT COORDINATION

- A. The Contractor shall provide for the complete coordination of the construction efforts. This shall include, but not necessarily be limited to, coordination of the following:
 - 1. The work of subcontractors;
 - 2. The flow of material and equipment from suppliers;
 - 3. The interrelated work with public utilities companies;
 - 4. The interrelated work with the Owner where tie-ins to existing facilities are required; and
 - 5. The effort of independent testing agencies.
- B. The Contractor will be allowed the widest practicable latitude in establishing his work plan. Contractor shall submit a plan of work to Owner and Engineer.

1.02 CUTTING AND PATCHING

- A. The Contractor shall do all cutting, fitting and patching of his work that may be required to make its several parts come together properly and integrate with such other work. The Contractor shall not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of the Engineer and the others whose work will be affected.

PART 2 - MATERIALS AND EQUIPMENT

(Not Applicable)

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 01050

FIELD ENGINEERING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. The Contractor shall provide and pay for field engineering service required for the project. Such work shall include survey work to establish lines and levels and to locate and lay out site improvements, structures, and controlling lines and levels required for the construction of the work. Also included are such Engineering services as are specified or required to execute the Contractor's construction methods. Engineers and Surveyors shall be licensed professionals under the laws of the state where the project is located.

1.02 GRADES, LINES AND LEVELS

- A. Existing basic horizontal and vertical control points for the project are those designated on the Drawings. The Contractor shall locate and protect control points prior to starting site work and shall preserve all permanent reference points prior to starting site work and shall preserve all permanent reference points during construction. In working near any permanent property corners or reference markers, the Contractor shall use care not to remove or disturb any such markers. In the event that markers must be removed or are disturbed due to the proximity of the construction work, the Contractor shall have them referenced and reset by a Professional Mapper and Land Surveyor qualified under the laws of the state of the project.

1.03 LAYOUT DATA

- A. The Contractor shall lay out the work at the location and to the lines and grades shown on the Drawings. Survey notes indicating the information and measurements used in establishing locations and grades shall be kept and furnished with the record drawings for the project.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 01200
PROJECT MEETINGS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Project meetings shall be scheduled as needed throughout the progress of the work. Those responsible for scheduling the meetings shall prepare the agenda, distribute written notice of each meeting not less than four (4) days in advance of the meeting date, make physical arrangements for the meeting, preside at the meeting, record the minutes (include all significant proceedings and decisions), and reproduce and distribute copies of the minutes to all participants, all parties affected by decisions made, and the Engineer.
- B. Representatives attending the meetings shall be qualified and authorized to act on behalf of the entities they represent.

1.02 PRE CONSTRUCTION CONFERENCE

- A. Before the Contractor starts the work at the site, the Engineer will schedule a preconstruction conference which will be held for review and acceptance of the schedules referred to in Section 01300, to establish procedures for handling shop drawings and other submittals and for processing Applications for Payment, and to establish a working understanding among the parties as to the work.
- B. The date for the start of construction shall be established at this conference.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

- A. The type of submittal requirements specified in this section include the following:
- Progress Schedules and Reports
 - Product Data
 - Shop Drawings
 - Manufacturer's Data
 - Miscellaneous
- B. Submittals shall be clear and legible, printed or typed. Submittals received that are not so, shall be returned to be resubmitted when in legible form.

1.02 PROGRESS SCHEDULES AND REPORTS

- A. Within ten (10) days after the effective date of the Agreement, the Contractor shall submit to the Engineer for review and acceptance an estimated progress schedule indicating the starting and completion dates of the various stages of the work, a preliminary schedule of shop drawing submissions, and a preliminary schedule of values of the work. Include sub-schedules of related activities which are essential to its progress.
- B. Revised schedules shall be submitted periodically as changes become apparent.
- C. Unless other format or use of a network analysis system is required, schedules shall be prepared in the required format specified in 1.10 of Section 01001 - General Requirements. A separate horizontal bar shall be provided for each trade or operation. The first work day of each week shall be identified on the horizontal time scale. Scale and spacing will be such as to allow space for notations and revisions.
- D. Schedules shall show the complete sequence of construction by activity with dates for the beginning and completion of each major element of construction. Projected percentage of completion for each item as of the first day of each month shall be shown.
- E. Progress Reports

The Contractor shall prepare and submit a monthly progress report. The report shall indicate the progress at the date of submission of each activity shown on his progress schedule. It shall show changes occurring since previous submissions, activities modified since previous submissions, and revised projections of progress and completion. The submittal shall include a narrative report to define: problem areas, anticipated delays, and the impact on the schedule, and corrective action recommended and its effect.

1.03 PRODUCT DATA (Shop Drawings and Manufacturer's Data)

- A. The Contractor shall prepare and submit to the Engineer a schedule of the shop drawings, product data and samples which are required for the work together with anticipated submittal time. Any drawings which require critical timing for maintaining delivery or construction schedules shall be so noted. Shop drawing submittal schedule shall be coordinated with the requirements of construction progress schedules.

- B. Those submittals required under various sections of the specifications, but not listed on the Contract Submittal List shall be submitted as "RECORD SUBMITTALS" and given to the Engineer along with the Record Drawings as specified in Section 01700 - Contract Closeout.
- C. Product data submitted for substitutions shall be handled as specified in Section 01630 - Substitutions and Product Options.
- D. Definitions
 - 1. Work-related submittals of this section are categorized for convenience as follows:
 - a. Shop drawings include specially-prepared technical data for this project, including drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements and similar information not in standard printed form for general application to several projects.
 - b. Product data include standard printed information on materials, products and systems; not specially-prepared for this project, other than the designation of selections from among available choices printed in the information.
 - c. Miscellaneous submittals related directly to the work (non-administrative) include warranties, maintenance agreements, workmanship bonds, project photographs, survey data and reports, physical work records, quality testing and certifying reports, copies of industry standard, record drawings, field measurement data, operating and maintenance materials, overrun stock, and similar information, devices and materials applicable to the work and not processed as shop drawings, product data or samples.

1.04 GENERAL SUBMITTAL REQUIREMENTS

- A. After checking and verifying all field measurements, the Contractor shall submit to the Engineer for review and approval, in accordance with the accepted schedule of shop drawing submissions, five (5) copies of all shop drawings, which shall have been checked by and stamped with the approval of the Contractor and identified as the Engineer may require. The data shown on the shop drawings will be complete with respect to dimensions, design criteria, materials of construction and like information to enable the Engineer to review the information as required.
- B. The Contractor shall also submit to the Engineer for review and approval with such promptness as to cause no delay in work, all samples required by the Contract Documents. All samples will have been checked by and stamped with the approval of the Contractor, identified clearly as to material, manufacturer, and pertinent catalog numbers and the use for which intended. At the time of each submission, the Contractor shall, in writing, call the Engineer's attention to any deviations that the shop drawings or samples may have from the requirements of the Contract Documents.

- C. The Engineer will review and approve with reasonable promptness shop drawings and samples, but the Engineer's review and approval shall be only for conformance with the design concept of the project and for compliance with the information given in the Contract Documents and shall not extend to means, methods, sequences, techniques or procedures of construction or to safety precautions or programs incident to the work. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions. The Contractor shall make any corrections required by the Engineer and shall return the required number of corrected copies of shop drawings and resubmit new samples for review and approval. The Contractor shall direct specific attention, in writing, to revisions other than the corrections called for by the Engineer on previous submittals. The Contractor's stamp of approval on any shop drawing or sample shall constitute a representation to the Owner and the Engineer that the Contractor has either determined and verified all quantities, dimension, field construction criteria, materials, catalog numbers, and similar data or assumes full responsibility for doing so, and that the Contractor has reviewed or coordinated each shop drawing or sample with the requirements of the work and the Contract Documents.
- D. Where a shop drawing or sample is required by the Specifications, no related work shall be commenced until the submittal has been reviewed and approved by the Engineer.
- E. The Engineer's review and approval of shop drawings or samples shall not relieve the Contractor from responsibility for any deviations from the Contract Documents unless the Contractor has in writing called the Engineer's attention to such deviations at the time of submission and the Engineer has given written concurrence and approval to the specific deviation, nor shall any concurrence or approval by the Engineer relieve the Contractor from responsibility for errors or omissions in the shop drawings.
- F. Systems to be submitted in the shop drawing submittal shall include but not necessarily be limited to:
 - a. Each item of equipment and/or materials listed in the project equipment and material schedules.
- G. Certifications
 - a. Whenever a standard of quality is established by a reference specification, the Contractor shall submit a certificate by the manufacturer that the material supplied meets the requirements of both the project and reference specification.

H. Schedule of Values

- a. At least ten (10) days prior to submitting the first Application for a progress payment, the Contractor shall submit to the Engineer a schedule of values of the work. This schedule shall be satisfactory in form and substance to the Engineer. The schedule of values shall include quantities and unit prices aggregating the contract price, and shall subdivide the work into component parts in sufficient detail to serve as the basis for progress payments during construction. Upon acceptance of the schedule of values by the Engineer, it shall be incorporated into a form of Application for Payment acceptable to the Engineer.
- b. Where estimated quantities and unit prices are shown in the Bid Form as the basis of payment, the quantities shown in the Bid Form are approximate and are given only as a basis of calculation upon which the award of the contract is to be made. The Owner or Engineer do not assume any responsibility that the final quantities will remain in accordance with estimated quantities, nor shall the Contractor claim misunderstanding or deception because of such estimate of quantities. Final payment will be made on the basis of the actual completed quantities of each item.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 01400
QUALITY CONTROL

PART 1 - GENERAL

1.01 TESTING LABORATORY SERVICES

- A. Arrangements for testing laboratory services will be made by the OWNER. Payment for testing to show compliance with specified requirements will be paid for by the OWNER. The cost of retesting when materials and workmanship fail to meet specified requirements will be deducted from monies due the Contractor or billed directly to the Contractor by the soils testing laboratory.

1.02 INSPECTION SERVICES

- A. The authorized representative of all applicable Federal and/or State agencies, including the United States Environmental Protection Agency (USEPA), U.S. Army Corps of Engineers (USACE), the Florida Division of Emergency Management (FDEM), the Florida Department of Environmental Protection (FDEP) and the South Florida Water Management District (SFWMD), shall be permitted to inspect all work, materials, payrolls, records of personnel, invoice of materials, and other relevant data and records. The Owner and his authorized representatives shall be permitted free access and every reasonable facility for the inspection of all work and materials, including the removal or uncovering of such portions of the finished work as may be directed. The Owner and his authorized representative shall also be permitted to inspect payrolls, invoices of materials and other relevant data and records.

1.03 INSPECTION OF WORK AWAY FROM SITE

- A. If work to be done away from the construction site is to be inspected on behalf of the Owner during its fabrication, manufacture or testing or before shipment, the Contractor shall give notice to the Engineer of the time and place where such fabrication, manufacturing, testing or shipping is to be done. Such notice shall be in writing and delivered to the Engineer in ample time so that the necessary arrangements for the inspection can be made.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 01490

CONTRACTOR SAMPLING AND TESTING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: This work consists of obtaining samples for testing for all items. The costs of the tests will be borne by the Owner.

PART 2 - SAMPLING AND TESTING

2.01 SAMPLING

- A. Sample material to be tested. Contractor shall sample any material that appears defective or inconsistent with similar material being produced, unless such material is voluntarily removed and replaced or corrected.

2.02 TESTING: Allow the Owner and/or Owner's Engineer the opportunity to witness all testing.

2.03 RECORDS: Contractor shall record test results on acceptable forms. Furnish all test results in the minimum time reasonably necessary to perform the tests and transmit the results. When tests are on material being incorporated in the work, report test results within twenty-four (24) hours. Payment for work may be delayed or the work suspended until test results are provided.

2.04 ACCEPTANCE: Contractor sampling and testing will be evaluated under the following subsections based on Owner verification testing.

- A. Visual Inspection: Acceptance is based on visual inspection of the work for compliance with the contract and prevailing industry standards.

- B. Measured or Tested Conformance

1. Provide all necessary production, processing, and control performance of the work so as to comply with the contract requirements.
2. Results from inspection or testing shall have values within the specified tolerances or specification limits. When no tolerance values are identified in the contract, the work will be accepted based on customary manufacturing and construction tolerances.

(Remainder of This Page Left Blank Intentionally.)

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

- A. This section specifies the minimum requirements for temporary facilities, utilities to be brought to the site, refuse/waste collection and control required to enable the construction of the project to progress adequately. The providing of adequate facilities at every stage of performing the work is the Contractor's sole responsibility, and is not limited by the requirement of this section.
- B. Except as otherwise indicated, the Contractor may, at his option, provide stand-alone utility plants to provide needed services, in lieu of connected services from available public utilities, provided such stand-alone plant facilities comply with governing regulations. Prior to availability of temporary utility services, provide trucked-in/trucked-out containerized or unitized services for startup of construction operations at the site.
- C. Except as otherwise indicated, the costs of providing and using temporary utility services are included in the Contract Sum.

1.02 TEMPORARY FACILITIES

- A. The types of utility services required for general temporary use at the project site include the following (other specific services may be required for specific construction methods or operations):
- Electrical Power Service
 - Water Service (potable for certain uses)
 - Sanitary
 - Storm Sewer or Open Drainage/Run-off Control
 - Refuse/Waste Collection
- B. Temporary Electricity
1. The Contractor shall make necessary applications and arrangements and pay all fees and charges for electrical energy for power and light necessary for proper completion of the work and during its entire progress up to time of final acceptance by the Owner. The Contractor shall provide and pay for all temporary switches, connections and meters.
- C. Temporary Water
1. The Contractor shall make all necessary application and arrangements, and pay all fees and charges for water necessary for the proper completion of the project up to the time of final acceptance. The Contractor shall provide and pay for any temporary piping and connections.
- D. Temporary Sanitary Facilities
1. The Contractor shall provide adequate sanitary facilities for the use of those employed on the work. Such facilities shall be made available when the first employees arrive on the site of the work, shall be properly secluded from public

observation, and shall be constructed and maintained during the progress of the work in suitable numbers and at such points and in such manner as may be required or approved.

2. The Contractor shall provide these portable sanitary facilities "on-site" for use by workers. Transporting workers to the nearest "public" sanitary facility will not be considered an acceptable alternative to these requirements.
3. The Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. He shall rigorously prohibit the committing of nuisances on the site of the work, on the lands of the Owner, or on adjacent property. The cost of providing these sanitary facilities shall be included in the Contractor's applicable pay items of work and no separate payment shall be made thereof.

E. Temporary Refuse/Waste Collection

1. The Contractor shall provide for adequate refuse/waste collection and disposal.
2. It will be the Contractor's responsibility to make all necessary arrangements for refuse/waste collection and disposal. The cost of providing for such refuse/waste collection and disposal shall be included in the Contractor's applicable pay items of work and no separate payment shall be made thereof.

F. Termination and Removal

1. At the time the need for temporary utility service or a substantial portion thereof has ended, or when its service has been replaced by use of permanent services, or not later than the time of substantial completion, promptly remove the installation unless requested by the Engineer to retain it for a longer period. Complete and restore work which may have been delayed or affected by the installation and use of the temporary utility, including repairs to construction and grades and restoration and cleaning of exposed surfaces. Replace work damaged beyond acceptable restoration.

1.03 TEMPORARY CONTROLS

A. Noise Control

1. The Contractor shall provide adequate protection against objectionable noise levels caused by the operation of construction equipment.

B. Dust Control

1. The Contractor shall provide for adequate protection against raising objectionable dust clouds caused by moving construction equipment, high winds or any other cause.

C. Water Control

1. The Contractor shall provide for satisfactory disposal of surplus water and shall submit a plan to the Engineer for his review prior to initiation and implementation of the plan. Prior approval shall be obtained from the proper authorities for the use of public or private lands or facilities for such disposal.

D. Pollution Control

1. The Contractor shall provide for adequate protection against polluting any public or private lands, lakes, ponds, rivers, streams, creeks, and other such areas, by the disposal of surplus material in the form of solids, liquids, or gases or from any other cause. The Contractor shall provide for adequate refuse/waste collection and disposal as described in Part 1, paragraph 1.02 of this Section.
2. The Contractor shall evaluate and assess the impact of any adverse effects on the natural environment which may result from construction operations and shall operate to minimize pollution of air, ground or surface waters vegetation, and afford the neighboring community the maximum protection during and up to completion of the construction project.
3. The Contractor shall take sufficient precautions to prevent pollution of streams, lakes and reservoirs with fuels, oils, bitumens, calcium chloride or other harmful materials. He shall conduct and schedule his operations so as to avoid or otherwise prevent pollution of siltation of streams, lakes and reservoirs and to avoid interference with movement of migratory fish.
4. All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.

E. Erosion Control

1. The Contractor shall not expose, by construction operations, a larger area of erosive land at any one time than the minimum necessary for efficient construction operations, and the duration of exposure of the uncompleted construction to the elements shall be as short as practicable.
2. Erosion control features shall be constructed concurrently with other work and at the earliest practicable time.

1.04 STORAGE FACILITIES

- A. All products, materials and equipment shall be stored in accordance with the manufacturer's instructions, with seals and labels intact and legible. Products subject to damage by the elements shall be stored in weathertight enclosures. Temperature and humidity shall be maintained within the ranges required by the manufacturer's instructions. Fabricated products shall be stored above the ground on blocking or skids. Products which are subject to deterioration shall be covered with impervious coatings with adequate ventilation to avoid condensation. Loose granular materials shall be stored in a well-drained area on solid surfaces to prevent mixing with foreign matter. Any products which will come in contact with potable water shall be stored off the ground so as to prevent contamination.
- B. Storage shall be arranged in such a manner to provide easy access for inspection. Periodic inspections shall be made of all stored products to assure that they are maintained under specified conditions, and free from damage or deterioration.
- C. After installation, Contractor shall provide substantial coverings as necessary to installed products to protect from damage from traffic and subsequent construction operations. Coverings shall be removed when no longer needed.

1.05 PRESERVATION OF PROPERTY

- A. Preserve from damage all property along the line of the work, or which is in the vicinity of or in any wise affected by the work, the removal or destruction of which is not called for by the plans. Wherever such property is damaged due to the activities of the Contractor, it shall be immediately restored to its original condition by the Contractor at no cost to the Owner.
- B. In case of failure on the part of the Contractor to restore such property, or make good such damage or injury, the Owner may, after 48 hours notice to the Contractor, proceed to repair, rebuild or otherwise restore such property as may be deemed necessary and the cost thereof will be deducted from any monies due or which may become due the Contractor under this Contract.
- C. The Contractor shall be responsible for the protection of property, in the areas in the vicinity of the project; and for the protection of his equipment, supplies, materials and work, against any damage resulting from the elements, such as flooding, by rainstorm, wind damage, or other elemental cause resulting from the project configuration. The Contractor shall take all precautions against any such damage occurrence, and shall be responsible for damage resulting from same. The Contractor shall provide adequate drainage facilities, tie-downs, or other protection, throughout the Contract period, for the protection of his, the Owner's, and other properties from such damage.

1.06 TRAFFIC REGULATION

- A. Signs, marking barricades and procedures shall conform to the requirements of the Florida Department of Transportation Manual on Traffic Controls and Safe Practices for Street and Highway Construction, Maintenance and Utility Operations.
- B. The Contractor shall maintain one-lane, two-way traffic at all times and maintain customer access to local businesses at all times throughout the course of the work.
- C. The Contractor shall provide and maintain adequate barricades, construction signs, torches, flashers, guards and flagmen as required in pedestrian and vehicular traffic areas. Regulations of local authorities shall be complied with.
- D. The contractor shall provide suitable crossings at street intersections and driveways, and supply such aid as may be required for pedestrians and motorists, including delivery vehicles, to safely negotiate the construction areas.
- E. The Contractor shall carry on the work in a manner that will cause the least interruption in traffic. Closing to through travel of more than two consecutive blocks, including the cross streets intersected will not be permitted without specific authorization from the local authorities. Where traffic must cross open trenches, the Contractor shall provide suitable bridges at street intersections and driveways and provide adequate ingress and egress to dwellings, business facilities, utilities and services. At any time the streets are required to be closed, the Contractor shall notify, in writing, law enforcement agencies, fire departments, and parties operating emergency vehicles before the street is closed and again as soon as it is opened. Access to fire hydrants and other fire extinguishing equipment shall be provided and maintained at all times. Refer to Section 01010 of these Specifications for "Notification of Construction" and "Notification of Street Closure" requirements.

- F. On completion of work, the Contractor shall remove all debris, excess materials, barricades and temporary work leaving walkways and road clear of obstructions.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 01558

TRAFFIC CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION: (Contractor shall)

- A. Maintain traffic within the limits of the project for the duration of the construction period, including any temporary suspensions of the work. Construct and maintain any necessary detour facilities. Provide necessary facilities for access to residences, businesses, etc., along the project. Furnish, install, and maintain traffic control and safety devices during construction. Furnish and install work zone pavement markings for maintenance of traffic in construction areas. Furnish and apply calcium chloride on the subgrade, unsurfaced base, or other unsurfaced traveled ways in order to control dust during construction operations. Provide any other special requirements for safe and expeditious movement of traffic as may be specified on the plans. Develop Maintenance of Traffic Plans (MOT) if required. The term, Maintenance of Traffic, includes all of such facilities, devices and operations as are required for the safety and convenience of the public as well as for minimizing public nuisance.

1.02 CONTRACTOR'S RESPONSIBILITY: (Contractor shall)

- A. Maintain traffic starting the day work begins on the project or on the first day Contract time is charged, whichever is earlier.
- B. Continually and adequately review traffic control devices to ensure proper installation and working order, including monitoring of lights. Provide an individual responsible for this review who is certified as an American Traffic Safety Services Association Certified Work Site Supervisor.

PART 2 - SPECIFIC REQUIREMENTS

2.01 MAINTENANCE OF ROADWAY SURFACES: (Contractor shall)

- A. Maintain all lanes that are being used for the maintenance of traffic, including those on detours and temporary facilities, under all weather conditions. Keep the lanes reasonable free of dust, and, when necessary to accomplish this, sprinkle them with water, or apply some other dust palliative. Provide the lanes with the drainage facilities necessary to maintain a smooth riding surface under all weather conditions. Refer to the Contract Documents to see if they require a paved surface for lanes being used for the maintenance of traffic.

2.02 STANDARDS

- A. Contractor's traffic control Work and if required, the Contractor prepared Work Zone Traffic Control Plan shall conform to detailed procedures and protective measures for protection and control of traffic affected by the Work consistent with the following applicable standards.
 - 1. Florida Department of Transportation (FDOT) *Standard Specifications for Road and Bridge Construction*, Latest Edition including all subsequent supplements issued thereto.
 - 2. Manual of Traffic Control and Safe Practices for Street and Highway construction. Maintenance and Utility Operations, FDOT.

3. FDOT Roadway and Traffic Design Standards, Latest Edition.
 4. Manual on Uniform Traffic Control Devices (MUCTD), Latest Edition.
- B. All references to the respective agency in the above referenced standards shall be construed to also include the Owner of this work.

2.03 NOTICE REQUIREMENT AND PERMITS

- A. Before closing any thoroughfare, the Contractor shall give written notice to and, if necessary, obtain a permit or permits from the duly constituted public authority having jurisdiction over the thoroughfare. Notice shall be given no less than 72 hours in advance of the time when it may be necessary in the process of construction to close such thoroughfare, or as may be otherwise provided in the approved Traffic Control Plan.

2.04 WORK ZONE TRAFFIC CONTROL PLAN

- A. If Maintenance of Traffic (MOT) Plans is not provided as part of the Contract Documents, the Contractor shall be responsible for development of project MOT Plan. If a MOT Plan is provided as part of the Contract Documents and the Contractor requests modification(s) to same, the Contractor shall be responsible for development of such modification(s) to Project MOT Plan.
- B. Contractor shall provide three (3) complete copies of signed and sealed MOT Plan(s) for review by Owner and/or Owner's Engineer. MOT Plan must be provided to scale in plan view as a Contract Plan overlay. Drop-offs in work zones must also be addressed in profile and cross section as required. The Contractor shall provide additional MOT Plans as required to other jurisdictional agencies for separate review and approval. List of other jurisdictional agencies to be provided with MOT Plans as follows:
- C. The MOT Plan developed by the Contractor shall be submitted to Owner and/or Owner's Engineer for review/approval twenty-eight (28) calendar days prior to the implementation of the contemplated MOT Plan. Owner and/or Owner's Engineer shall be allotted fourteen (14) calendar days to review the MOT Plan from date of receipt of same. If the MOT Plan is not approved or if additional information is required for re-submittal, the referenced twenty-eight (28) calendar day implementation period shall re-start as of the date of the Owner and/or Owner's Engineers receipt date of the MOT Plan re-submittal. MOT Plan to be submitted to other jurisdictional agencies shall be provided within time limits as established by the individual agencies. The Contractor shall directly contact individual agencies to determine such time limits.
- D. Contractor shall submit names of individuals to serve as Engineer, Professional Engineer and Work Zone Traffic Control Supervisor (WTS). Provide copies of required certifications and resumes listing previous experience for these individuals at the Project Pre-construction Conference or with the initial MOT Plan submittal, whichever is earlier.

END OF SECTION

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

- A. Materials and equipment furnished by CONTRACTOR shall be new and shall not have been in service at any other installation unless otherwise provided. Materials and equipment shall conform to applicable specifications and standards and comply with the size, make, type and quality specified, or as specifically approved in writing by ENGINEER.
- B. Manufactured and fabricated items shall be designed, fabricated and assembled in accordance with the best engineering and shop practices. Like parts of duplicate units shall be manufactured to standard sizes and gauges to be interchangeable.
- C. Two or more things of the same kind shall be identical, by the same manufacturer.
- D. Materials and equipment shall be suitable for service conditions shown or specified.
- E. Equipment which requires auxiliary devices or equipment in order to operate properly shall have such auxiliary devices or equipment included as a part of its system.
- F. Equipment sizes, capacities and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
- G. Materials and equipment shall not be used for any purpose other than that for which it is designed or is specified.
- H. Where existing materials or equipment is specifically shown or specified to be reused in the work, special care shall be used in removal, handling, storage, and reinstallation, to assure proper function in the completed work.
- I. CONTRACTOR shall arrange for transportation, storage and handling of products which require off-site storage, restoration or renovation.
- J. Salvaged Materials
 - 1. In the absence of special provisions to the contrary, salvaged materials, equipment or supplies are the property of OWNER and shall be cleaned and stored as directed by ENGINEER.
- K. Manufacturer's Instructions
 - 1. The installation of all work shall comply with manufacturer's written instructions. CONTRACTOR shall obtain and distribute copies of such instructions to parties involved in the installation including two copies to ENGINEER. One complete set of instructions shall be maintained at the job site during installation and until completion All products and equipment shall be handled, installed, connected, cleaned, conditioned and adjusted in accordance with the manufacturer's instructions and specified requirements. Should job conditions or specified requirements conflict with manufacturers instructions, such conflicts shall be called to ENGINEER'S attention for resolution and revised instructions.

L. Equipment Guarantee

1. All mechanical and electrical equipment, together with devices of whatever nature and all components, which are furnished and/or installed by CONTRACTOR shall be guaranteed. The guarantee shall be against manufacturing and/or design inadequacies, materials and workmanship, improper assembly, hidden damage, failure of devices and/or components, excessive leakage or other circumstances which would cause the equipment to fail under normal design and/or specific operating conditions for a period of one year or such longer period as may be shown and/or specified from and after the date of acceptance of the equipment by OWNER. Each piece of equipment, device or component which shall fail within the above specified term shall be replaced with reasonable promptness by CONTRACTOR without cost to OWNER.

M. Operating Characteristics

1. Rotating machinery shall be designed and fabricated to provide satisfactory operation without excessive wear and without excessive maintenance during its operating life. Rotating parts shall be statically and dynamically balanced and shall operate without excessive vibration.

N. Lubrication System

1. The minimum design criteria for lubrication of moving parts of the equipment shall include one week of continuous operation during which no lubricants shall be added to the system. The system shall also be designed to receive lubricants whether in operation or shut down, and shall not leak or waste lubricants under either condition. The manufacturer's recommendations of grade and quality and a supply of the lubricants so recommended in quantities sufficient to conduct startup and testing operations shall be furnished with the equipment.

O. Safety Requirements

1. Screens, guards or cages shall be provided for all exposed, rotating or moving parts in accordance with accepted practices of applicable governmental agencies.

P. Nameplates

1. Each major component of equipment shall have the manufacturers name, catalog and/or model number, serial number and applicable performance requirements and characteristics embossed, stamped, or engraved on a stainless steel plate securely attached to the item of equipment.

Q. Anchor Bolts

1. The manufacturer shall provide stainless steel anchor bolts for each piece of equipment furnished.

1.02 TRANSPORTATION AND HANDLING

- A. Materials and equipment shall be loaded and unloaded by methods affording adequate protection against damage. Every precaution shall be taken to prevent injury to the materials or equipment during transportation and handling. Suitable power equipment

will be used and the materials or equipment shall be under control at all times. Under no condition shall the materials or equipment be dropped, bumped or dragged. When a crane is used, a suitable hook or lift sling shall be used. The crane shall be so placed that all lifting is done in a vertical plane. Materials or equipment skid loaded, palletized or handled on skidways shall not be skidded or rolled against materials or equipment already unloaded.

- B. Materials and equipment shall be delivered to the job site by means that will adequately support it and not subject it to undue stresses. Contractor shall promptly inspect the products for damage and defects and conformance with the specification. Materials and equipment damaged or injured in the process of transportation, unloading or handling will be rejected and shall be immediately removed from the site.

1.03 STORAGE AND PROTECTION

- A. All materials and equipment shall be stored in accordance with the manufacturer's instructions, with seals and labels intact and legible. Items subject to damage by the elements shall be stored in weathertight enclosures. Temperature and humidity shall be maintained within the ranges required by the manufacturer's instructions. Fabricated items shall be stored above the ground on blocking or skids. Items which are subject to deterioration shall be covered with impervious coatings with adequate ventilation to avoid condensation. Loose granular materials shall be stored in a well-drained area on solid surfaces to prevent mixing with foreign matter. Any items which will come in contact with potable water shall be stored off the ground so as to prevent contamination.
- B. Storage shall be arranged in such a manner to provide easy access for inspection. Periodic inspections shall be made of all stored items to assure that they are maintained under specified conditions, and free from damage or deterioration.
- C. After installation, CONTRACTOR shall provide substantial coverings as necessary to protect installed items from damage, from traffic, and subsequent construction operations. Coverings shall be removed when no longer needed.

PART 2 - MATERIALS AND EQUIPMENT

(Not Applicable)

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 01630

SUBSTITUTIONS AND PRODUCT OPTIONS

PART 1 - GENERAL

1.01 REQUESTS FOR REVIEW

- A. Requests to review substitute items of material and equipment will not be accepted by the Engineer from anyone other than the Contractor. If the Contractor wishes to furnish or use a substitute or equivalent item of material or equipment, the Contractor shall make written application to the Engineer for acceptance, certifying that the proposed substitute will perform adequately the functions called for by the general design, be similar and of equivalent substance to that specified and be suited to the same use and capable of performing the same function as that specified. The application will state whether or not acceptance of the substitute for use in the work will require a change in Drawings or Specifications to adapt the design to the substitute and whether or not incorporation or use of the substitute in connection with the work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified shall be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which shall be considered by the Engineer in evaluating the proposed substitute. The Engineer may require the Contractor to furnish at the Contractor's expense additional data about the proposed substitute. The Engineer will be the sole judge of acceptability, and no substitute will be ordered or installed without the Engineer's prior written acceptance. The Owner may require the Contractor to furnish at the Contractor's expense, a special performance guarantee or other surety with respect to any substitute.

1.02 SUBSTITUTION AFTER EXECUTION OF AGREEMENT

- A. After execution of the Agreement, substitution of materials or equipment supplied by manufacturers or suppliers other than those listed, will be considered only if it is demonstrated by the Contractor that:
1. The material or equipment proposed for substitution is superior in design, construction and/or efficiency to that of the listed manufacturer or supplier;
 2. The material proposed for substitution is in every way equal to that of the listed supplier, and that availability and/or delivery of listed materials within the time frame scheduled cannot be met; or
 3. The material proposed for substitution is in every way equal to that of the listed supplier and is available at a lower cost. In the event such a substitution is allowed, the Contractor shall accept and execute a Change Order reducing the Contract Price by an amount equal to the cost differential.

1.03 EQUIVALENT MATERIALS AND EQUIPMENT

- A. Whenever materials or equipment are specified or described in the Drawings or fabricator, supplier or distributor, the naming of the item is intended to establish the type, function, and quality required. Unless the name is followed by words indicating that no substitution is permitted, materials or equipment of other manufacturers, fabricators, suppliers or distributors may be accepted by the Engineer to determine that the material or equipment proposed is equivalent to that named.
- B. It is not the intent of the Contract Documents to function as proprietary specifications. Where a particular manufacturer make and model are cited and specifically required for interchangeability of parts and/or match existing equipment, this has been so stated in the Specifications.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

A. Definition

Closeout is defined to include general requirements near end of Contract Time, in preparation for final acceptance, final payment, normal termination of contract, occupancy by OWNER and similar actions evidencing completion of the work. Specific requirements for individual units of work are specified in sections of Division 2 through 16. Time of closeout is directly related to "Substantial Completion", and therefore may be either a single time period for entire work or a series of time periods for individual parts of the work which have been certified as substantially complete at different dates. That time variation (if any) shall be applicable to other provisions of this section.

1.02 PREREQUISITES TO SUBSTANTIAL COMPLETION

- A. When the CONTRACTOR considers the work to be substantially complete, he shall submit to the ENGINEER: a written notice that the work, or designated portion thereof, is substantially complete; and a list of items to be completed or corrected.
- B. Within a reasonable time after receipt of such notice, the ENGINEER will make an inspection to determine the status of completion.
- C. Should the ENGINEER determine that the work is not substantially complete, the ENGINEER will promptly notify the CONTRACTOR, in writing, giving the reasons. The CONTRACTOR shall remedy the deficiencies in the work and send a second written notice of substantial completion to the ENGINEER. The ENGINEER will reinspect the work.
- D. When the ENGINEER finds that the work is substantially complete, he will prepare and deliver to the OWNER a tentative Certificate of Substantial Completion with a tentative list of items to be completed or corrected before final payment. After consideration of any objections made by the OWNER as provided in Conditions of the objections made by the OWNER as provided in Conditions of the Contract, and when the ENGINEER considers the work substantially complete, he will execute and deliver to the OWNER and the CONTRACTOR a definite Certificate of Substantial Completion with a revised tentative list of items to be completed or corrected.
- E. When the CONTRACTOR considers the work complete, he shall submit written certification that the Contract Documents have been reviewed, the work has been inspected for compliance with the Contract Documents, the work has been completed in accordance with the Contract Documents, equipment and systems have been tested in the presence of the OWNER's representative and are operational, and the work is completed and ready for final inspection.
- F. With reasonable promptness after receipt of such certification, the ENGINEER will make an inspection to verify the status of completion. Should the ENGINEER consider that the work is incomplete or defective, he will promptly notify the CONTRACTOR, in writing, listing the incomplete or defective work. The CONTRACTOR shall take immediate steps to remedy the stated deficiencies and send a second written certification to the ENGINEER that the work is complete. The ENGINEER will reinspect the work.

- G. Should the ENGINEER perform reinspections due to failure of the Work to comply with the claims of status of completion made by the CONTRACTOR, the OWNER will compensate the ENGINEER for such additional services and the OWNER will deduct the amount of such compensation from the final payment to the CONTRACTOR.

1.03 CLOSEOUT SUBMITTALS

- A. When the ENGINEER finds that the work is acceptable under the Contract Documents, he shall request the CONTRACTOR to make closeout submittals.

The CONTRACTOR's closeout submittals shall include:

1. Evidence of compliance with requirements of governing authorities.
2. Project Record Documents.
3. Operating and Maintenance Data
4. Evidence of Payment and Release of Liens.
5. Certificate of Insurance for Products and Completed Operations.
6. Warranties and Bonds (required for the Correctional Period and Maintenance Period)
7. Spare parts and maintenance materials.

1.04 ADDITIONAL CLOSEOUT REQUIREMENTS

- A. Project Record Documents

1. The CONTRACTOR shall keep one (1) Record copy of all specifications, drawings, addenda, modifications, shop drawings, field test records, and samples at the site in good order and annotated in red to show all changes made during the construction process. These shall be available to the ENGINEER for examination and shall be delivered to the ENGINEER for the OWNER upon completion of the work.
2. Documents and samples shall be stored in the CONTRACTOR's field office apart from documents used for construction. The CONTRACTOR shall provide files and racks for storage of documents, and a locked cabinet or secure storage space for storage of samples. Documents shall be maintained in a clean, dry, legible condition and in good order.
3. Record Documents shall not be used for construction purposes.
4. Each Document shall be labeled "PROJECT RECORD" in neat, large printed letters.
5. Information shall be recorded by the CONTRACTOR, on a daily basis, concurrently with construction progress. No work shall be concealed until required information is recorded on the CONTRACTOR's Record Drawings.

6. Drawings shall be legibly marked to record actual construction information on: depths of various elements of foundation in relation to finish first floor datum; horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements; location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure; field changes of dimension and detail; changes made by Field Order or by Change Order; and details not on original contract drawings.
7. Specifications and Addenda shall have each section legibly marked to record: manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed; and changes made by Field Order or by Change Order.
8. At contract closeout Record Documents shall be delivered to the ENGINEER for the OWNER. The submittal shall be accompanied with a transmittal letter in duplicate, containing:
 1. Date
 2. Project title and number
 3. CONTRACTOR's name and address
 4. Title and number of each Record Document
 5. Signature of CONTRACTOR or his authorized representative

B. As-Built Survey Requirements

1. The CONTRACTOR shall provide the ENGINEER with an as-built survey as follows:
2. After completion of the construction, the as-built configuration (both horizontally and vertically) of all the facilities shall be determined and a complete set of as-built drawings prepared.
3. The survey drawing shall be prepared in AutoCAD (2008 or earlier version) format showing all the as-built improvements and elevations where proposed work is shown on the construction drawings. The CONTRACTOR shall submit three (3) sets of check prints to the ENGINEER for approval prior to the request for final inspection. After the check prints are approved, the CONTRACTOR shall submit four (4) sets of certified prints and a copy of the AutoCAD drawings on a compact disc (CD).
4. The as-built survey shall be performed and certified by a registered Florida Land Surveyor meeting the Florida minimum technical standards for surveys and the Surveyor shall provide to the ENGINEER a copy of the Surveyor's professional liability insurance coverage in the amount of one million dollars (\$1,000,000.00). The survey shall be certified to the OWNER.

1.05 WARRANTIES AND BONDS

- A. The CONTRACTOR shall compile and submit to the ENGINEER in duplicate, for review and transmittal to the OWNER, warranties, bonds, service and maintenance contracts as specified in the respective sections of Specifications. Submittal shall be made within ten days after Substantial Completion and prior to final request for payment.

1.06 FINAL STATEMENT OF ACCOUNTING

- A. The CONTRACTOR shall submit a final statement of accounting to the ENGINEER. The statement shall reflect all adjustments to the Contract Sum.
1. The original Contract Sum
 2. Additions and deductions resulting from:
 - a. Previous Change Orders
 - b. Deductions for uncorrected work
 - c. Deductions for liquidated damages
 - d. Deductions for reinspection payments
 - e. Other adjustments
 - f. Allowance
 - g. Unit Prices
 - h. Penalties and Bonuses
 3. Total Contract Sum, as adjusted
 4. Previous payments
 5. Sum remaining due

1.07 FINAL CHANGE ORDER

- A. The ENGINEER will prepare a final Change Order, if required, reflecting approved adjustments to the Contract Price which were not previously made by Change Orders.

1.08 FINAL APPLICATION FOR PAYMENT

- A. The CONTRACTOR shall submit the final Application for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 01710

FINAL CLEANING

PART 1 - GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

- A. The CONTRACTOR shall execute cleaning, during progress of the work, and at the completion of the work, as required by General Conditions.
- B. Cleaning and disposal operations shall comply with all applicable codes, ordinances, regulations, and anti-pollution laws.
- C. Refer to Section 01500 - *Temporary Facilities and Controls* for additional requirements.

PART 2 - MATERIALS

- A. The CONTRACTOR shall:
 - 1. Use only those materials which will not create hazards to health or property and which will not damage surfaces.
 - 2. Use only those cleaning materials and methods recommended by manufacturer of the surfaces to be cleaned.
 - 3. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 CLEANING DURING CONSTRUCTION

- A. The CONTRACTOR shall:
 - 1. Execute periodic cleaning to keep the work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.
 - 2. Provide on-site containers for the collection of waste materials, debris and rubbish. Rental of refuse/waste containers must fully comply with the requirements of Section 01500 - *Temporary Facilities and Controls*.
 - 3. Remove waste materials, debris and rubbish from the site at least once a week and dispose of at legal disposal areas away from the site.
 - 4. Prior to final completion, CONTRACTOR shall conduct an inspection of work areas, to verify that the entire work is clean.

3.02 FINAL CLEANING

A. The CONTRACTOR shall:

1. Employ skilled workmen for final cleaning.
2. Remove grease, mastic, adhesives, dust, dirt, stains, and other foreign materials from sight-exposed surfaces.
3. Broom clean exterior paved surface; rake clean other surfaces of the grounds.
4. Except as otherwise indicated or requested by the ENGINEER, remove temporary protection devices and facilities which were installed during the course of the work to protect previously completed work during the remainder of the construction project.
5. Prior to final completion, CONTRACTOR shall conduct an inspection of work areas, to verify that the entire work is clean.
6. Where extra materials of value remaining after completion of the associated work have become the OWNER's property, dispose or store at the site, as directed by the ENGINEER.

END OF SECTION

DIVISION 2
SITE CONSTRUCTION

SECTION 02140

DEWATERING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Scope: In general, the work specified in this section of the specifications shall consist of supplying labor, materials, and plant, and performing all work necessary to lower and control the groundwater levels and hydrostatic pressures to permit all excavations and construction specified under this Contract to be performed in the dry. Dewatering activities shall conform to the conditions of the SFWMD dewatering general water use permit conditions (Chapter 40E-20.302) including short term dewatering operations.
- B. Examination of Site: The Contractor shall take all steps that he considers necessary to familiarize himself with the site conditions, the ground conditions and the groundwater conditions. It is expressly understood that neither the Owner nor the Engineer will be held responsible for any interpretations or conclusions drawn by the Contractor.

PART 2 - PRODUCT

2.01 METHOD AND EQUIPMENT

- A. The Contractor may use any dewatering method he deems feasible so long as it results in working in the dry and in stable soil conditions. It is the intent of these specifications that an adequate dewatering system be installed to lower and control the groundwater in order to permit excavation, construction of the structures, construction of pipelines, and the placement of the fill materials, all to be performed under dry conditions. The dewatering system shall be adequate to pre-drain the water-bearing strata above and below the bottom of the foundations, the drains, the sewers and all other excavations. An adequate weight of fill material shall be in place prior to discontinuing operation of dewatering to prevent buoyancy of the structure.

PART 3 - EXECUTION

3.01 GENERAL

- A. The Contractor shall be solely responsible for the arrangement, location and depths of the dewatering system necessary to accomplish the work described under this section of the specifications. The dewatering shall be accomplished in a manner that will reduce the hydrostatic head below any excavation to the extent that the water level and piezometric water levels in the construction area are below the prevailing excavation surface; will prevent the loss of fines, seepage, boils, quick conditions, or softening of the foundation strata; will maintain stability of the sides and bottom of the excavation; and will result in all construction operations being performed in the dry.
- B. Disposal of Water: The Contractor shall promptly dispose of all water removed from the excavation in such a manner as will not endanger public health, damage public or private property, or affect adversely any portion of the work under construction or completed by him or any other Contractor. Contractor shall obtain written permission from the Owner of any property involved before digging ditches or constructing water courses for the removal of water.

C. Siltation and Erosion

1. The Contractor shall take steps and make suitable provisions to minimize siltation and erosion which may result from, or as a result of, his operations during the course of construction of this project.
2. The methods and provisions utilized by the Contractor to minimize siltation and erosion shall be approved by the Engineer and shall be in conformance with current Florida Department of Environmental Protection and South Florida River Water Management District practices and regulations.

D. Inadequate System: If the dewatering requirements are not satisfied due to inadequacy or failure of the dewatering system, then loosening of the foundation strata, or instability of the slopes, or damage to the foundations or structures may occur. The supply of all labor, materials, and plant, and the performance of all work necessary to carry out additional work for reinstatement of the structures of foundation soil resulting from such inadequacy or failure shall be undertaken by the Contractor to the approval of the Engineer, and at no additional expense to the Owner.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. The extent of earthwork is shown on the drawings.
- B. Related Work Specified Elsewhere
Section 02222 - *Trenching, Backfilling and Compacting.*

1.02 QUALITY ASSURANCE

- A. Codes and Standards
 - 1. Perform earthwork in compliance with applicable requirements of governing authorities having jurisdiction.
- B. Testing and Inspection Service
 - 1. The Owner will engage a testing and inspection service, to include testing soil materials proposed for use in the work and field facilities for quality control testing during earthwork operations.
 - 2. Soil survey for satisfactory soil materials and samples of soil materials shall be furnished to the testing service by the Contractor.
 - 3. All test reports must be signed by a licensed engineer.

1.03 JOB CONDITIONS

- A. Existing Utilities
 - 1. Locate existing underground utilities in the areas of work before starting earthwork operations. Where utilities are to remain in place, provide adequate means of protection during earthwork operations.
 - 2. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the utility owner immediately for directions. Cooperate with the Owner and public and private utility companies in keeping their respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility owner.
 - 3. Do not interrupt existing utilities serving facilities occupied and used by the Owner or others, except when permitted in writing by the Engineer and then only after acceptable temporary utility services have been provided.
 - 4. Demolish and completely remove from the site underground utilities indicated to be removed. Coordinate with local utility companies for shut-off of services if lines are active.

B. Use of Explosives

1. The use of explosives is not permitted.

C. Temporary Protection

1. Barricade open excavations made as a part of earthwork operations and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction.
2. Protect structures, utilities, sidewalks, pavements, and other facilities from damages caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. Backfill and Fill Materials

1. Soil materials for use as backfill and fill shall be free of rock or gravel larger than 2-inches in any dimension, debris, waste, vegetable, and other deleterious matter.
2. Use excavated or borrow material that has been sampled, tested and certified as satisfactory soil material.

B. Subbase Material

1. Properly graded mixture of natural and crushed gravel, crushed stone, crushed slag, natural or processed sand that will readily compact to the required density.
2. Use material complying with AASHTO M147, Grade A, unless otherwise indicated or acceptable to the Engineer.

PART 3 - EXECUTION

3.01 INSPECTION

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

3.02 EXCAVATION

- A. Excavation consists of the removal and disposal of materials encountered when establishing the required grade elevations.
1. Where it is necessary to cut roots projecting into an excavation or to trim branches for equipment clearance, all severed root ends or cuts to branches over 1/2-inch diameter shall be treated with an asphalt base pruning paint. Backfill over exposed roots as soon as possible.

B. Excavation Classifications

1. The following classifications of excavation will be made when unanticipated rock excavation is encountered in the work. Do not perform such work until material to be excavated has been cross-sectioned and classified by the Engineer. Such excavation will be paid for under the appropriate bid item in the Bid Proposal.
 - a. Earth excavation includes the removal and disposal of pavements and other obstructions visible on the ground surface, underground structures and utilities indicated to be demolished and removed, material of any classification indicated in data on subsurface conditions, and all other materials encountered that are not classified as rock excavation or unauthorized excavation.
 - b. Rock excavation consists of the removal and disposal of materials encountered that cannot be excavated with a 3/4 cubic yard capacity power shovel without drilling and blasting, or continuous use of a ripper or other special equipment, except such materials that are classified as earth excavation. Typical of materials classified as rock are boulders 1/2 cu. yard or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits.
 - c. Intermittent drilling that may be performed to increase production and is not necessary to permit excavation of the material encountered will be classified as earth excavation.

C. Rock shall be removed to the following limits:

1. Two (2) feet outside of concrete work for which forms are required, except footings. One foot outside the perimeters of footings.
2. In pipe trenches, a minimum of 4-inches below invert elevation of pipe and 2-feet wider than the inside diameter of pipe, but not less than 3-foot minimum trench width.
3. Neat outside dimensions of concrete work where no forms are required.
4. Under slabs on grade, 6-inches below bottoms of concrete slab.

D. Unauthorized excavation consists of removal of materials beyond indicated elevations without the specific direction of the Engineer. Replace unauthorized excavation by backfilling and compacting as specified for authorized excavations of the same classification, unless otherwise directed by the Engineer.

E. Additional Excavation

1. When excavation has reached required subgrade elevations, notify the Engineer who will make an inspection of conditions.
2. If unsuitable materials are encountered at the required subgrade elevations, carry excavations deeper and replace the excavated material as directed by the Engineer.
3. Removal of unsuitable material and its replacement as directed will be paid for under the appropriate bid item in the Bid Proposal.

F. Dewatering

1. Prevent surface water and subsurface or groundwater from flowing into excavations, and flooding the project site and surrounding area.
2. Do not allow water to accumulate in excavations. Remove water from excavations to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to the stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey the water away from the site.
3. Convey water removed from excavations and rainwater to collecting or run-off areas. Do not use trench excavations for site utilities as temporary drainage ditches.
4. Contractor shall be required to obtain any demolition permits as may be required due to dewatering volume requirements set by local and state agencies.

G. Material Storage

1. Stockpile excavated materials classified as satisfactory soil material where directed, until required for fill. Place, grade, and shape stockpiles for proper drainage.
2. Dispose of excess unsatisfactory soil material, trash and debris, as specified.

3.03 BACKFILL AND FILL

A. Ground Surface Preparation

1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break-up sloped surfaces steeper than one vertical to four horizontal so that fill material will bond with existing surface.
2. When the existing ground surface has a density less than that specified under "Compaction" for the particular area classification, break-up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to the required depth and percentage of maximum density.

B. Placement and Compaction

1. Place backfill and fill materials in layers not more than 8-inches in loose depth for material compacted by heavy compaction equipment, and not more than 4-inches loose depth for material compacted by hand-operated equipment.
2. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content of the soil material. Compact each layer to the required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
 - a. Backfill excavations as promptly as the work permits, but not until completion of inspection, testing, approval, and recording location of underground utilities, as required.

3.04 COMPACTION

A. General

1. Control soil compaction during construction, providing the minimum percentage of density specified for each area classification.
2. Percentage of Maximum Density Requirement:
 - a. Lawn Areas: Compact each layer of backfill or fill material at 85% maximum density (optimum moisture).
 - b. Walkways: Compact top 6-inches of subgrade and each layer of backfill or fill material at 95% maximum density (optimum moisture).

B. Moisture Control

1. Where the subgrade or layer of soil materials must be moisture conditioned before compaction, uniformly apply water to the surface of subgrade, or layer of soil material, to prevent free water appearing on the surface during or subsequent to compaction operations. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
2. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by disking, harrowing or pulverizing, until the moisture content is reduced to a satisfactory value.

3.05 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction:

1. Testing service must inspect and approve subgrades and fill layers before further construction work is performed thereon.
2. Secure representative samples of the fill material and determine the Standard Density and required moisture content to be maintained by the Moisture-Density Relation Test ASTM D-1557.
3. Make in-place soil density tests during compaction operations in accordance with ASTM D-1556.
4. If, in the opinion of the Engineer, based on reports of the testing service and inspection, the subgrade or fills which have been placed are below the specified density, additional compaction and testing will be required until satisfactory results are obtained.
 - a. The results of density tests of soil-in-place will be considered satisfactory if the average of any four consecutive density tests which may be selected are in each instance equal to or greater than the specified density, and if not more than one density test out of five has a value more than 2% below the required density.

3.06 MAINTENANCE

A. Reconditioning Compacted Areas

1. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, re-shape, and compact to the required density prior to further construction.

3.07 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal from Owner's Property

1. Remove waste materials, including excavated material classified as unsatisfactory soil material, trash and debris, and dispose of it off the Owner's property in a lawful manner.

END OF SECTION

SECTION 02222

TRENCHING, BACKFILLING AND COMPACTING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. The extent of trenching, backfilling and compacting is shown on the drawings.
- B. This section includes furnishing equipment, labor and materials, and performing all operations necessary and incidental to perform the required work.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

3.01 CLEARING OF THE SITE

- A. The site of the work shall be cleared of all trees, shrubs, paving and objectionable material which interfere with the prosecution of the proposed work. Trees and shrubs which will not interfere with construction shall be protected from damage. Clearing shall be considered as an incidental item of excavation.

3.02 EXCAVATION

A. General

- 1. Perform excavation described of whatever substance encountered to the dimensions and depths specified or shown on the drawings. Undercutting will not be permitted, except when ordered by the ENGINEER. Material suitable for backfill shall be stockpiled near the site. Rock or other material undesirable for backfill shall be spoiled outside the area in a neat manner, as directed by the ENGINEER. Where it is necessary to cut roots projecting into an excavation or where it is necessary to trim branches for equipment clearance, all severed root ends or cuts to branches over 1/2-inch diameter shall be treated with an asphalt base pruning paint. Backfill over exposed roots as soon as possible.

B. Rock

- 1. Where encountered in the trench bed, rock shall be excavated to a depth of 1/4 of the pipe diameter below the bottom of the pipe but in no case less than 4-inches. All undercut trench excavation shall be backfilled and tamped with materials as specified in the following paragraphs under Unstable Subgrade.

C. Unstable Subgrade

- 1. In the event that unsuitable material is encountered at or below the excavation depth specified or shown on the drawings, the ENGINEER shall be notified. Such material shall be removed and replaced with suitable material. Methods and materials used for replacement shall be one of the following as directed by the ENGINEER in writing.

- a. Suitable earth or sand, compacted in the trench. Materials shall be furnished as a part of the Bid Proposal item covering excavation and backfill.
 - b. Gravel or crushed limerock, compacted in the trench and paid for under the appropriate item.
 - c. Existing materials, stabilized after removal and then replaced and compacted in the trench at no additional cost to the OWNER.
2. The ENGINEER shall determine the methods and materials to be used, based upon the condition of the excavation, the pipe structure to be supported, and the availability and character of stabilizing materials.

D. Trenches

1. Keep pipe laying operation as close to the excavation operation as possible during the prosecution of the work. The ENGINEER reserves the right to stop the excavation at any time when, in his opinion, the excavation is opened too far in advance of the pipe laying.
2. Pipe trenches shall be only of sufficient width to provide a free working space on each side of the pipe. To prevent excess pressure on the pipe, the maximum width of trench at the top of the pipe and at the bottom of the trench shall not be greater than 2-feet more than the greatest exterior diameter of the pipe. If this maximum width is exceeded, it shall be the CONTRACTOR's responsibility to provide, at no additional cost to the OWNER, such additional bedding or select backfill materials as the ENGINEER may require. The excavation below the spring line shall be made to conform as near as possible to the shape of the lower third of the pipe. To protect the pipe lines from unusual stresses, all work shall be done in open trenches. Excavation shall be made for bells of all pipes and of sufficient depth to permit access to the joint for construction and inspections. In no case will the bells be used to support the body of the pipe.
3. In order to avoid existing utilities, at times it may be necessary for the pipe to be laid deeper than the minimum cover specified in the preceding paragraph. At such time the CONTRACTOR will not be allowed extra compensation for additional excavation involved.
4. In case excavation has been made deeper than necessary, a layer of concrete, fine gravel or other material satisfactory to the ENGINEER shall be placed, at no extra cost, to secure a firm foundation for the lower third of each pipe. Where possible, excavated material shall be placed so as not to interfere with public travel. Bridging shall be provided to afford necessary access to public or private premises. Bridging shall be considered as part of the excavation operation and shall be supplied at no additional cost to the OWNER.

E. Structural: (For inlets, manholes, and similar structures)

1. Remove sufficient material to allow proper space for erecting and removing forms. The elevations of the bottoms of footings, if shown on the drawings, shall be considered as approximate only, and the ENGINEER may order, in writing, such changes in dimensions or elevations of footings as may be deemed necessary to secure a satisfactory foundation. Excavation for structures shall be sufficient to leave at least 12-inches in the clear between their outer surfaces and the embankment or timber that may be used to protect them. Backfill of earth

under structures will not be permitted. Excess excavation for structures shall be filled with thoroughly compacted sand, gravel, or concrete at the expense of the CONTRACTOR.

2. After excavation for a structure is completed, the CONTRACTOR shall notify the ENGINEER to that effect. No concrete or reinforcing steel shall be placed until the ENGINEER has approved the depth of the excavation and the character of the foundation material.

F. Sheeting and Shoring

1. The CONTRACTOR shall provide all trench and structural bracing, sheeting or shoring necessary to construct and protect the excavation, existing utilities, structures and private property of all types and as required for the safety of the employees. Sheeting shall be removed or cut off by the CONTRACTOR during backfilling operations as directed by the ENGINEER. Removal of shoring for structures shall be done in such a manner as not to disturb or mar finished masonry or concrete surfaces.

3.03 DRAINAGE

- A. Grading shall be controlled in the vicinity of excavations so that the surface of the ground will be properly sloped to prevent water from running into trenches or other excavated areas. Any water which accumulates in the excavations shall be removed promptly by well point or by other means satisfactory to the ENGINEER in such a manner as to not create a nuisance to adjacent property or public thoroughfare. Trenches shall be kept dry while pipe is being laid. Bridging of dewatering pipe shall be provided where necessary. Pumps and engines for well point systems shall be operated with mufflers, and at a minimum noise level suitable to a residential area. The CONTRACTOR will not be allowed to discharge water into the OWNER's storm drainage system without the written approval of the ENGINEER. Approval will be subject to the condition that the storm sewer be returned to its original condition.
- B. The CONTRACTOR is responsible for carrying the water to the nearest ditch or body of water and for obtaining the necessary permission to use same. The CONTRACTOR shall be financially responsible for any nuisance created due to carrying off water from his drainage system.

3.04 BACKFILL

A. Trenches

1. Trenches shall be backfilled immediately after the pipe is laid unless other protection for the pipe line is provided. Clean earth, sand, crushed limerock or other material approved by the ENGINEER shall be used for backfill. Backfill material shall be selected, deposited and compacted (simultaneously on both sides of the pipe) so as to eliminate the possibility of lateral displacement of the pipe. Backfill material shall be solidly tamped around the pipes in layers to a level at least 1-foot above the top of the pipe. Each layer shall be compacted to a maximum thickness of 6-inches.
2. In unpaved areas, the remainder of the backfill shall be deposited and then compacted by puddling, water flooding or mechanical tampers. Mechanical tamping of layers in unpaved areas shall be to a maximum thickness of 12-inches. In areas to be paved or repaved, the entire depth of backfill shall be deposited in layers and compacted by hand or mechanical tampers to a

maximum thickness of 6-inches. Compaction shall be carried out to achieve a density of at least 98% of the maximum density as determined by AASHTO, Method T-180. Under areas to be paved, puddling may be used for backfill consolidation after tamping to 1-foot over the pipe, as specified, provided the method is first approved by the ENGINEER and the density requirements are met.

3. In areas to be paved, density tests for determination of the specified compaction shall be made by a testing laboratory and spaced one in every 300-feet of trench cut. It is the intent of this specification to secure a condition where no further settlement of trenches will occur. When backfilling is completed, the roadway base for pavement replacement may be placed immediately. It will be the responsibility of the CONTRACTOR to restore the surface to the original grade wherever settlement occurs.

B. Structural

1. After completion of foundation footings and walls and other construction below the elevation of the final grades, and prior to backfilling, forms shall be removed and the excavation shall be cleared of all trash and debris. Material for backfilling shall consist of the excavation, borrow sand or other approved materials, and shall be free of trash, lumber or other debris. Backfill shall be placed in horizontal layers not in excess of 9-inches in thickness, and have a moisture content such that a density may be obtained to prevent excessive settlement or shrinkage. Each layer shall be compacted by hand or approved machine tampers with extreme care being exerted not to damage pipe or structures. Backfill shall be placed and compacted evenly against the exposed surfaces to prevent undue stress on any surface.

3.05 RESTORATION OF SURFACE IMPROVEMENTS

- A. Roadways, including shoulders, alleys and driveways of shell, limerock, stabilized soil or gravel, grass plots, sod, shrubbery, ornamental trees, signs, fences, or other surface improvements on public or private property which have been damaged or removed in excavating, shall be restored to conditions equal to or better than conditions existing prior to beginning work. Restoration of shoulders shall consist of sodding, seeding and mulching, or stabilizing with limerock as selected by the ENGINEER. The cost of doing this work shall be included in the cost of the various applicable items.
- B. Materials for unpaved roadways, road shoulders, alleys, or drive-ways, shall be compacted to a minimum of 98% of the maximum density as determined by AASHTO, Method T-180. The cost of this work and furnishing new materials shall be included in the cost of the applicable items of work as no separate payment will be made, unless a separate bid item is provided.

3.06 FINE GRADING

- A. Finished areas around structures shall be graded smooth and hand raked and shall meet the elevations and contours shown on the drawings. Lumber, earth clods, rocks and other undesirable materials shall be removed from the site.

3.07 DISPOSAL OF MATERIAL

- A. Such portions of the excavated materials as needed and as suitable, shall be used for backfilling and grading about the completed work to the elevations as shown on the drawings or as directed. Excavated material in excess of the quantity required for this

purpose shall be disposed of by the CONTRACTOR. The CONTRACTOR shall leave the earth over the trenches or other excavations in a neat and uniform condition acceptable to the OWNER.

3.08 TESTS

- A. The CONTRACTOR shall furnish facilities for making all density tests and make such restorations as may be necessary due to test operations. All density tests on backfill or base replacement will be made by a commercial testing laboratory employed by the OWNER and at such locations as may be recommended by the ENGINEER. If the densities as determined by the specified tests fall below the required minimums, the CONTRACTOR shall pay for all retests.

END OF SECTION

SECTION 02605

PRECAST CONCRETE MANHOLES AND STRUCTURES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials and equipment required and install precast concrete stormwater manholes, stormwater structures, frames and covers, access hatches, manhole rungs, ladders and appurtenances as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A. Excavation and backfill is included in Section 02220.
- B. Drainage structures and piping are included in Section 02720.

1.03 SUBMITTALS

- A. Submit to the ENGINEER, in accordance with Section 01300, shop drawings, product data, materials of construction, and details of installation. Submittals shall include at least the following:
 - 1. Base sections, riser sections, eccentric and concentric conical top sections, flat slab tops, grade rings with notarized certificate indicating compliance with ASTM C478.
 - 2. Pipe connection to manhole.
 - 3. Manhole rungs, including method of installation and notarized certificate indicating compliance with pull-out resistance test specified herein.
 - 4. Manhole frame and cover with notarized certificate indicating compliance with ASTM A48, Class 30.
 - 5. Method of repair for minor damage to precast concrete sections.
 - 6. Building brick with notarized certificate indicating compliance with ASTM C62.
- B. Samples
- C. Design Data
 - 1. Precast concrete structures:
 - a. Six copies of sectional plan(s) and elevations showing dimensions and reinforcing-steel placement.
 - b. Six copies of structural calculations including assumptions.
 - c. Six copies of concrete design mix.

- D. Test Reports
 - 1. Precast concrete structures
 - a. Six copies of concrete test cylinder reports from an approved testing laboratory certifying conformance with this Section.
- E. Certificates
- F. Manufacturers Installation (or Application) Instructions
- G. Statement of Qualifications
- H. Manufacturer's Field Report
- I. Project Record Documents
- J. Operation and Maintenance Data
- K. Warranties

1.04 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM A48 - Standard Specification for Gray Iron Castings.
 - 2. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 3. ASTM C32 - Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale).
 - 4. ASTM C33 - Standard Specification for Concrete Aggregates.
 - 5. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)
 - 6. ASTM C 150 - Standard Specification for Portland Cement
 - 7. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes
 - 8. ASTM C443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
 - 9. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections
 - 10. ASTM D4101 - Standard Specification for Propylene Plastic Injection and Extrusion Materials.
- B. American Concrete Institute (ACI)
 - 1. ACI 318 - Building Code Requirements for Reinforced Concrete
 - 2. ACI 350R - Environmental Engineering Concrete Structures

- C. American Association of State Highway and Transportation Officials (AASHTO)
 - 1. Standard Specifications for Highway Bridges
- D. Occupational Safety and Health Administration (OSHA)
- E. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

- A. All material shall be new and unused.
- B. Materials' quality, manufacturing process and finished sections are subject to inspection and approval by ENGINEER or other OWNER representative. Inspection may be made at place of manufacture, at work site following delivery, or both.
- C. Materials will be examined for compliance with ASTM standards, this Section and approved manufacturer's drawings. Additional inspection criteria shall include, appearance, dimensions(s), blisters, cracks and soundness.
- D. Materials shall be rejected for failure to meet any requirements specified herein. Rejection may occur at place of manufacture, at work site, or following installation. Mark for identification rejected materials and remove from work site immediately. Rejected materials shall be replaced at no cost to OWNER.
- E. Repair minor damage to precast concrete sections by approved method, if repair is authorized by ENGINEER.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Reference to a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.
- B. Like items of materials/equipment shall be the end products of one manufacturer in order to provide standardization for appearance, operation, maintenance, spare parts and manufacturer's service.
- C. Provide lifting lugs or holes in each precast section for proper handling.

2.02 PRECAST CONCRETE MANHOLE SECTIONS

- A. Precast concrete base sections, riser sections, transition top sections, flat slab tops and grade rings shall conform to ASTM C478 and shall be in accordance with FDOT standards.
 - 1. Top section shall be eccentric cone where cover over pipe exceeds 4-ft. Top section shall be a flat slab where cover over top of pipe is 4-ft or less. Top section shall be a plastic lined flat slab where manhole riser sections are to be plastic lined.
 - 2. Base, riser and transition top sections shall have tongue and groove joints.
 - 3. Sections shall be cured by an approved method.

4. Precast concrete sections shall be shipped after concrete has attained 3000 psi compressive strength.
5. Design precast concrete base, riser, transition top, flat slab top and grade ring for a minimum H-20 loading plus earth load. Calculate earth load with a unit weight of 130 pcf.
6. Mark date of manufacture, name and trademark of manufacturer on the inside of each precast section.
7. Construct and install precast concrete base as shown on the Drawings and specified in FDOT standards.
8. Provide integrally cast knock-out panels in precast concrete manhole sections at locations, and with sizes shown on Drawings. Knock-out panels shall have no steel reinforcing.

2.03 PRECAST CONCRETE STRUCTURES

- A. Refer to FDOT Standards for inside dimensions, headroom requirements and minimum thickness of concrete.
- B. Manufacturer shall notify ENGINEER at least 5 working days prior to placing concrete during manufacturing process. ENGINEER may inspect reinforcing steel placement prior to placing concrete.
- C. Structural design calculations and Drawings shall be prepared and stamped by a professional engineer registered in Florida.
- D. Design Criteria
 1. Precast concrete
 - a. Minimum compressive strength shall be 5,000 psi at 28 days.
 - b. Maximum water-to-cement ratio shall be 0.40 by weight.
 - c. Minimum cement content shall be 600 lbs of cement per cubic yard of concrete.
 2. Manufactured products
 - a. Conform to ACI 318 and ACI 350R.
 - b. Analyze walls and slabs using accepted engineering principals.
 - c. When "fy" exceeds 40,000 psi, "z" (ACI 318) shall not exceed 95,000 psi. "fs" shall not exceed 50 percent of "fy".
 - d. Design products to support their own weight, weight of soil at 120 pcf, and a live load equal to AASHTO HS-20 applied to top slab.
 - e. Cast base slab and walls together to form a monolithic base section.

- f. Design structure walls for a water pressure of 90 psf. Originate pressure diagram at finished ground surface. Include lateral pressure from vehicles in accordance with AASHTO.
- g. Consider discontinuities in structure produced by openings and joints. Provide additional reinforcing around openings. Frame openings to carry full design loads to support walls.
- h. Prevent flotation, with ground water level at finished ground surface, by dead weight of structure and soil load above structure. Do not consider skin friction, soil friction, or weight of equipment in structure.
- i. Locate horizontal wall joints 18-in minimum from horizontal centerline of wall openings.
- j. Design structure with a minimum number of joints. Maximum number of structure sections, including top slab, shall be four.
- k. Provide lifting hooks for top slab.
- l. Locate access openings, wall sleeves and pipe penetrations as shown on Drawings.
- m. Wall sleeves shall be provided by the precast concrete manufacturer.

2.04 BRICK MASONRY

- A. Bricks shall be sound, hard, uniformly burned, regular and uniform in shape and size. Underburned or salmon brick shall not be acceptable. Only whole brick shall be used.
 - 1. Bricks for channels and shelves shall conform to ASTM C32, Grade SS except that the mean of five tests for absorption shall not exceed 8 percent and no individual brick exceed 11 percent.
 - 2. Bricks for raising manhole frames to finished grade shall conform to ASTM C62.
- B. Mortar shall be composed of 1 part Portland cement, 2 parts sand, and hydrated lime not to exceed 10-lbs to each bag of cement. Portland cement shall be ASTM C150, Type II; hydrated lime shall conform to ASTM C207.
- C. Sand shall be washed, cleaned, screened, well graded with all particles passing a No.4 sieve and conform to ASTM C33.

2.05 JOINTING PRECAST MANHOLE SECTIONS AND STRUCTURES

- A. Seal tongue and groove joints of precast manhole and structure sections with either rubber O-ring gasket or preformed flexible joint sealant. O-ring gasket shall conform to ASTM C443. Preformed flexible joint sealant shall be Kent Seal No.2 by Hamilton-Kent; Ram-Nek by K. T. Snyder Company or equal.
- B. Completed joint shall withstand 15 psi internal water pressure without leakage or displacement of gasket or sealant.

2.06 MANHOLE RUNGS

- A. Manhole rungs shall be either of the following types:
 - 1. Cast aluminum alloy 6061-T6, drop front design, 12-in wide with an abrasive step surface conforming to OSHA requirements.
 - 2. Steel reinforced, copolymer polypropylene, 16-in wide, M. A. Industries Inc, PF Series or equal. Copolymer polypropylene shall conform to ASTM D4101 Classification PP0344 B33534 Z02. Steel reinforcing shall be 1/2-in diameter, conforming to ASTM A615, Grade 60 and shall be continuous throughout rung.

2.07 PIPE CONNECTIONS TO MANHOLE

- A. Connect pipe to manhole in the following ways:
 - 1. Grout in place - Precast manhole section shall have a formed, tapered circular opening larger than the pipe outside diameter. Grout shall be non-shrink and waterproof equal to Hallemite, Waterplug or Embeco. Plastic pipe shall have a waterstop gasket secured to pipe with a stainless steel clamp.
 - 2. Flexible sleeve - Integrally cast sleeve in precast manhole section or install sleeve in a formed or cored opening. Fasten pipe in sleeve with stainless steel clamp(s). Coat stainless steel clamp(s) with bituminous material to protect from corrosion. Flexible sleeve shall be Lock Joint Flexible Manhole Sleeve; Kor-N-Seal connector; PSX Press-Seal Gasket or equal.
 - 3. Compression gasket - Integrally cast compression gasket in precast manhole section. Insert pipe into compression gasket. Compression gasket shall be A-Lok or equal.

2.08 DAMPPROOFING

- A. Dampproofing shall be Hydrocide 648 by Sonneborn Building Products; Dehydratine 4 by A. C. Horn Inc; RIW Marine Liquid by Toch Brothers or equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Manhole and Structure Installation.
 - 1. Manhole and structure shall be constructed to the dimensions shown on the Drawings and as specified in FDOT standards. Protect all work against flooding and flotation. Construct cast-in-place bases in accordance with the requirements of Division 3 and the details shown on the Drawings.
 - 2. Place manhole base on a bed of 12-in screened gravel as shown on the Drawings. Set manhole base grade so that a maximum grade adjustment of 8-in is required to bring the manhole frame and cover to final grade.
 - a. Use precast concrete grade rings or brick and non-shrink mortar to adjust manhole frame and cover to final grade.
 - 3. Set precast concrete barrel sections and structures plumb with a 1/4-in maximum out of plumb tolerance allowed. Seal joints of precast barrel sections with either a

rubber O-ring set in a recess or preformed flexible joint sealant in sufficient quantity to fill 75 percent of the joint cavity. Fill the outside and inside joint with non-shrink mortar and finished flush with the adjoining surfaces. Caulk the inside of any leaking barrel section joint with lead wool or non-shrink grout to the satisfaction of the ENGINEER.

4. Allow joints to set for 14 hours before backfilling unless a shorter period is specifically approved by the ENGINEER.
5. Plug holes in the concrete barrel sections required for handling with a non-shrinking grout or non-shrinking grout in combination with concrete plugs. Finish flush on the inside.
6. Cut holes in precast sections to accommodate pipes prior to setting manhole sections in place to prevent jarring which may loosen the mortar joints.
7. Backfill carefully and evenly around manhole sections.

B. Manhole Pipe Connections

1. Construct manhole pipe connections, including pipe stubs, as specified above. Close or seal pipe stubs for future connections with a gasketed watertight plug.

C. Manhole Rung Installation

1. Aluminum Manhole Rungs
 - a. Grout aluminum manhole rungs into precast sections, on 12-in centers. Preform holes in riser and cone sections for rungs during casting. Holes for rungs shall be 1-1/8-inch in diameter and a minimum of 3-1/2-in deep.
 - b. Grout rungs into precast sections immediately after casting and placing in the curing area, or immediately after coring holes for manhole rungs into base section. Fill holes with grout consisting of Portland Type II cement and mortar sand in a 1 to 1/2 ratio mixed to a putty consistency.
 - c. Paint those parts of the rungs which are embedded with a heavy coating of zinc chromate or other approved paint.
2. Steel Reinforced Polypropylene Plastic Manhole Rungs
 - a. Preform holes for manhole rungs during casting of the riser and cone sections, using tapered form pins specifically made for preforming manhole rung holes.
 - b. Drive manhole rungs into preformed holes after concrete has developed a compressive strength of 3,000 psi.
 - c. Alternatively, cast manhole rungs into riser and cone sections when concrete is placed.
 - d. Drilling holes for manhole rungs may be used to accommodate field conditions when approved by the ENGINEER. Drill holes of diameter, spacing and depth required by manhole rung manufacturer.

3. Pull-out resistance test
 - a. All manhole rung installation methods shall withstand a pull-out resistance test of 1,500 pounds.

D. Brickwork

1. Mix mortar only in such quantity as may be required for immediate use. Use mortar before initial set has taken place. Mortar shall be used within 1-1/2 hours and shall be constantly worked with hoe or shovel until used. Anti-freeze mixtures shall not be included in the mortar. Install masonry when the outside temperature is above 40 degrees F unless provisions are made to protect the mortar, bricks and finished work from frost by heating and enclosing the work with tarpaulins or other suitable material. ENGINEER's decision regarding the adequacy of protection against freezing shall be final.
2. Construct channels and shelves of brick and concrete as shown on the Drawings and as specified in FDOT standards. Brick lined channels shall correspond in shape with the lower half of the pipe. Set shelf elevation at crown of highest pipe and slope 1-in/ft to drain toward the flow through channel. Construct brick surfaces exposed to sewage flow with nominal 2-in by 8-in face exposed (i.e. bricks on edge).

E. Setting Manhole Frame and Cover

1. Set manhole covers and frames in a full mortar bed. Utilize bricks or precast concrete grade rings, a maximum of 8-in thick, to assure frame and cover are set to the finished grade. Set manhole frame and cover to final grade prior to placement of permanent paving.

F. Dampproofing

1. Paint outer surfaces of precast and cast-in-place manholes and structures with two coats of bituminous dampproofing at the rate of 30 to 60 sq ft per gallon, in accordance with manufacturer's instructions.

3.02 LEAKAGE TESTS

- A. Test each manhole for leakage. ENGINEER shall observe each test. Perform exfiltration test as described below:
- B. Assemble manhole in place; fill and point all lifting holes and exterior joints within 6-ft of the ground surface with an approved non-shrinking mortar. Test prior to placing the shelf and invert and before filling and pointing the horizontal joints below 6-ft of depth. Lower ground water table below bottom of the manhole for the duration of the test. Plug all pipes and other openings into the manhole and brace to prevent blow out.
- C. Fill manhole with water to the top of the cone section. If the excavation has not been backfilled and no water is observed moving down the surface of the manhole, the manhole is satisfactorily water-tight. If the test, as described above is unsatisfactory as determined by the ENGINEER, or if the manhole excavation has been backfilled, continue the test. A period of time may be permitted to allow for absorption. Following this period, refill manhole to the top of the cone, if necessary and allow at least 8 hours to pass. At the end of the test period, refill the manhole to the top of the cone again, measuring the volume of water added. Extrapolate the refill amount to a 24-hour leakage rate. The leakage for each manhole shall not exceed one gallon per vertical foot for a 24-

hour period. If the manhole fails this requirement, but the leakage does not exceed three gallons per vertical foot per day, repairs by approved methods may be made as directed by the ENGINEER. If leakage due to a defective section of joint exceeds three gallons per vertical foot per day, the manhole shall be rejected. Uncover the rejected manhole as necessary and to disassemble, reconstruct or replace it as directed by the ENGINEER. Retest the manhole and, if satisfactory, fill and paint the interior joints.

- D. No adjustment in the leakage allowance will be made for unknown causes such as leaking plugs, absorptions, etc. It will be assumed that all loss of water during the test is a result of leaks through the joints or through the concrete.
- E. An infiltration test may be substituted for an exfiltration test if the ground water table is above the highest joint in the manhole. If there is no leakage into the manhole as determined by the ENGINEER, the manhole will be considered water-tight. If the ENGINEER is not satisfied, testing shall be performed as described hereinbefore.
- F. Leakage Tests for Structures
 - 1. The ENGINEER will visually inspect structure(s) for possible leaks before backfilling of structures is allowed. Seal all joints to the satisfaction of the ENGINEER.
 - 2. The ENGINEER may require an exfiltration test as described for manholes on any structure for which he/she deems the test appropriate.

3.03 CLEANING

- A. Thoroughly clean all new manholes of all silt, debris and foreign matter of any kind, prior to final inspections.

END OF SECTION

SECTION 02611

REINFORCED CONCRETE PIPE FOR GRAVITY SERVICE

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This section covers materials and methods of installation of Reinforced Concrete Pipe (RCP) for non-pressure or gravity service in Piped Utility Systems.

1.02 HANDLING AND STORAGE

- A. Pipe, fittings, and accessories shall be loaded and unloaded by lifting with hoists or skidding in order to avoid shock or damage. Under no circumstances shall such material be dropped. Pipe handled on skidways shall not be rolled or skidded against pipe on the ground. Slings, hooks or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior surface or internal lining of the pipes.
- B. Materials, if stored, shall be kept safe from damage. The interior of all pipe, fittings, and other appurtenances shall be kept free from dirt or foreign matter at all times.
- C. Gaskets for joints shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.
- D. Inspection
 - 1. Pipe and appurtenances shall be inspected at the point of delivery. Material found to be defective due to manufacture or damage in shipment shall be rejected. Tests as specified in the applicable material standard may be performed to ensure conformance with the standard.

PART 2 - PRODUCTS

2.01 ROUNDED PIPE

- A. Pipe shall be cast vibrated, machine-made or flat bed concrete pipe that is designed, manufactured, cured, tested and marked in accordance with the requirements of ASTM Designation C-76. Pipe shall be equivalent to Class III, unless otherwise noted on plans, and Wall B or C of the proper strength for the depth of cover required. Pipe shall be manufactured in lengths no longer than 16-feet nor shorter than 8-feet, except that shorter lengths as required at closures or junctions of structures will be permitted. Pipe with elliptical reinforcing shall be adequately marked to prevent improper placement in the trench. Lift holes or eyes may be provided in each pipe for the purpose of handling.
- B. Joints shall be of either a bell and spigot or double spigot and sleeve design using round rubber gaskets. The joint shall be so designed and fabricated that when the pipe is laid it shall be self-centering, and when the joint completed, the gasket will be enclosed on all four surfaces. The gasket shall not be required to support the weight of the pipe, but shall keep the joint tight under all normal conditions of service, including expansion, contraction and earth settlement.
- C. Joints and gaskets shall conform to the requirements of ASTM C443.

2.02 ELLIPTICAL PIPE

- A. Pipe shall be cast vibrated, machine made or flat bed elliptically shaped concrete pipe designed, manufactured, cured, tested and marked in accordance with ASTM C507.
- B. Pipe shall be of the proper strength for the depth of cover involved and shall be manufactured in lengths not longer than 16-feet nor shorter than 8-feet, except that shorter lengths as required at closures or junctions with structures will be permitted.
- C. Pipe designed for placement with the major axis horizontal shall be designated as "Vertical Elliptical" and shall be so marked.
- D. Joints for elliptical pipe shall be cold adhesive, pre-formed plastic gaskets conforming to Standard Specifications for Road and Bridge Construction of Florida Department of Transportation, Section 942, paragraph 942-2.

2.03 EXTERNAL CONCRETE JOINT WRAP

- A. All concrete pipe joints and pipe connections to structures shall be wrapped with an approved filter fabric joint wrap product. Joint material and installation shall be in accordance with Section 440 of the FDOT Standard Specifications, latest edition.

PART 3 - EXECUTION

3.01 UNDERGROUND STRUCTURES AND CONFLICTS

- A. Prior to excavation, investigation shall be made to the extent necessary to determine the location of existing underground structures and conflicts. Care shall be exercised to avoid damage to existing structures. When obstructions that are not shown on the drawings are encountered during the progress of work and interfere so that an alteration of the plans is required, the Engineer will alter the drawings or order a deviation in line and grade or arrange for removal, relocation, or reconstruction of the obstructions. When crossing existing pipelines or other structure, alignment and grade shall be adjusted as necessary, with the approval of the Engineer to provide clearance as required by federal, state or local regulations or as deemed necessary by the Engineer to prevent future damage or contamination of either structure.

3.02 ALIGNMENT AND GRADE

- A. The pipelines shall be laid and maintained to the lines and grades established by the drawings and specifications, with manholes, service connections, fittings, and appurtenances at the required locations unless otherwise approved by the Engineer.

3.03 TRENCH CONSTRUCTION

- A. The trench shall be excavated to the required alignment, depth, and width. Trench preparation shall proceed in advance of pipe installation for only as far as necessary to allow proper pipe installation. The width of the trench at the top of the pipe shall be ample to permit the pipe to be laid and joined properly and allow the backfill to be placed as specified. Trenches shall be of such extra width, when required, to permit the placement of timber supports, sheeting, bracing and appurtenances.
- B. Holes for the bells shall be provided at each joint but shall not be larger than necessary for joint assembly and assurance that the pipe barrel will lie flat on the trench bottom. Other than noted previously, the trench bottom shall be true and even in order to provide

support for the full length of the pipe barrel, except that slight depression may be provided to allow withdrawal of pipe slings or other lifting tackle.

- C. When excavation of rock is encountered, all rock shall be removed to provide a clearance of at least 6-inches below and on each side of all pipe for pipe sizes 24-inches or smaller, and 9-inches for pipe sizes 30-inches and larger. When excavation is completed, a bed of sand, crushed stone, or earth that is free from stones, large clods, or frozen earth, shall be placed on the bottom of the trench to the previously mentioned depths, leveled, and tamped. These clearances and bedding procedures shall also be observed for pieces of concrete or masonry and other debris or subterranean structures, such as masonry walls, piers, or foundations that may be encountered during excavation. This installation procedure shall be followed when gravel formation containing loose boulders greater than 8-inches in diameter are encountered. In all cases, the specified clearances shall be maintained between the bottom of all pipe and appurtenances and any part, projection, or point or rock, boulder, or stones of sufficient size and placement which, in the opinion of the Engineer could cause a fulcrum point.
- D. Should the trench pass over a sewer or other previous excavation, the trench bottom shall be sufficiently compacted to provide support equal to that of the native soil or conform to other regulatory requirements in a manner that will prevent damage to the existing installation.
- E. When the subgrade is found to be unstable or to include ashes, cinders, refuse, organic material, or other unsuitable material, such material shall be removed, to a minimum of at least 3-inches, or to the depth ordered by the Engineer and replaced under the directions of the Engineer with clean, stable backfill material. The bedding shall be consolidated and leveled in order that the pipe may be installed as specified.
- F. When the bottom of the trench or the subgrade is found to consist of material that is unstable to such a degree that, in the judgment of the Engineer, it cannot be removed, a foundation for the pipe and/or appurtenance shall be constructed using piling, timber, concrete, or other materials at the direction of the Engineer.
- G. Pipe cutting for the insertion of fittings, or closure pieces shall be done in neat, workmanlike manner without creating damage to the pipe or lining.

3.04 TESTING

- A. After completion of installation, perform testing for gravity sewers in accordance with requirements of Section 430 – Pipe Culverts and Storm Sewers in the FDOT *Standard Specifications for Road and Bridge Construction*, latest edition.

END OF SECTION

SECTION 02720

DRAINAGE STRUCTURES AND PIPING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. The extent of drainage structures and piping is shown on the drawings.
- B. Related Work Specified Elsewhere

Section 02200 - *Earthwork*.

Section 02222 - *Trenching, Backfilling and Compacting*.

Section 02611 - *Reinforced Concrete Pipe for Gravity Service*

1.02 SUBMITTALS

- A. Submit shop drawings of precast manholes, inlets, grating, frames and lids, and pipe.
- B. Submit cut sheets 24-hours in advance of pipe excavation for ENGINEER approval.

1.03 QUALITY ASSURANCE

- A. All material shall be new and unused.
- B. Materials' quality, manufacturing process and finished sections are subject to inspection and approval by ENGINEER or OWNER representative. Inspection may be made at place of manufacture, at work site following delivery, or both.
- C. Materials will be examined for compliance with ASTM standards, this Section and approved manufacturer's drawings. Additional inspection criteria shall include, appearance, dimensions(s), blisters, cracks and soundness.
- D. Materials shall be rejected for failure to meet any requirements specified herein. Rejection may occur at place of manufacture, at work site, or following installation. Mark for identification rejected materials and remove from work site immediately. Rejected materials shall be replaced at no cost to OWNER.
- E. Repair minor damage to precast concrete sections by approved method, if repair is authorized by ENGINEER.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Reference to a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.
- B. Like items of materials/equipment shall be the end products of one manufacturer in order to provide standardization for appearance, operation, maintenance, spare parts and manufacturer's service.
- C. Provide lifting lugs or holes in each precast section for proper handling.

2.02 PRECAST CONCRETE MANHOLE SECTIONS

- A. Precast concrete base sections, riser sections, transition top sections, flat slab tops and grade rings shall conform to ASTM C478 and shall be in accordance with FDOT standards.
1. Top section shall be eccentric cone where cover over pipe exceeds 4-ft. Top section shall be a flat slab where cover over top of pipe is 4-ft or less. Top section shall be a plastic lined flat slab where manhole riser sections are to be plastic lined.
 2. Base, riser and transition top sections shall have tongue and groove joints.
 3. Sections shall be cured by an approved method.
 4. Precast concrete sections shall be shipped after concrete has attained 3000 psi compressive strength.
 5. Design precast concrete base, riser, transition top, flat slab top and grade ring for a minimum H-20 loading plus earth load. Calculate earth load with a unit weight of 130 pcf.
 6. Mark date of manufacture, name and trademark of manufacturer on the inside of each precast section.
 7. Construct and install precast concrete base as shown on the Drawings and specified in FDOT standards.
 8. Provide integrally cast knock-out panels in precast concrete manhole sections at locations, and with sizes shown on Drawings. Knock-out panels shall have no steel reinforcing.

2.03 PRECAST CONCRETE STRUCTURES

- A. Refer to FDOT Standards for inside dimensions, headroom requirements and minimum thickness of concrete.
- B. Manufacturer shall notify ENGINEER at least 5 working days prior to placing concrete during manufacturing process. ENGINEER may inspect reinforcing steel placement prior to placing concrete.
- C. Structural design calculations and Drawings shall be prepared and stamped by a Professional Engineer registered in Florida.
- D. Design Criteria
1. Precast concrete
 - a. Minimum compressive strength shall be 5,000 psi at 28 days.
 - b. Maximum water-to-cement ratio shall be 0.40 by weight.
 - c. Minimum cement content shall be 600 lbs of cement per cubic yard of concrete.

2. Manufactured products
 - a. Conform to ACI 318 and ACI 350R.
 - b. Analyze walls and slabs using accepted engineering principals.
 - c. When "fy" exceeds 40,000 psi, "z" (ACI 318) shall not exceed 95,000 psi. "fs" shall not exceed 50 percent of "fy".
 - d. Design products to support their own weight, weight of soil at 120 pcf, and a live load equal to AASHTO HS-20 applied to top slab.
 - e. Cast base slab and walls together to form a monolithic base section.
 - f. Design structure walls for a water pressure of 90 psf. Originate pressure diagram at finished ground surface. Include lateral pressure from vehicles in accordance with AASHTO.
 - g. Consider discontinuities in structure produced by openings and joints. Provide additional reinforcing around openings. Frame openings to carry full design loads to support walls.
 - h. Prevent flotation, with ground water level at finished ground surface, by dead weight of structure and soil load above structure. Do not consider skin friction, soil friction, or weight of equipment in structure.
 - i. Locate horizontal wall joints 18-in minimum from horizontal centerline of wall openings.
 - j. Design structure with a minimum number of joints. Maximum number of structure sections, including top slab, shall be four.
 - k. Provide lifting hooks for top slab.
 - l. Locate access openings, wall sleeves and pipe penetrations as shown on Drawings.
 - m. Wall sleeves shall be provided by the precast concrete manufacturer.

2.04 BRICK MASONRY

- A. Bricks shall be sound, hard, uniformly burned, regular and uniform in shape and size. Underburned or salmon brick shall not be acceptable. Only whole brick shall be used.
 1. Bricks for channels and shelves shall conform to ASTM C32, Grade SS except that the mean of five tests for absorption shall not exceed 8 percent and no individual brick exceed 11 percent.
 2. Bricks for raising manhole frames to finished grade shall conform to ASTM C62.
- B. Mortar shall be composed of 1 part Portland cement, 2 parts sand, and hydrated lime not to exceed 10-lbs to each bag of cement. Portland cement shall be ASTM C150, Type II; hydrated lime shall conform to ASTM C207.
- C. Sand shall be washed, cleaned, screened, well graded with all particles passing a No.4 sieve and conform to ASTM C33.

2.05 JOINTING PRECAST MANHOLE SECTIONS AND STRUCTURES

- A. Seal tongue and groove joints of precast manhole and structure sections with either rubber O-ring gasket or preformed flexible joint sealant. O-ring gasket shall conform to ASTM C443. Preformed flexible joint sealant shall be Kent Seal No.2 by Hamilton-Kent; Ram-Nek by K. T. Snyder Company or equal.
- B. Completed joint shall withstand 15 psi internal water pressure without leakage or displacement of gasket or sealant.

2.06 MANHOLE FRAMES AND COVERS

- A. Manhole frames and covers shall be in accordance with FDOT Standard Index No. 201 for the type of manhole or inlet required. Covers shall have 2" raised letter identification: "Storm Sewer" cast into top.

2.07 PIPE CONNECTIONS TO MANHOLE

- A. Connect pipe to manhole in the following ways:
 - 1. Grout in place - Precast manhole section shall have a formed, tapered circular opening larger than the pipe outside diameter. Grout shall be non-shrink and waterproof equal to Hallemite, Waterplug or Embecco. Plastic pipe shall have a waterstop gasket secured to pipe with a stainless steel clamp.
 - 2. Flexible sleeve - Integrally cast sleeve in precast manhole section or install sleeve in a formed or cored opening. Fasten pipe in sleeve with stainless steel clamp(s). Coat stainless steel clamp(s) with bituminous material to protect from corrosion. Flexible sleeve shall be Lock Joint Flexible Manhole Sleeve; Kor-N-Seal connector; PSX Press-Seal Gasket or equal.
 - 3. Compression gasket - Integrally cast compression gasket in precast manhole section. Insert pipe into compression gasket. Compression gasket shall be A-Lok or equal.

2.08 DAMPPROOFING

- A. Dampproofing shall be Hydrocide 648 by Sonneborn Building Products; Dehydratine 4 by A. C. Horn Inc; RIW Marine Liquid by Toch Brothers or equal.

2.09 PIPING

- A. Reinforced Concrete Pipe (RCP)
 - 1. RCP pipe shall comply with the requirements of ASTM Designation C-76, as specified in Section 02611, Reinforced Concrete Pipe for Gravity Service.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Manhole and Structure Installation
 - 1. Manhole and structure shall be constructed to the dimensions shown on the Drawings and as specified in FDOT standards. Protect all work against flooding

and flotation. Construct cast-in-place bases in accordance with the requirements of Division 3 and the details shown on the Drawings.

2. Place manhole base on a bed of 12-in screened gravel as shown on the Drawings. Set manhole base grade so that a maximum grade adjustment of 8-in is required to bring the manhole frame and cover to final grade.
 - a. Use precast concrete grade rings or brick and non-shrink mortar to adjust manhole frame and cover to final grade.
3. Set precast concrete barrel sections and structures plumb with a 1/4-in maximum out of plumb tolerance allowed. Seal joints of precast barrel sections with either a rubber O-ring set in a recess or preformed flexible joint sealant in sufficient quantity to fill 75 percent of the joint cavity. Fill the outside and inside joint with non-shrink mortar and finished flush with the adjoining surfaces. Caulk the inside of any leaking barrel section joint with lead wool or non-shrink grout to the satisfaction of the ENGINEER.
4. Allow joints to set for 14 hours before backfilling unless a shorter period is specifically approved by the ENGINEER.
5. Plug holes in the concrete barrel sections required for handling with a non-shrinking grout or non-shrinking grout in combination with concrete plugs. Finish flush on the inside.
6. Cut holes in precast sections to accommodate pipes prior to setting manhole sections in place to prevent jarring which may loosen the mortar joints.
7. Backfill carefully and evenly around manhole sections.

B. Manhole Pipe Connections

1. Construct manhole pipe connections, including pipe stubs, as specified above. Close or seal pipe stubs for future connections with a gasketed watertight plug.

C. Brickwork

1. Mix mortar only in such quantity as may be required for immediate use. Use mortar before initial set has taken place. Mortar shall be used within 1-1/2 hours and shall be constantly worked with hoe or shovel until used. Anti-freeze mixtures shall not be included in the mortar. Install masonry when the outside temperature is above 40 degrees F unless provisions are made to protect the mortar, bricks and finished work from frost by heating and enclosing the work with tarpaulins or other suitable material. ENGINEER's decision regarding the adequacy of protection against freezing shall be final.
2. Construct channels and shelves of brick and concrete as shown on the Drawings and as specified in FDOT standards. Brick lined channels shall correspond in shape with the lower half of the pipe. Set shelf elevation at crown of highest pipe and slope 1-in/ft to drain toward the flow through channel. Construct brick surfaces exposed to sewage flow with nominal 2-in by 8-in face exposed (i.e. bricks on edge).

- D. Setting Manhole Frame and Cover
 - 1. Set manhole covers and frames in a full mortar bed. Utilize bricks or precast concrete grade rings, a maximum of 8-in thick, to assure frame and cover are set to the finished grade. Set manhole frame and cover to final grade prior to placement of permanent paving.
- E. Dampproofing
 - 1. Paint outer surfaces of precast and cast-in-place manholes and structures with two coats of bituminous dampproofing at the rate of 30 to 60 sq ft per gallon, in accordance with manufacturer's instructions.

3.02 LEAKAGE TESTS

- A. Test each manhole for leakage. ENGINEER shall observe each test. Perform exfiltration test as described below:
- B. Assemble manhole in place; fill and point all lifting holes and exterior joints within 6-ft of the ground surface with an approved non-shrinking mortar. Test prior to placing the shelf and invert and before filling and pointing the horizontal joints below 6-ft of depth. Lower ground water table below bottom of the manhole for the duration of the test. Plug all pipes and other openings into the manhole and brace to prevent blow out.
- C. Fill manhole with water to the top of the cone section. If the excavation has not been backfilled and no water is observed moving down the surface of the manhole, the manhole is satisfactorily water-tight. If the test, as described above is unsatisfactory as determined by the ENGINEER, or if the manhole excavation has been backfilled, continue the test. A period of time may be permitted to allow for absorption. Following this period, refill manhole to the top of the cone, if necessary and allow at least 8 hours to pass. At the end of the test period, refill the manhole to the top of the cone again, measuring the volume of water added. Extrapolate the refill amount to a 24-hour leakage rate. The leakage for each manhole shall not exceed one gallon per vertical foot for a 24-hour period. If the manhole fails this requirement, but the leakage does not exceed three gallons per vertical foot per day, repairs by approved methods may be made as directed by the ENGINEER. If leakage due to a defective section of joint exceeds three gallons per vertical foot per day, the manhole shall be rejected. Uncover the rejected manhole as necessary and to disassemble, reconstruct or replace it as directed by the ENGINEER. Retest the manhole and, if satisfactory, fill and paint the interior joints.
- D. No adjustment in the leakage allowance will be made for unknown causes such as leaking plugs, absorptions, etc. It will be assumed that all loss of water during the test is a result of leaks through the joints or through the concrete.
- E. An infiltration test may be substituted for an exfiltration test if the ground water table is above the highest joint in the manhole. If there is no leakage into the manhole as determined by the ENGINEER, the manhole will be considered water-tight. If the ENGINEER is not satisfied, testing shall be performed as described hereinbefore.

F. Leakage Tests for Structures

1. The ENGINEER will visually inspect structure(s) for possible leaks before backfilling of structures is allowed. Seal all joints to the satisfaction of the ENGINEER.
2. The ENGINEER may require an exfiltration test as described for manholes on any structure for which he/she deems the test appropriate.

3.03 CLEANING

- A. Thoroughly clean all new manholes of all silt, debris and foreign matter of any kind, prior to final inspections.

END OF SECTION

SECTION 02801

RESTORATION OF SURFACE IMPROVEMENTS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. The work includes the restoration of driveways, lawn areas, trees and plants, roadways, sprinkler systems, walks and any other existing improvement affected by the proposed work.
- B. This section includes furnishing equipment, labor and materials, and performing all necessary and incidental operations to perform the required work.

1.02 QUALITY ASSURANCE

- A. Standards
 - 1. Florida Grades and Standards for Nursery Plants, Part 1:
- B. Irrigation Contractor Qualifications
 - 1. Irrigation Competency Card is required for contractor or sub-contractor doing any irrigation repair, including relocation of heads, lines or valves, or any new irrigation work.

PART 2 - MATERIALS AND EQUIPMENT

2.01 SOD

- A. Sod used for restoration shall match the existing sod in the area. St. Augustine sod shall be replaced with St. Augustine Floratam. In areas without irrigation, Argentina Bahia sod shall be used, unless otherwise directed by the Engineer/Landscape Architect.
- B. Sod shall have well matted roots.
- C. The sod shall be sufficiently thick to secure a dense stand of live grass, with a minimum thickness of two-inches. The sod shall be live, fresh and uninjured at the time of planting. It shall be planted as soon as possible after being dug and shall be shaded and kept moist from the time it is dug until it is planted.
- D. The sod shall be commercial size rectangles measuring 12-inches by 24-inches or larger, except where 6-inch strip sodding is called for on the drawings.
- E. Sod shall be planted as soon as possible after being harvested and shall be shaded and kept moist from the time of harvesting until it is planted.
- F. The source of the sod may be inspected and approved by the Engineer/Architect prior to construction.

2.02 PLANTS

- A. Existing damaged plants shall be replaced by plants of equal type, quality and size whenever possible. All new plants shall be sound, healthy, vigorous and free from defects, decay, disfiguring, bark abrasions, plant diseases, insect pests, their eggs or larvae. The new plants shall be approved by the Engineer/Landscape Architect before placing.
- B. Existing plants may be removed, preserved, and replaced at the Contractors option, in which case, the plants shall be handled and maintained by approved nursery staff.
- C. Plants shall be watered and cared for until new growth appears. Dead and dying plants shall be immediately replaced.
- D. Plants used shall be in accordance with the standards for Florida No. 1 or better, as given in the current "Grades and Standards for Nursery Plants," State of Florida, Department of Agriculture, or their equal as approved by the Engineer/Landscape Architect.
- E. Plants shall conform to the sizes indicated by the Owner.

2.03 MULCH

- A. Mulch for all planter areas shall be shredded cypress or eucalyptus, clean, bright and free from weeds, moss, sticks, and other debris.

2.04 WATER

- A. The water used in the performance of this Contract shall be of drinking water quality, clean and free from injurious amounts of oil, acid, alkali, organic matter, or any substance which might be harmful to plant growth or obnoxious to traffic.

2.05 PLANTING MIXTURE

- A. The planting mixture, when required, shall consist of a thorough mixture of 40% peat and 60% sand. The peat shall be Florihome peat or equivalent and the sand shall be clean and free from debris of any kind.

2.06 FERTILIZER

- A. Fertilizer shall be granular 8-8-8, or equivalent.
- B. Commercial fertilizers shall comply with the State fertilizer laws.
- C. Fertilizer may, at the discretion of the Engineer/Architect, upon satisfactory evidence of its feasibility from the manufacturer, be applied in liquid form.

2.07 ASPHALTIC CONCRETE

- A. Asphaltic concrete for surface and base course applications shall be Type I as specified in the Florida Department of Transportation's Standard Specifications for Road and Bridge Construction, 2015 Edition, and shall be in accordance with the project specifications and plans.

2.08 PORTLAND CEMENT CONCRETE

- A. Portland cement concrete used in the performance of this Contract shall have a compressive strength of 3000 psi at 28 days and shall conform to the requirements of Section 03300.

PART 3 - EXECUTION

3.01 LANDSCAPING RESTORATION

- A. All grass areas disturbed by construction shall be restored with the same type of sod as was existing prior to disturbance.
- B. Lawn Areas
 - 1. Any lawn area affected by the required work shall be restored to a condition equal or better than the conditions existing before the commencement of work.
- C. Balled Plants
 - 1. Plants where required shall be adequately balled with firm natural balls of soil, sized as set forth in "Grades and Standards". Balls shall be firmly wrapped with burlap or equally approved strong cloth. No balled plant will be planted if the ball is cracked or broken before or during the process of planting.
- D. Option
 - 1. Plants may be furnished as container grown instead of balled if all other requirements are met.
- E. Preparation of Plant Pits
 - 1. All plant pits shall be circular in outline and have vertical sides. Tree pits shall be two feet wider than the width of the ball and one foot deeper than the depth of the ball. Shrubs that are either B&B or in 3 gallon and under containers shall have pits that are one foot wider than the width of the plant ball and 6-inches deeper than the depth of the ball.
- F. Setting Plants
 - 1. All plants except as otherwise specified, shall be centered in pits. Deep planting shall be avoided and unless otherwise specified, plants shall be set at such a level that after settlement they will bear the same relation to the required grade as they have to the natural grade before being transplanted.
- G. Balled and burlapped plants and palms shall be placed on 6-inches to 12-inches of tamped planting mixture and adjusted so as to be at the proper level. The rope and burlap shall be cut away and the burlap folded down to the bottom of the pit. Very large B&B plants shall remain wrapped until fully backfilled and then just the upper portion of the burlap shall be removed. Backfill of planting mix shall be placed halfway up the pit and then water tamped. After this water has drained away, backfill around the edge of the pit to form a saucer and fill area three times with water.

H. Water

1. Water to be used initially during plant installation shall be furnished by the Contractor. The existing irrigation system, where damaged, shall be promptly repaired after the installation of the plants.

I. Sod Placement

1. The provisions for the preparation of the area to be sodded shall include scarifying and loosening the soil and application of fertilizer.
2. Sodding shall not be performed when weather and soil conditions are, in the Engineer's opinion, unsuitable for proper results.
3. The sod shall be placed on the prepared surface with edges in close contact, and shall be firmly and smoothly embedded by light tamping with appropriate tools.
4. Where sodding is used in drainage ditches or ponds, the setting of the pieces shall be staggered, such as to avoid a continuous seam along the line of flow. Along the edges of such staggered areas, the offsets of individual strips shall not exceed 6-inches.
5. In order to prevent erosion caused by vertical edges at the outer limits, the outer pieces of sod shall be tamped so as to produce a featheredge effect.
6. On areas where the sod may slide, due to height and slopes, it shall be pegged, with pegs driven through the sod blocks into firm soil and at intervals as shown on the drawings or as directed by the Engineer/Architect.
7. Any pieces of sod which, after placing, show appearance of extreme dryness shall be removed from the work.
8. The sod shall be kept in a moist condition after planting and for the duration of the Contract.

J. Maintenance

1. Contractor shall maintain the planted areas in a satisfactory condition until final acceptance of the project. Such maintenance shall include mowing, edging, weed control, watering, filling, leveling and repairing of any washed or eroded areas as may be necessary.

3.02 PAVEMENT REPLACEMENT

- A. Asphalt pavement shall be removed by saw cutting on a straight line with edges as vertical as possible. Concrete pavement or asphalt surfaced concrete shall be removed by cutting with a concrete saw in as straight a line and vertically as possible.
- B. Prior to replacing concrete or asphalt pavement replacement, a limerock base shall be laid. The base for concrete pavement shall be six (6) inches of compacted thickness, and that for asphalt pavement shall be eight (8) inches of compacted thickness for City driveways. For State or County roads the thickness shall be as required by that agency's permit. The base course for each shall be compacted in two equal layers to a minimum of 98% of the maximum density as determined by AASHTO, Method T-180. The Owner will have tests made by an independent testing laboratory to verify compaction results.

- C. Non-asphalt pavement replacement shall be replaced of like material and thickness. Asphalt or built-up asphalt pavement replacement shall be replaced with like material or concrete as directed by the Engineer/Architect. Where asphalt or built-up asphalt pavement is replaced by concrete, the concrete shall have a minimum of six (6) inches in thickness and be reinforced with 6 by 6 No. 6 gage welded wire fabric. Where the pavement replacement is of like material, it shall be replaced in thickness equal to or better than that existing at the time of removal.
- D. Unless the base is sealed or other temporary paving applied over driveway areas to be repaved, pavement shall be replaced not later than three weeks after completion of backfill.

3.03 CURB REMOVAL AND REPLACEMENT

- A. Curb removal and replacement required in the construction of this work shall be done by the Contractor. Reasonable care shall be exercised in removing the curb, and the Contractor shall either stockpile or dispose of this material as directed by the Engineer/Architect. Curb shall be replaced of like material in a manner and condition equal to or better than that existing at the time of removal. Materials and methods of replacing State Highway sidewalks or curbs shall conform to the Department of Transportation specifications.

3.04 TESTS

- A. The Contractor shall furnish facilities for making all density tests and make such restorations as may be necessary due to test operations. All density tests on backfill or base replacement will be made by a commercial testing laboratory employed by the Owner and at such locations as may be recommended by the Engineer/Architect. If the densities as determined by the specified tests fall below the required minimums, the Contractor shall pay for all retests.

END OF SECTION

SECTION 02930

GRASSING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. The extent of grassing consists of supplying and planting grass seed and/or sod in the locations shown on the drawings and in those areas where construction activity has damaged or destroyed the ground cover.
- B. The grassing work shall include, but not be limited to, supplying all labor, materials, and equipment necessary to perform seeding, sodding, fertilizing, liming when specified, mulching, watering, mowing, and clean-up.

1.02 QUALITY ASSURANCE

- A. Seeds shall meet the requirements of the State Department of Agriculture and Consumer Services and all applicable State laws.
- B. The Engineer/Architect reserves the right to test, reject or approve all materials before application.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver grass seed in original containers showing analysis of seed mixture, percentage of pure seed, year of production, net weight, date of packaging, and location of packaging. Damaged packages will not be accepted.
- B. Deliver fertilizer in water proof bags showing weight, chemical analysis, and name of manufacturer.
- C. The Contractor shall, at the time of delivery, furnish the Engineer/Architect invoices of all materials received in order that the minimum application rate of materials may be determined. Failure to supply invoices at the time of delivery will warrant that payment for those items be delayed until proper submittal of invoices are obtained and the minimum application rates of material can be verified.
- D. Mixtures of different types of seed called for in these specifications shall be mixed in the proper proportions at the site of the work in the presence of the Engineer/Architect or his representative.

PART 2 - PRODUCTS

2.01 SEED

- A. Unless otherwise provided for on the drawings, the Contractor shall conform to the following seed schedule. The total pounds of seed per acre shall be the sum total shown for all the varieties of seed opposite the schedule number.

SEEDING SCHEDULE

<u>SCHEDULE NUMBER</u>	<u>COMMON NAME OF SEED</u>	<u>LBS./ ACRE</u>	<u>PLANTING DATES</u>
1.	Pensacola Bahia (scarified)	90	March 15 -
	Bermuda Common (50% hulled)	25	October 15
2.	Pensacola Bahia (scarified)	100	October 16 -
	Bermuda Common (50% hulled)	35	March 14
	Annual Rye Grass	10	
	Rye Grain	30	

- B. The Bermuda seed shall be an equal mixture of hulled and unhulled seed.
- C. The Pensacola Bahia seed shall be scarified seed, having a minimum active germination of 40 percent and a total germination of 85 percent.
- D. Quick-growing type grass seed shall be a species approved by the Engineer/Architect which will provide an early ground cover during the particular season when planting is done and will not later compete with permanent grass.

2.02 SOD

- A. Sod shall be Bahia or St. Augustine (match existing) with well matted roots, unless otherwise noted or directed by the Engineer.
- B. The sod shall be commercial size rectangles measuring 12-inches by 24-inches or larger, except where 6-inch strip sodding is called for on the drawings.
- C. The sod shall be sufficiently thick to secure a dense stand of live grass, with a minimum thickness of 2-inches. The sod shall be live, fresh, and uninjured at the time of planting. It shall have a soil mat of sufficient thickness adhering firmly to the roots to withstand all necessary handling. It shall be reasonably free of weeds and other grasses.
- D. Sod shall be planted as soon as possible after being harvested and shall be shaded and kept moist from the time of harvesting until it is planted.
- E. The source of the sod may be inspected and approved by the Engineer/Architect prior to construction.

2.03 MULCH

- A. Dry Mulch
 - 1. Dry mulch shall be straw or hay, consisting of oat, rye, or wheat straw, or of Pangola, Peanut, Coastal Bermuda or Bahia grass hay. Only undeteriorated mulch which can readily be cut into the soil shall be used.
- B. Manufactured Mulch
 - 1. Manufactured mulches may consist of jute, cotton, or other fiber materials, plastic sheeting, netting, chemical adhesive soil stabilizers, or other approved coverings.

Manufactured mulch shall only be used when specifically called for on the drawings and shall be as approved by the Engineer/ Architect.

2. The Contractor shall, if requested, submit appropriate certification from the manufacturer that the material meets all of the above requirements, based on laboratory and field tests of the product.
3. The air dry weight (as defined by the Technical Association of the Pulp and Paper Industry for wood cellulose) shall be marked on each package by the manufacturer.

2.04 FERTILIZER

- A. The fertilizer shall be a commercial granular type with a chemical designation of 16-4-8 or 20-5-10.
- B. The numerical designations for fertilizer indicate the minimum percentages (respectively) of (1) total nitrogen, (2) available phosphoric acid, and (3) water-soluble potash, contained in the fertilizer.
 1. At least 50 percent of the phosphoric acid shall be from a normal super phosphate or an equivalent source which will provide a minimum of two units of sulfur.
 2. The amount of sulfur shall be indicated on the quantitative analysis card attached to each bag or container.
- C. Commercial fertilizers shall comply with the State fertilizer laws.
- D. Fertilizer may, at the discretion of the Engineer/Architect, upon satisfactory evidence of its feasibility from the manufacturer, be applied in liquid form.

2.05 LIME

- A. Lime shall be agricultural grade, ground limestone minimum 80 percent passing No. 8 sieve, calcium carbonate equivalent minimum 80 percent and shall conform to the requirements of the State Department of Agriculture and Consumer Affairs.

2.06 WATER

- A. The water used in the grassing operations may be obtained from any approved spring, pond, lake, stream, or municipal water system.
- B. The water shall be free of excess and harmful chemicals, acids, alkalis, or any substance which might be harmful to plant growth or obnoxious to traffic.
- C. Salt water shall not be used.

2.07 GRAVEL BED

- A. In the locations shown on the drawings, provide a 3-inch deep bed of river-run gravel of rounded particles ranging in size from 1/2-inch to 2-inches. Gravel shall be as obtained from the vicinity of Montgomery, Alabama, or Chattahoochee, Florida, or equal.
- B. Where gravel is not kept in place by walls or sidewalk, an edging strip shall be used. The edging strip shall be of 1" x 6" cypress, and extend 1/2-inch above the gravel surface.

PART 3 - EXECUTION

3.01 GENERAL

- A. Grassing operations will not be permitted when wind velocities exceed 15 miles per hour. Grassing will be accomplished only when the soil is moist and in proper condition to induce growth. No grassing shall be done when the ground is frozen, unduly wet, or otherwise not in a tillable condition.
- B. Before acceptance of the seeding performed for the establishment of permanent vegetation, the Contractor will be required to produce a satisfactory stand of perennial grass whose root system shall be developed sufficiently to survive dry periods and winter weather and be capable of reestablishment in the spring.

3.02 GRASSING BY SEEDING

A. Sequence of Operations

- 1. The several operations involved in the work shall proceed in the following sequence: grading, fertilizing (and/or application of lime) and preparation of the ground, spreading of the mulch, seeding, cutting in mulch, and rolling.

B. Preparation of Area to be Seeded

- 1. The ground over which the seed is to be sown shall be prepared by disk-harrowing and thoroughly pulverizing the soil to a depth of 4-inches. The prepared soil shall be loose and reasonably smooth. The area shall be reasonably free of large clods, roots, and other material which will interfere with the work or subsequent mowing and maintenance operations.

C. Application of Fertilizer

- 1. The fertilizer (and/or lime) shall be spread uniformly in one or more applications as specified below.
 - a. An initial application of 275 lbs. per acre.
- 2. Unless otherwise directed, a second application of 275 lbs. per acre shall be applied within 90 calendar days after the initial application on projects which have not been accepted prior to this time.
- 3. Unless otherwise directed, a third application of 500 lbs. per acre shall be applied within 270 to 360 calendar days after the initial application on projects which have not been accepted prior to this time.
- 4. Lime shall be spread at a minimum uniform rate of 250 lbs. per acre and thoroughly mixed with the soil to a depth of 4-inches.

D. Dry Mulching

- 1. Approximately 2-inches, loose thickness, of the dry mulch material shall be applied uniformly over the area to be seeded. After the area has been seeded, the mulch material shall be cut into the soil so as to produce a loose mulched thickness of 3- to 4-inches. Care shall be exercised that the materials are not cut too deeply into the soil.

- E. While the soil is still loose and moist, the seed shall be scattered uniformly over the area to be grassed. The application rates of the various types of seed shall be as described in Paragraph 2.01.
- F. Rolling
 - 1. Immediately after completion of the seeding, the entire grassed or mulched area shall be rolled with a cultipacker, traffic roller, or other suitable equipment. At least two trips over the entire area will be required.
- G. Watering
 - 1. The seeded areas shall be watered so as to provide optimum growth conditions for the establishment of the grass. The period for maintaining such moisture conditions shall not be less than two weeks after planting.

3.03 GRASSING BY HYDRO-SEEDING

- A. General
 - 1. This method of grassing generally consists of distributing materials over the area to be grassed by spraying a slurry composed of water, seed, fertilizer, and mulch (wood cellulose fiber mulch for hydro-seeding applications).
- B. Ground Preparation
 - 1. The provisions for the preparation of the seeding areas and for the subsequent maintaining of the moisture condition shall be as specified in Paragraphs 3.02 B, C and G.
- C. Equipment
 - 1. Equipment used in hydro-seeding shall have a built-in agitation system with an operating capacity sufficient to agitate, suspend, and homogeneously mix a slurry of the specified amount of fiber, fertilizer, seed, and water. The slurry distribution lines shall be large enough to prevent stoppage. The discharge line shall be equipped with a set of hydraulic spray nozzles which will provide even distribution of the slurry on the various areas to be grassed. The slurry tank shall have a minimum capacity of 1,000 gallons.
- D. Application
 - 1. Wood cellulose fiber mulch shall be applied at the rate of 1,500 lbs. per acre in a mixture of seed, fertilizer, and water. The seed, fertilizer, mulch, and water shall be combined into the slurry tank for distribution of all ingredients in one operation. The materials shall be combined in a manner recommended by the mulch manufacturer. The slurry mixture shall be so regulated that the amounts and rates of application shall result in a uniform application of all materials at rates not less than the amounts specified herein. Using the color of the mulch as a guide, the equipment operator shall spray the prepared seed-bed with a uniform visible coat. The slurry shall be applied in a sweeping motion, in an arched stream, so as to fall like rain, allowing the mulch fibers to build upon each other until an even coat is achieved.

3.04 SODDING

A. Ground Preparation

1. The provisions for the preparation of the area to be sodded shall include scarifying and loosening the soil and application of fertilizer as described in Paragraphs 3.02 B. and C.

B. Inclement Weather and Unsuitable Conditions

1. Sodding shall not be performed when weather and soil conditions are, in the Engineer/Architect's opinion, unsuitable for proper results.

C. Sod Placement

1. The sod shall be placed on the prepared surface with edges in close contact, and shall be firmly and smoothly embedded by light tamping with appropriate tools.
2. Where sodding is used in drainage ditches or ponds, the setting of the pieces shall be staggered, such as to avoid a continuous seam along the line of flow. Along the edges of such staggered areas, the offsets of individual strips shall not exceed 6-inches.
3. In order to prevent erosion caused by vertical edges at the outer limits, the outer pieces of sod shall be tamped so as to produce a featheredge effect.
4. On areas where the sod may slide, due to height and slopes, it shall be pegged, with pegs driven through the sod blocks into firm soil and at intervals as shown on the drawings or as directed by the Engineer/Architect.
5. Any pieces of sod which, after placing, show appearance of extreme dryness shall be removed from the work.

D. Watering

1. The sod shall be kept in a moist condition after planting and for the duration of the Contract. Water shall not be applied between the hours of 8:00 A.M. and 4:00 P.M.

3.05 MAINTENANCE

- A. The Contractor shall, at his expense, maintain the planted areas in a satisfactory condition until final acceptance. Such maintenance shall include watering, filling, leveling, and repairing of any washed or eroded areas and additional seed, fertilizer, and mulch or sod applied to areas where a satisfactory stand of grass has not been achieved.
- B. Immediately prior to final inspection, the Contractor shall mow and remove clippings from the areas grassed under this Contract.

END OF SECTION

DIVISION 3
CONCRETE

SECTION 03100

CAST-IN-PLACE AND POURED CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The work included under this section consists of furnishing all materials, forms, transportation and equipment, and performing all necessary labor to do all the plain and reinforced concrete work shown on the Drawings, or incidental to the proper execution of the work, or as herein specified.
- B. Composition: Concrete shall be composed of cement, fine aggregate, coarse aggregate, and water so proportioned and mixed as to produce a plastic workable mixture in accordance with all requirements under this section suitable to the specific conditions of placement.

1.02 SUBMITTALS

- A. All materials specified shall be certified by the producer or manufacturer that the furnished material meets the specific requirements of the specifications. Concrete mix designs shall be submitted for approval prior to placement.

PART 2 - MATERIALS AND EQUIPMENT

2.01 PORTLAND CEMENT

- A. Shall comply with the standard specifications for Portland Cement, A.S.T.M. designation C-150, Type II, or Type III (high-early), where indicated on drawings.

2.02 CONCRETE AGGREGATE

- A. Shall conform to standard specifications for concrete aggregate, A.S.T.M. Designation C-33. Maximum size of aggregate shall not exceed one-fifth of the narrowest dimension between reinforcing bars.
- B. Fine Aggregate. Fine aggregate shall be clean, hard, strong, durable, uncoated particles of natural sand known as Lake Wales, Interlachen, or approved equal. The source, composition, quality and gradation of the fine aggregate shall be subject to the approval of the Engineer. Samples of the sand shall be furnished, together with certified copies of the gradation and analysis from the recognized testing laboratory.

- 1. The weight of extraneous or deleterious substances shall not exceed the following percentages.

Loss by Decantation	3%
Shale	1%
Clay Lumps	1%
Coal and Lignite	1%

- 2. The fine aggregate shall be reasonably well graded from coarse to fine and when tested by means of laboratory sieves shall meet the following requirements in percent of total weight:

<u>Total Retained On</u>	<u>Percent Retained</u>
No. 4 Sieve	0 - 5
No. 10 Sieve	3 - 30
No. 30 Sieve	30 - 70
No. 50 Sieve	65 - 95
No. 100 Sieve	95 - 100

- Deficiencies in the percentages of the fine aggregates passing the No. 50 and No. 100 Sieves may be remedied by the addition of pozzolanic or cementitious materials excepting Portland cement. Such materials must meet the approval of the Engineer.

C. Coarse Aggregate

- Coarse aggregate shall consist of hard, tough, durable components, free from adherent coatings and vegetable matter, and shall not contain soft, friable, thin or elongated particles in quantities considered deleterious by the Engineer. Coarse aggregate shall be properly graded from fine to coarse to produce concrete of desired strength, density, and workability. The source, composition, quality and gradation of the coarse aggregate shall be subject to the approval of the Engineers. Samples of the coarse aggregate shall be furnished together with certified copies of the gradation and analysis from a recognized testing laboratory.

- All coarse aggregate shall be washed and shall be free from disintegrated pieces, salt, alkali, vegetable matter and adherent coatings. The total percentage of all deleterious substances shall not exceed 5 percent by weight. The substances designated shall not be presented in excess of the following amounts.

Loss by Decantation	1%
Clay Lumps or Other Soluble Materials	1/4%
Soft Fragments	5%

- Where the cover over reinforcing is two (2) inches or more, the maximum size of aggregate shall be 1 1/2 inches. Where the cover over reinforcing is less than 2 inches, the maximum size of aggregate shall be 3/4 inch. The maximum size of aggregate shall not exceed one-fifth of the narrowest dimension between forms nor three-fourths of the minimum clear spacing between reinforcing bars. The grading of the coarse aggregate in the concrete shall be within the following limits.

Percent Passing

Maximum Size Square Mesh Screen	97 - 100%
1/2 Maximum Size Square Mesh Screen	40 - 70%
No. 4 Sieve	0 - 6%

2.03 WATER

- Water shall be clean and free from oil, acids, alkalis, organic materials or other injurious substances.

2.04 REINFORCEMENT

- A. Reinforcing Bars: ASTM A615, Grade 60, deformed bars of USA manufacture.
- B. Welded Wire Fabric: ASTM A185, gauges, spacing and dimensions as indicated.
- C. Metal Bar Supports: CRSI MSP-1, Chapter 3, Class 2, Type B, Stainless Steel Protected Bar Supports, or otherwise approved by the Engineer. Use concrete supports for reinforcement in concrete placed on grade.
- D. Tie Wire: 16 gauge minimum, black, soft annealed.
- E. Coupler Splice Devices: Cadweld tensions couplers, capable of developing the ultimate strength of the bar as manufactured by Erico Products, Incorporated, Solon, Ohio, or equal.

2.05 FORM WORK

- A. Lumber: Douglas Fir or Larch, No. 2 grade, seasoned and surfaced on four sides.
- B. Plywood: Plyform, Class 1, BB-Exterior type, mill oiled and edge sealed, with thickness not less than 3/4 inch.
- C. Medium Density Overlay (MDO) Plywood Forms: PS-1, B-B High Density Concrete Form Overlay, Class I, unoled.
 - 1. Butt form panels, make contact surface fully flush and seal butting holes with sponge form tape. Chamfer edges of beams and ceilings.
 - 2. Where MDO plywood is used to form beams, do not use MDO plywood that has been patched or damaged.
- D. Drip Forms: Varnished ponderosa pine or equally rigid non-staining plastic, 1/2 inch wide on each leg.

2.06 ADMIXTURES

- A. Air Entraining Admixture: ASTM C260.
- B. Water Reducing and Retarding Admixture:
 - 1. Concrete Without Superplasticizer:
 - a. Water Reducing Admixtures: ASTM C494, Type A, equal to Eucon WR-75 by the Euclid Company, Pozzolith 200 N by Master Builders, Plastocrete 161 by Sika Chemical Corporation, and containing no calcium chloride.
 - b. Water Reducing and Retarding Admixtures: ASTM C494, Type D, equal to Eucon Retarder-75 by the Euclid Company, Pozzolith 100 XR by Master Builders, Plastiment by Sika Chemical Corporation, and containing no calcium chloride.
 - c. Accelerating Admixtures: ASTM C494, Type C or E, equal to Accelguard 80 by the Euclid Company, Darex Set Accelerator by W.R. Grace, and containing no calcium chloride.

PART 3 - EXECUTION

3.01 PROPORTIONING

- A. The proportions of aggregate to cement shall be such as to produce a thoroughly plastic mixture, which will work readily into the corners and angles of the forms and around the reinforcement but without permitting the materials to segregate or excess free water to collect on the surface. The percentage of sand shall not be less than thirty (30) nor more than fifty (50) percent of the total weight of the aggregate.
- B. The total content, including the surface water contained in the aggregate, shall not exceed 5.7 gallons per sack of cement. The slump shall not exceed four (4) inches. Air-entraining admixture shall be Darex AEA as manufactured by the Dewey and Almy Chemical Company.
- C. The amount of air entrained in the freshly mixed concrete shall not be less than three (3) percent nor more than six (6) percent. The minimum cement content in sacks per cubic yard of concrete shall not be less than six (6) sacks per cubic yard for Class "A" concrete.
- D. Concrete materials shall be accurately measured by weight. Measurement of materials for ready-mixed concrete shall conform to the "Standard Specifications for Ready-Mixed Concrete", (A.S.T.M designation C-94).
 - 1. Class "A" concrete for all structures shall have minimum compressive Strength of 4,000 psi at 28 days.
 - 2. Class "B" concrete for sidewalks shall have minimum compressive strength of 3,000 psi at 28 days.
 - 3. All concrete shall be Class "A" unless otherwise shown on the drawings.

3.02 MIXING AND PLACING

- A. Concrete shall be mixed conveyed and deposited in accordance with the "A.C.I. Building Code" (A.C.I.318).
- B. Prior to placing any concrete, the Contractor shall submit for the Engineer's approval a design mix, calculated by a recognized testing laboratory, and using the approved aggregates to produce a workable mix of the desired strength, together with certified copies of 7 days and 28 day tests of cylinders taken from concrete made according to the design mix. The mixes shall be designed to secure concrete having a minimum compressive strength at age 28 days.
- C. Ready-mixed concrete delivered shall be accompanied by delivery tickets showing the following.
 - 1. Date and time leaving plant Additives (if any)
 - 2. Type of cement and weight Site arrival time
 - 3. Quantity of Water and time added Site leaving time
- D. Concrete
 - 1. Ready-mixed concrete shall be used. All mixing requirements specified herein shall be enforced, and the Owner's laboratory representative and the Engineer shall have free access to the mixing plant at all times.

2. Except for materials and/or procedures otherwise specified herein, ready-mixed concrete shall be mixed and delivered in accordance with the requirements of ASTM C94.
3. No water shall be added to the concrete after it leaves the plant except where part of the design water was purposely omitted at the plant, and then only as approved by the Engineer.

E. Mixer Speed

1. Neither the speed of any mixer nor the quantity of material loaded into any mixer shall exceed the recommendations of the manufacturer.
2. Excessive over-mixing, required addition of water to preserve the required consistency, shall be cause of rejection of the batch.
3. Concrete shall not remain in a transit mixer or agitator truck more than 90 minutes after the water has been introduced, and not for more than 45 minutes if any approved retarding agent is not used.
4. Minimum mixing time shall be 50 revolutions of drum at rated speed.

F. Measurement

1. Equipment necessary to determine and control the actual amounts of all materials entering the concrete shall be provided by the concrete manufacturer.
2. All materials shall be measured by weight, except that water may be measured by volume calculated at 8-1/3 pounds per gallon. One bag of cement will be considered as 94 pounds in weight.

G. Mixes

1. Mix Design: Conform to ACI 318, Section 4.3. Submit data on consecutive tests and standard deviation.
2. Maximum Water-Cement Ratio:
0.37 (lbs/lb) - Concrete with superplasticizer
0.45 (lbs/lb) - Class A concrete without superplasticizer
0.55 (lbs/lb) - Class B concrete without superplasticizer
0.65 (lbs/lb) - Class C concrete without superplasticizer
3. Air Content: 5 percent plus or minus 1.5 percent (Class A and B).
4. Slump: 4 inches plus or minus 1 inch for Class A and B without superplasticizer. 7 inches plus or minus 1 inch for Class A and B with superplasticizer. 8 inches plus or minus 1 inch for tremie concrete or as specified by details.

H. Placing Concrete

1. All concrete shall be placed in clean, damp forms that are not hot to the touch.
2. To prevent segregation, concrete shall be deposited as nearly as practicable in final position and not allowed to drop freely more than necessary and in no case more than five feet, except in an approved funnel or tremie. All concrete shall be placed during daylight unless otherwise authorized at least four hours in advance. Where the reinforcing steel above the top of the concrete being placed becomes coated with laitance or partially set-up concrete, all such concrete shall be removed from the reinforcing steel prior to placing concrete around the bars.
3. Concrete shall be packed carefully and tightly around pipe and other items to secure maximum adhesion.
4. Concrete shall be placed in layers not over 12 inches deep before compacting. Concrete shall be compacted by internal vibrating equipment supplemented by spading and hand-rodging between reinforcing steel and form to eliminate air bubbles and honeycomb. Vibrators shall not be used to move the concrete laterally inside the forms. Duration of vibration shall be limited to the time necessary to provide satisfactory consolidation without causing segregation, not less than five and more than 15 seconds per square foot of exposed top surface. The vibrator shall be constantly relocated and shall be placed in each specific spot only once for each layer. The Contractor shall take steps to assure that sufficient personnel are available to devote full time to operating vibrator, spading and rodging.
5. Wall concrete shall be placed in layers as indicated above, with the first lift preceded by a 1-inch minimum layer of 1:2-1/2 cement-sand grout, with a 6-inch to 8-inch slump, placed on existing concrete not more than 20 minutes before concrete placement. The surface of previously placed hardened concrete shall be clean and wet before grouting, or shall be treated with a bonding agent as required. Puddles of water in horizontal recessed keys shall be avoided by the use of drain recesses to outside edge of concrete. Concrete in walls and deep beams shall be placed in lifts not to exceed three layers at 12 inches each for the full length of the pour before proceeding higher. The placing of concrete shall not be delayed more than 20 minutes between layers or lifts.

3.03 CURING AND PROTECTION

A. Curing

1. Immediately after surface defects have been repaired, apply a spray coat of curing compound to all exposed surfaces, including slabs, walls, beams and columns in accordance with the manufacturer's recommendations. Protect exposed steel keyways and other embedded items from the curing compound. Water cure, as specified in paragraph B hereunder, all concrete surfaces that is to be exposed to wastewater, surfaces that are to be coated with a coal tar epoxy system, and concrete floors requiring a bond for special finishes.
2. Do not apply compound during periods of rainfall. Should the film become damaged from any cause within the required curing period, immediately repair the damaged portions with additional compound. Upon removal of forms, immediately coat the newly exposed surfaces to provide a curing treatment equal to that provided for the surface.

3. Curing and Sealing Compound: Use clear compound conforming to Federal Specification TT-C-800A, 30% solids content minimum, having test data from an independent laboratory indicating a maximum moisture loss of 0.030 grams per sq. cm. when applied at a coverage rate of 300 sq. ft per gallon, and equal to Super Floor Coat or Super Pliocure by The Euclid Chemical Company or Masterseal 66 by Master Builders. Furnish manufacturer's certification as required.
 4. Apply specified clear curing and sealing compound to all horizontal areas so noted on the Drawings or in the Specifications. Apply immediately after final finishing. Apply this compound to non-structural construction joints of slabs on grade to act as a bond breaker prior to placement of adjacent concrete.
- B. Water Curing Method: Cure all concrete that is to be water cured by either the wet burlap method, by continuous fogging or by covering the waterproof sheet.
1. Wet Burlap Method: Cover concrete surface with a double thickness of burlap, cotton mats, or other approved materials, kept thoroughly saturated with water. Keep the forms wet until removed and upon removal, start the curing specified herein immediately. Cure the concrete for a period of 7 days for normal Portland cement or 4 days for high early strength cement. Do not submerge concrete poured in the dry until it has attained sufficient strength to adequately sustain the stress involved and do not subject it to flowing water across its surface until it has cured 4 days.
 2. Continuous Fogging: Perform continuous fogging by fogging with a nozzle, which so atomizes the flow of water that a mist, and not a spray, is formed. Fog the concrete surface regularly without allowing any part of the surface to become dry. Take all necessary precautions to prevent erosion of the concrete surface by water.
 3. Covering the Waterproof Sheets: Keep the entire area to be cured continuously wet by fogging, as specified in the fogging paragraph above, for at least 18 hours and then immediately cover the waterproof curing sheet conforming to ASTM C171, waterproof paper and polyethylene film, free of holes or tears. Keep sheet fully flat, without wrinkles or air bubbles, held down tautly at all edges. Do not use this method on slabs which will be exposed to view.

3.04 PLACING REINFORCEMENT

- A. All reinforcement shall be detailed, fabricated and erected in accordance with the A.C.I. "Manual of Standard Practice for Detailing Reinforced Concrete Structure", (A.C.I. 315), including bar supports and spacers. At splices all reinforcing bars shall be lapped a minimum of twenty-four (24) bar diameters but not less than twelve (12) inches.
- B. The reinforcing shall be fabricated to the shapes and dimensions shown and shall be placed where indicated on the drawing. Before placing, all reinforced steel shall be thoroughly cleaned of rust, mill scale or coatings, which would reduce or destroy the bond. Reinforcing bars shall conform to the requirements of the latest editions of the A.C.I. Code and the CRSI Manuals.
- C. Wire mesh, unless otherwise shown on the drawings or specified, shall be 6" x 6" No.10 woven or electrically welded wire fabric conforming to the requirements of ASTM Designation A185, latest revision.

- D. Space chairs and bolsters in accordance with ACI 315 and 318 using height to furnish cover over reinforcing required. Chairs with plastic feet or stainless steel shall be used in all beams and elevated slabs. Chairs for other concrete adjacent to or on the ground may be pieces of concrete block or concrete brick compressed into subgrade with the rebars bearing directly on the pointed edge of the masonry supports, or chairs set on precast concrete pads compressed into the subgrade.
- E. When placed in the forms, reinforcement shall be clean and free of all loose rust, scale, dust, dirt, paint, oil or other foreign material, and shall be accurately and securely positioned both laterally and vertically before placing concrete.
- F. The rebars shall be fastened together at every intersection or at intervals not greater than 24 bar diameters by wire ties or by some alternate method acceptable to the Engineer. In areas where large bars are closer together, the wire ties may be spaced not more than 30 bar diameter apart, rather than as specified above.

3.05 FORMS

- A. Installation and erection shall be in accordance with ACI 347 and specified hereinafter.
- B. Forms shall conform to shape, lines and dimensions of numbers indicated, and shall be sufficiently tight to prevent leakage of mortar. They shall not deflect under dead load weight of construction as a liquid or of construction load. Forms shall be properly braced or tied together so as to maintain position and shape within specified tolerances. Construct forms so that they can be removed steadily without hammering or prying against the concrete. Forms for exposed concrete shall be carefully made and accurately placed to obtain correct shape and line.
- C. Forms shall be of wood, metal, or other approved materials. Metal forms shall be of a type and manufacture acceptable to the Engineer. Plywood, fiberboard, or absorptive type form linings may be used where appropriate. Sectional forms shall produce a uniform surface and shall be assembled in a modular pattern. Pours will not be scheduled until all erection and bracing is complete. Walers, ties and braces shall be required for all forms. Chamfer strips made from nominal dimensional 1" x 1" lumber cut on the diagonal shall be installed at the top of the forms on all exposed edges of walls, slabs, beams and other structures above grade.
- D. Drip edge shall be made from wood quarter round and installed where shown. Extruded plastic fillets shall be used where detailed. Circular structures shall be formed with special care, and attention to the appearance of the finished structure. Random location of fillers, non-modular sections, and excessive deviations from true circular segments shall be cause for rejection of the forms.
- E. The Contractor shall be fully responsible for the adequacy of form work in its entirety. Forms shall support required loads and shall maintain their dimensional and surface correctness to produce members required drawings.
- F. Slots, chases, recesses or other openings as shown on the drawings or as needed for the work of any other trades shall be boxed out.
- G. Box out for all temporary openings and build forms to seal them up when and as required.
- H. After sealing and immediately before the placing of reinforcing, faces of all forms in contact with the concrete shall receive a thorough coating of the liquid form releasing agent, applied in compliance with the Manufacturer's instructions.

- I. Reused forms shall be thoroughly cleaned out of dirt, debris, concrete and foreign matter. Forms shall not be reused if they have developed defects, which would affect their tightness and strength or desired surface finish. Used forms shall not be used for architectural concrete.
- J. Forms shall be removed in a manner that will prevent injury to concrete. Supporting forms or shoring shall not be removed until the members have acquired sufficient strength to support their weight and any load thereon.
- K. Removal shall be in sequence as approved by the Engineer. Unless test cylinders warrant another procedure, the forms shall not be removed from members prior to the time listed in the schedule hereinafter unless otherwise directed.
- L. Bonding To Existing Surfaces: Clean existing concrete surfaces that are to have new concrete bonded thereto of all grease, oil, dust, dirt and loose particles and coat with an epoxy bonding agent just prior to placing of the new concrete. Apply the bonding agent as recommended by the manufacturer and allow the agent to become tacky before the new concrete is placed. Do not allow the bonding agent to overlap or be spilled on the surfaces to be exposed after the work is completed.

3.06 FORM REMOVAL

- A. Maintain formwork in place for the following structural conditions until the concrete has attained the minimum percentage of indicated design compressive strength or for the period of time specified in the following table.

Note: Time periods in the table include all days except those in which the temperature falls below 40 degrees F.

3.07 CONCRETE FINISHINGS

- A. Repair of Surface Defects
 - 1. General: Repair surface defects, including tie holes immediately after form removal. Dampen the area to be patched and an area at least 6 inches wide surrounding it to prevent absorption of water from the patching mortar. Notify the Engineer prior to commencing operations.
 - 2. Removal of Defective Concrete: Remove all honeycombed and other defective concrete down to sound concrete. Cut edges perpendicular to the surface or slightly under cut. Sand blast surfaces to receive repair.
 - 3. Bonding Grout: Thoroughly dampen surfaces to be patched and apply a coat of bonding grout consisting of one part cement to one part fine sand passing a No. 30 sieve and having the consistency of thick cream.
 - 4. Placing Patching Mortar: After the bonding grout begins to lose its water sheen, apply a premixed patching mortar, thoroughly consolidating it into place and striking it off so as to leave the patch slightly higher than the surrounding surface. Leave mortar undisturbed for one hour to permit initial shrinkage and then finally finish.
 - 5. Tie Holes: After being cleaned and thoroughly dampened, fill the tie holes solid with patching mortar.

- B. Floated Finish: After concrete has been placed, consolidated, struck off and leveled, do not work the surface further until water sheen has disappeared and the surface has hardened sufficiently to permit floating. During the first floating, check the planeness of the slab with a 10 foot straightedge applied at no less than two angles. Cut down all high spots and fill all low spots to produce a surface having the required tolerance. Then refloat the slab to a uniform sandy texture.
- C. Light Broomed Finish: After floating, power trowel slabs to receive a light broomed finish to produce a smooth surface, relatively free of defects. Before the surface sets, pass a soft broom drag over the surface to produce a surface uniform in texture and appearance.
- D. Troweled Finish: After floating, power trowel slabs to receive a troweled finish to produce a smooth surface, relatively free of defects. Hand trowel after the surface has hardened sufficiently. When a ringing sound is produced as the trowel is moved over the surfaces, perform final troweling by hand to produce a surface which is thoroughly consolidated, free from trowel marks, uniform in texture and appearance and plane to a tolerance of 1/8 inch of 10 feet as determined by a 10 foot straightedge placed anywhere on the slab in any direction.
- E. Hardener Finish: Where indicated to receive a troweled hardener finish, water cure slabs without application of curing and sealing agent. When slab is at least 20 days old and thoroughly dry, apply the hardener in accordance with the manufacturer's recommendations. Where dry-shake hardener or slip resistant finish is required, apply the hardener or slip-resistant product prior to complete curing and finishing, in accordance with the requirements and recommendations of the product manufacturer.
- F. Saw Cut Joints: Cut joints that are to be saw cut not sooner than 2 hours after the concrete is poured and not later than 8 hours after the pour.

3.07 TESTS

- A. Compressive strength tests shall be made by breaking standard 6-inch diameter by 12-inch high test specimens prepared, cured and broken in accordance with the American Society for Testing Materials Methods C-31 and C-39, latest revision. Four specimen test cylinders shall be taken from each pour of five (5) cubic yards or more. One additional test shall be taken from each thirty (30) cubic yards or fraction thereof in each pour in excess of thirty (30) cubic yards.
- B. Test specimens shall be taken from manhole bottom pours of less than five (5) cubic yards as directed by the Engineer. Test specimens shall be taken in the presence of the Engineer. One cylinder from each pour shall be broken at seven (7) days, the remainder at twenty-eight (28) days. Additional test cylinders may be ordered for determining the characteristics of a new design mix or changes in equipment or methods, and under adverse weather or curing conditions.
- C. Slump test shall be made in accordance with ASTM C143, latest revision, and shall be made with each load and at time of cylinders.
- D. The Contractor shall supply all cylinder molds, slump cones, tools and labor for preparing specimen, and shall provide clean, moist sand or burlap for curing. Cylinder shall not be shipped to the testing laboratory until the third day following preparation, and shall be protected from accidental damage at all times.
- E. The test cylinders shall be tested in a recognized commercial testing laboratory at the expense of the Contractor.

3.08 EXPANSION JOINTS, CONSTRUCTION JOINTS AND WATER SPOTS

- A. Expansion Joins shall be placed as indicated on the drawings. Joint materials for surfaces exposed to water and sewage shall conform to ASTM D175, Preformed Joint Filler, non-extruding and resilient (bituminous type), thickness as shown on the drawings. Joint materials for isolation joints, slab-on-grade joints and wall joints not exposed to water and sewage shall conform to ASTM D994, preformed expansion joint filler for concrete (bituminous type), thickness as shown on the drawings.
- B. Construction Joins shall be located in accordance with a schedule of pours which shall be prepared and submitted by the Contractor. Vertical construction joints shall be held to the minimum number consistent with good standard practice.
- C. Water Stops. Material for water stops shall be 9-inch PVC multi-rib center-bulb type for expansion joints, and 1/4" x 4" and 1/8" x 4" structural steel sheets for construction joints. PVC joint material shall be as manufactured by The Burke Company, or approved equal.

END OF SECTION

SECTION 03300

CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Work consists of the forming, mixing, placing and curing concrete for use in small structures, sidewalk, and curb replacement.

1.02 QUALITY ASSURANCE

- A. Concrete may be standard design and product of commercial ready-mix or transit-mix supplier conforming to the following requirements:

<u>CLASS</u>	<u>CEMENT CONTENT PER CUBIC YARD</u>	<u>MINIMUM 28-DAY STRENGTH (lb. per sq. in.)</u>
Structural	6.25 bags or 600 pounds	4,000
Non-structural	6.75 bags or 560 pounds	3,000

- B. Job mixes of small quantities shall conform to the same requirements.

1.03 SUBMITTALS

- A. Compressive strength tests, when required by the Engineer, shall be made by breaking standard 6-inch diameter by 12-inch high test specimens prepared, cured and broken in accordance with the ASTM C31 and C39. Three specimen test cylinders shall be taken from each concrete pour of three cubic yards. One additional test cylinder shall be taken for quantities up to one truck load. Test specimens shall be taken in the presence of the Engineer. One cylinder from each pour shall be broken at seven days, the remainder at twenty-eight days. Additional test cylinders may be ordered for determining the characteristics of a new design mix or changes in equipment or methods, and under adverse weather or curing conditions.
- B. Slump test shall be made in accordance with ASTM C143, and shall be made whenever directed by the Engineer.
- C. Responsibility for Tests and Reports
 1. The Contractor shall supply all cylinder molds, slump cones, tools and labor for preparing specimens, and shall provide clean, moist sand or burlap for curing. Cylinders shall be shipped to the testing laboratory until the third day following preparation, and shall be protected from accidental damage at all times.
 2. The test cylinders shall be tested in a recognized commercial testing laboratory.

1.04 DELIVERY AND STORAGE

- A. Ready-mixed concrete delivered shall be accompanied by delivery tickets showing the following:
 - Date and time leaving plant
 - Type of cement and weight
 - Quantity of water and time added
 - Additive (if any).
- B. Bulk or bagged cement or bagged concrete mix shall be stored off the ground in a sheltered area.

PART 2 - PRODUCTS

2.01 CEMENT

- A. Portland cement shall conform to the latest revision of Federal and/or ASTM Specifications enumerated below:
 - 1. For general concrete construction, ASTM C150, Type I.
 - 2. Type II (meeting ASTM C150) cement shall be used in all areas where the concrete will be subjected to a hydrogen sulfide environment (i.e., direct contact with groundwater).

2.02 AGGREGATES

- A. Fine Aggregate
 - 1. Fine aggregate shall be clean, hard, strong, durable, uncoated particles of natural sand.
 - 2. The fine aggregate shall be reasonably well graded from coarse to fine.
- B. Coarse Aggregate
 - 1. Coarse aggregate shall be washed and consist of hard, tough, durable components, free from adherent coatings, salt, alkali, vegetable matter, and shall no contain an excessive number of soft, friable, thin or elongated particles. Coarse aggregate shall be properly grades from fine to coarse to produce concrete of the desired strength, density, and workability.
 - 2. Where the cover over reinforcing is two inches or more, the maximum size of aggregate shall be 1-1/2 inches. Where the cover over reinforcing is less than two inches, the maximum size of aggregate shall be 3/4-inch. The maximum size of aggregate shall not exceed one-fifth of the narrowest dimension between forms nor three-fourths of the minimum clear spacing between reinforcing bars.

2.03 BAGGED CONCRETE MIX

- A. For very small amounts of concrete a premixed sand, gravel and cement in 40 lb. (1/3 cu. ft.) or 80 lb. (2/3 cu. ft.) bags may be used. The Engineer must give approval for its use.

2.04 ADMIXTURES

- A. The design mix may be based upon the use of such admixtures as the designer may select to improve the workability, plasticity or rate of curing of the concrete.

2.05 MIXING WATER

- A. The water used in mixing concrete shall be fresh, clean and free from injurious amounts of oil, acid, alkali, or organic matter.
- B. Water from any source other than a municipal water supply shall be shown by test to comply with Florida State Department of Transportation requirements for mixing water.

2.06 STEEL BAR AND WIRE FABRIC REINFORCEMENT

- A. The reinforcing shall be fabricated to the proper shapes and dimensions. Before placing, all reinforcements shall be thoroughly cleaned of rust, mill scale and/or coatings.
- B. Reinforcing bars shall conform to the requirements of ASTM A615, Grade 60 including hoops and stirrups.
- C. Reinforcing steel shall be detailed, fabricated and placed according to the methods and standards recommended in the "Manual of Standard Practice for Detailing Reinforced Concrete Structures" of the American Concrete Institute.
- D. Splices in reinforcing mats shall be staggered. Horizontal mats shall be supported on metal chairs with all sills or pads below subgrade. Spacers shall be provided for wall and column steel and shall be removed as the concrete is placed.
- E. Wire fabric, unless otherwise shown or specified, shall be 6-inches by 6-inches by W1.4 x W1.4 woven or electrically welded wire fabric conforming to the requirements of ASTM A185.

PART 3 - EXECUTION

3.01 FORMS

- A. Material
 - 1. Forms shall be of wood, metal, or other approved materials, shall be built true to line and grade, mortar-tight, adequately braced and supported, and sufficiently rigid to prevent displacement or sagging. Metal forms shall be of a type and manufacture acceptable to the Engineer. Plywood, fiberboard, or absorptive type form linings may be used where appropriate.
 - 2. Form work shall be constructed conforming to AC1 347 Chapter 2. Joints of sectional forms shall be located in a modular manner with as few fillers as possible. Voids in plywood and joints between form modules used for concrete exposed to view or hydraulic action shall be filled with silicone sealant and shall be tool smooth. Profile items such reglets and anchors shall be securely fastened with flush mechanical fasteners.
 - 3. Pours shall not be scheduled until all erection and bracing of form work has been completed.

3.02 CONCRETE PLACING

- A. Concrete shall not be placed until forms and reinforcing have been inspected.
- B. Concrete shall be placed with the aid of mechanical vibrating equipment supplemented by hand forking or spading. Vibration shall be transmitted directly to the concrete and not through the forms. The duration of vibration at any location in the forms shall be held to the minimum necessary to produce thorough consolidation.
- C. Concrete shall be compacted and worked in an approved manner into all corners and angles of the forms and around reinforcement and embedded fixtures in such a manner as to prevent segregation of the coarse aggregate.
- D. Before depositing new concrete on or against concrete which has set, the existing surfaces shall be cleaned of all laitance, foreign matter and loose particles, and slushed with a neat cement grout. Grout for horizontal construction joints shall be of cement and fine aggregate in the same proportions as in the concrete to be placed, and shall be from 1/2- to 1-inch thickness.
- E. The concrete shall be placed by suitable equipment as nearly as possible to its final location and without any segregation of the aggregate. Free vertical drop shall not exceed three feet.

3.03 CONCRETE CURING

- A. Water for curing shall be clear and entirely free from any elements which might cause staining or discoloration.
- B. Concrete shall be kept wet by covering with water, water saturated covering, or by alternate methods which will keep all surfaces continuously wet, for a period of seven days.
- C. Where wood forms are left in place during curing, they shall be kept wet at all times.

3.04 WEATHER PROTECTION

- A. No concrete shall be mixed or placed when the air temperature in the shade and away from artificial heat is as low as 40 degrees F., and falling. Concrete may be mixed and placed when the air temperature in the shade and away from artificial heat is 35 degrees Fahrenheit, and rising.
- B. Fresh concrete shall be protected from rain, flowing water and mechanical injury.

3.05 CONCRETE FINISHING

- A. Slabs, Walks and Pavements shall be brought to a true and even finish by power or hand-floating. The surface shall be floated to a true, smooth finish. Troweling shall be the minimum to obtain a smooth, dense surface and shall not be done until the mortar has hardened sufficiently to prevent excess fine material from being worked to the surface. All walk and pavement surfaces, shall, immediately after troweling, be lightly broomed. The brooming shall be sufficient to mark the surface without appreciably disturbing the troweled finish.

END OF SECTION

SECTION 03600

GROUT

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide all labor, materials, tools and equipment and perform all grouting as specified hereinafter and indicated on the Drawings.

1.02 RELATED WORK

- A. Section 03100: *Cast-In-Place and Poured Concrete*.

1.03 SUBMITTALS

- A. Submit manufacturer's literature for review on the following items:
 - 1. Nonshrink grout data including grout properties, mixing, surface preparation and installation instructions.

1.04 DELIVERY AND STORAGE

- A. Deliver and store grouting materials in unbroken containers with seals and labels intact as packaged by the manufacturer.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Nonshrink, Nonmetallic Grout: The Burke Company's Non-Ferrous, Non-Shrink Grout, Sauereisen F-100 Level Fill, Master Builders Masterflow 713, Eculid NS Grout, or equal-pre-mixed type.
- B. Nonshrink Metallic Grout: The Burke Company's Metallic Spec Grout, Master Builders Embecco 636 Grout pre-mixed type, or equal.
- C. Epoxy Grout: Sikadur 42 Grout-Pak, or equal, for grouting sleeves for anchor bolts, etc.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean all bonding surfaces of dust and oil.

3.02 INSTALLATION

A. Nonshrink Grout

1. Use nonshrink, nonmetallic grout for grouting precast concrete wall panel connections, column base plates, anchor bolts, reinforcing bars, pipe sleeves, machinery support and pump base plates. Use epoxy grout for anchor bolts, etc., where indicated on the Drawings.
2. Mix and place nonshrink grout as recommended by the manufacturer.
3. Mix grout as close to the work area as possible and transport quickly to its final position in a manner which will not permit segregation of materials.
4. Cure nonshrink grout with water saturated burlap for at least three days or with an application of Super Rez Seal cure and seal compound applied immediately after grout placement.
5. Do not operate machinery set on grout pads until grout has cured for at least 24 hours.

END OF SECTION

DIVISION 11
EQUIPMENT

ADDITIONAL TECHNICAL SPECIFICATIONS

SECTION 120
EARTHWORK AND RELATED OPERATIONS
FOR LOCAL AGENCIES

EARTHWORK AND RELATED OPERATIONS

SECTION 120 EXCAVATION AND EMBANKMENT

120-1 Description.

120-1.1 General: Excavate and construct embankments as required for the roadway, ditches, channel changes and borrow material. Use suitable excavated material or authorized borrow to prepare subgrades and foundations. Construct embankments in accordance with Standard Plans, Index 120-001. Compact and dress excavated areas and embankments.

Meet the requirements of Section 110 for excavation of material for clearing and grubbing and Section 125 for excavation and backfilling of structures and pipe. Material displaced by the storm sewer or drainage structure system is not included in the earthwork quantities shown in the Contract Documents.

The existing surface may be a combination of the following:

1. The original unpaved ground line;
2. The bottom of the existing pavement;
3. The bottom of existing features removed by clearing and grubbing;
4. The bottom of the existing base, if the base is to be removed.

The finished graded surface includes the completed grades of side slopes, unpaved shoulders, and the bottom of the base for flexible or rigid pavement.

120-1.2 Unidentified Areas of Contamination: When encountering or exposing any abnormal condition indicating the presence of contaminated materials, cease operations immediately in the vicinity and notify the Engineer. The presence of tanks or barrels; discolored earth, metal, wood, ground water, etc.; visible fumes; abnormal odors; excessively hot earth; smoke; or other conditions that appear abnormal may indicate the presence of contaminated materials and must be treated with extreme caution.

Make every effort to minimize the spread of contamination into uncontaminated areas. Immediately provide for the health and safety of all workers at the job site and make provisions necessary for the health and safety of the public that may be exposed to any potentially hazardous conditions. Ensure provisions adhere to all applicable laws, rules or regulations covering potentially hazardous conditions and will be in a manner commensurate with the gravity of the conditions.

The Engineer will notify the District Contamination Impact Coordinator (DCIC) who will coordinate selecting and tasking the Department's Contamination Assessment/Remediation Contractor (CAR). Provide access to the potentially contaminated area. Preliminary investigation by the CAR Contractor will determine the course of action necessary for site security and the steps necessary under applicable laws, rules, and regulations for additional assessment and/or remediation work to resolve the contamination issue.

The CAR Contractor will delineate the contamination areas, any staging or holding area required; and, in cooperation with the Prime Contractor and Engineer, develop a work plan that will provide the CAR Contractor's operations schedule with projected completion dates for the final resolution of the contamination issue.

The CAR Contractor will maintain jurisdiction over activities inside any outlined contaminated areas and any associated staging holding areas. The CAR Contractor will be responsible for the health and safety of workers within the delineated areas. Provide continuous

access to these areas for the CAR Contractor and representatives of regulatory or enforcement agencies having jurisdiction.

Both Contractors will use the schedule as a basis for planning the completion of both work efforts. The Engineer may grant the Contract Time extensions according to the provisions of 8-7.3.2.

Cooperate with the CAR Contractor to expedite integration of the CAR Contractor's operations into the construction project. The Prime Contractor is not expected to engage in routine construction activities, such as excavating, grading, or any type of soil manipulation, or any construction processes required if handling of contaminated soil, surface water or ground water is involved. All routine construction activities requiring the handling of contaminated soil, surface water or groundwater will be by the CAR Contractor. Adjustments to quantities or to Contract unit prices will be made according to work additions or reductions on the part of the Prime Contractor in accordance with 4-3.

The Engineer will direct the Prime Contractor when operations may resume in the affected area.

120-2 Classifications of Excavation.

120-2.1 General: The Department may classify excavation specified under this Section for payment as any of the following: regular excavation, subsoil excavation, lateral ditch excavation, and channel excavation.

If the proposal does not show subsoil excavation or lateral ditch excavation as separate items of payment, include such excavation under the item of regular excavation.

If the proposal shows lateral ditch excavation as a separate item of payment, but does not show channel excavation as a separate item of payment, include such excavation under the item of lateral ditch excavation. Otherwise, include channel excavation under the item of regular excavation.

120-2.2 Regular Excavation: Regular excavation includes roadway excavation and borrow excavation, as defined below for each.

120-2.2.1 Roadway Excavation: Roadway excavation consists of the excavation and the utilization or disposal of all materials necessary for the construction of the roadway, ditches, channel changes, etc., except for removal of existing pavement as defined in Section 110.

120-2.2.2 Borrow Excavation: Borrow excavation consists of the excavation and utilization of material from authorized borrow pits, including only material that is suitable for the construction of roadway embankments or of other embankments covered by the Contract.

A Cost Savings Initiative Proposal (CSIP) submittal based on using borrow material from within the project limits will not be considered.

120-2.3 Subsoil Excavation: Subsoil excavation consists of the excavation and disposal of muck, clay, rock, or any other material that is unsuitable in its original position and that is excavated below the existing surface. For pond and ditches that identify the placement of a blanket material, the existing surface is template as the bottom of the blanket material. Subsoil excavation also consists of the excavation of all suitable material within the above limits as necessary to excavate the unsuitable material. Consider the limits of subsoil excavation indicated in the Plans as being particularly variable, in accordance with the field conditions actually encountered.

The quantity of material required to replace the excavated material and to raise the elevation of the roadway to the bottom of the template will be paid for under embankment or borrow excavation (Truck Measure).

120-2.4 Lateral Ditch Excavation: Lateral ditch excavation consists of all excavation of inlet and outlet ditches to structures and roadway, changes in channels of streams, and ditches parallel to the roadway right-of-way. Dress lateral ditches to the grade and finished graded surface shown in the Plans.

120-2.5 Channel Excavation: Channel excavation consists of the excavation and satisfactory disposal of all materials from within the limits of the channel as shown in the Plans.

120-3 Preliminary Soils Investigations.

When the Plans contain the results of a soil survey, do not assume such data is a guarantee of the depth, extent, or character of material present.

120-4 Removal of Unsuitable Materials and Existing Roads.

120-4.1 Subsoil Excavation: Where muck, rock, clay, or other material within the limits of the roadway is unsuitable in its original position, excavate such material to the depths shown in the Plans as the removal limits or as indicated by the Engineer, and backfill with suitable material. Where the removal of plastic soils is required, meet a construction tolerance, of plus or minus 0.2 foot in depth and plus or minus 6 inches (each side) in width.

120-4.2 Construction over Existing Old Road: Where a new roadway is to be constructed over an old one, completely remove the existing flexible and Portland cement concrete pavement for the entire limits of the width and depth in accordance with Section 110. Compact disturbed material in accordance with Section 120 or 160, whichever material applies. If indicated in the Plans, remove the existing base in accordance with Section 110.

120-5 Disposal of Surplus and Unsuitable Material.

120-5.1 Ownership of Excavated Materials: Dispose of surplus and excavated materials as shown in the Plans or, if the Plans do not indicate the method of disposal, take ownership of the materials and dispose of them outside the right-of-way.

120-5.2 Disposal of Muck on Side Slopes: As an exception to the provisions of 120-5.1, when approved by the Engineer, in rural undeveloped areas, the Contractor may place muck (A-8 material) on the slopes, or store it alongside the roadway, provided there is a clear distance of at least 6 feet between the roadway grading limits and the muck, and the Contractor dresses the muck to present a neat appearance. In addition, the Contractor may also dispose of this material by placing it on the slopes in developed areas where, in the opinion of the Engineer, this will result in an aesthetically pleasing appearance and will have no detrimental effect on the adjacent developments. Where the Engineer permits the disposal of muck or other unsuitable material inside the right-of-way limits, do not place such material in a manner which will impede the inflow or outfall of any channel or side ditches. The Engineer will determine the limits adjacent to channels within which such materials may be disposed.

120-5.3 Disposal of Paving Materials: Unless otherwise noted, take ownership of paving materials, such as paving brick, asphalt block, concrete slab, sidewalk, curb and gutter, etc., excavated in the removal of existing pavements, and dispose of them outside the right-of-way. If the materials are to remain the property of the Department, place them in neat piles as directed. Existing base materials that are removed may be incorporated in the stabilized portion

of the subgrade in accordance with Section 160. If the construction sequence will allow, incorporate all existing base material into the project as allowed by the Contract Documents.

120-5.4 Disposal Areas: Where the Contract Documents require disposal of excavated materials outside the right-of-way, and the disposal area is not indicated in the Contract Documents, furnish the disposal area without additional compensation.

Provide areas for disposal of removed paving materials out of sight of the project and at least 300 feet from the nearest roadway right-of-way line of any State maintained road. If the materials are buried, disregard the 300 foot limitation.

120-6 Borrow.

120-6.1 Materials for Borrow: Do not open borrow pits until the Engineer has approved their location.

Prior to the purchase or use of any borrow pit materials, provide the Engineer with a written certification of borrow pit compliance meeting the requirements of Section 337.0262, Florida Statutes.

Do not provide borrow materials that are polluted as defined in Chapter 376 of the Florida Statutes (oil of any kind and in any form, gasoline, pesticides, ammonia, chlorine, and derivatives thereof, excluding liquefied petroleum gas) in concentrations above any local, State, or Federal standards.

Prior to placing any borrow material that is the product of soil incineration, provide the Engineer with a copy of the Certificate of Materials Recycling and Post Burn Analysis showing that the material is below all allowable pollutant concentrations.

120-6.2 Furnishing of Borrow Areas: To obtain the Engineer's approval to use an off-site construction activity area that involves excavation such as a borrow pit or local aggregate pit, request in writing, a review for cultural resources involvement. Send the request to the Division of Historical Resources (DHR), Department of State, State Historic Preservation Officer, Tallahassee, FL. As a minimum, include in the request the Project Identification Number, the County, a description of the property with Township, Range, Section, etc., the dimensions of the area to be affected, and a location map. Do not start any work at the off-site construction activity area prior to receiving clearance from the DHR that no additional research is warranted.

For certain locations, the DHR will require a Cultural Resources Assessment (CRA) Survey before approval can be granted. When this is required, secure professional archaeological services to complete an historical and archaeological survey report. Submit the report to the DHR and to the Department. The Engineer will determine final approval or rejection of off-site construction activity areas based on input from the DHR.

Before receiving approval or before use of borrow areas, obtain written clearance from the Engineer concerning compliance with the Federal Endangered Species Act and other Wildlife Regulations as specified in 7-1.4 and Section 4(f) of the USDOT Act as specified in 7-1.8.

The Department will adjust Contract Time in accordance with 8-7 for any suspension of operations required to comply with this Article. The Department will not accept any monetary claims due to delays or loss of off-site construction activity areas.

Except where the Plans specifically call for the use of a particular borrow or dredging area, the Contractor may substitute borrow or dredging areas of his own choosing provided the Engineer determines the materials from such areas meet the Department's standards and other requirements for stability for use in the particular sections of the work in which it is to be placed, and the Contractor absorbs any increase in hauling or other costs. Stake the corners of

the proposed borrow area and provide the necessary equipment along with an operator in order for the Engineer to investigate the borrow area. The Engineer will determine test locations, collect samples, and perform tests to investigate the proposed borrow area based on soil strata and required soil properties. The Engineer will approve use of materials from the proposed area based on test results and project requirements. Final acceptance of materials will be based on Point of Use Test as described in 6-1.2.4.

Before using any borrow material from any substitute areas, obtain the Engineer's approval, in writing, for the use of the particular areas, and, where applicable, ensure that the Engineer has surveyed the surface. Upon such written approval by the Engineer, consider the substitute areas as designated borrow areas.

When furnishing the dredging or borrow areas, supply the Department with evidence that the necessary permits, rights, or waivers for the use of such areas have been secured.

Do not excavate any part of a Contractor furnished borrow area which is less than 300 feet from the right-of-way of the project or any State Road until the Engineer has approved a plan for landscaping and restoring the disturbed area. Perform this landscaping and land restoration at no expense to the Department, prior to final acceptance of the project. Do not provide a borrow area closer than 25 feet to the right-of-way of any state road. In Department furnished borrow pits, do not excavate material within 5 feet of adjacent property lines.

Upon completion of excavation, neatly shape, dress, grass, vegetate, landscape, and drain all exposed areas including haul roads, as necessary so as not to present an objectionable appearance.

Meet the requirements of Section 104 when furnishing borrow areas, regardless of location.

120-6.3 Borrow Material for Shoulder Build-up: When indicated in the Plans, furnish borrow material with a specific minimum bearing value, for building up of existing shoulders. Blend materials as necessary to achieve this specified minimum bearing value prior to placing the materials on the shoulders. Take samples of this borrow material at the pit or blended stockpile. Include all costs of providing a material with the required bearing value in the Contract unit price for borrow material.

120-6.4 Haul Routes for Borrow Pits: Provide and maintain, at no expense to the Department, all necessary roads for hauling the borrow material. Where borrow area haul roads or trails are used by others, do not cause such roads or trails to deteriorate in condition.

Arrange for the use of all non-public haul routes crossing the property of any railroad. Incur any expense for the use of such haul routes. Establish haul routes which will direct construction vehicles away from developed areas when feasible, and keep noise from hauling operations to a minimum. Advise the Engineer in writing of all proposed haul routes.

120-6.5 Authorization for Use of Borrow: When the item of borrow excavation is included in the Contract, use borrow only when sufficient quantities of suitable material are not available from roadway and drainage excavation, to properly construct the embankment, subgrade, and shoulders, and to complete the backfilling of structures. Do not use borrow material until so ordered by the Engineer, and then only use material from approved borrow pits.

120-7 Materials for Embankment.

120-7.1 Use of Materials Excavated from the Roadway and Appurtenances: Assume responsibility for determining the suitability of excavated material for use on the project in

accordance with the applicable Contract Documents. Consider the sequence of work and maintenance of traffic phasing in the determination of the availability of this material.

120-7.2 General Requirements for Embankment Materials: Construct embankments of acceptable material including reclaimed asphalt pavement (RAP), recycled concrete aggregate (RCA) and Portland cement concrete rubble, but containing no muck, stumps, roots, brush, vegetable matter, rubbish, reinforcement bar or other material that does not compact into a suitable and enduring roadbed. Do not use RAP or RCA in the top 3 feet of slopes and shoulders that are to be grassed or have other type of vegetation established. Do not use RAP or RCA in stormwater management facility fill slopes or permitted wetland impact areas.

Remove all waste material designated as undesirable. Use material in embankment construction in accordance with Plans or as the Engineer directs.

Complete the embankment using maximum particle sizes (in any dimension) as follows:

1. In top 12 inches: 3-1/2 inches (in any dimension).
2. 12 to 24 inches: 6 inches (in any dimension).
3. In the depth below 24 inches: not to exceed 12 inches (in any dimension) or the compacted thickness of the layer being placed, whichever is less.

Spread all material so that the larger particles are separated from each other to minimize voids between them during compaction. Compact around these rocks in accordance with 120-9.2.

When and where approved by the Engineer, the Contractor may place larger rocks (not to exceed 18 inches in any dimension) outside the 1:2 slope and at least 4 feet or more below the bottom of the base. Compact around these rocks to a firmness equal to that of the supporting soil. Construct grassed embankment areas in accordance with 120-9.2.5. Where constructing embankments adjacent to bridge end bents or abutments, do not place rock larger than 3-1/2 inches in diameter within 3 feet of the location of any end-bent piling.

120-7.3 Materials Used at Pipes, Culverts, etc.: Construct embankments over and around pipes, culverts, and bridge foundations with selected materials.

120-8 Embankment Construction.

120-8.1 General: Construct embankments in sections of not less than 300 feet in length or for the full length of the embankment. Do not construct another LOT over an untested LOT without the Engineer's approval in writing.

For construction of mainline pavement lanes, turn lanes, ramps, parking lots, concrete box culverts and retaining wall systems, a LOT is defined as a single lift of finished embankment not to exceed 500 feet.

For construction of shoulder-only areas, shared use paths, and sidewalks areas, a LOT is defined as a single lift of finished embankment not to exceed 2000 feet.

Isolated compaction operations will be considered as separate LOTs. For multiple phase construction, a LOT shall not extend beyond the limits of the phase.

120-8.2 Dry Fill Method:

120-8.2.1 General: Construct embankments to meet the compaction requirements in 120-9 and in accordance with the acceptance program requirements in 120-10.

As far as practicable, distribute traffic over the work during the construction of embankments so as to cover the maximum area of the surface of each layer.

Construct embankment using the dry fill method whenever normal dewatering equipment and methods can accomplish the needed dewatering.

120-8.2.1.1 Maximum Compacted Lift Thickness Requirements:

Construct the embankment in successive layers with lifts up to a maximum listed in Table 120-1 below based on the embankment material classification group.

Table 120-1			
Group	AASHTO Soil Class	Maximum Lift Thickness	Thick Lift Control Test Section Requirements
1	A-3	12 inches	Not Needed
	A-2-4 (No. 200 Sieve \leq 15%)		
2	A-1	6 inches without Control Test Section	Maximum of 12 inches per 120-8.2.1.2
	A-2-4 (No. 200 Sieve $>$ 15%)		
	A-2-5, A-2-6, A-2-7, A-4, A-5, A-6		
	A-7 (Liquid Limit $<$ 50)		

120-8.2.1.2 Thick Lift Requirements:

For embankment materials classified as Group 2 in Table 120-1 above, the option to perform thick lift construction in successive layers of not more than 12 inches compacted thickness may be used after meeting the following requirements:

1. Notify the Engineer and obtain approval in writing prior to beginning construction of a test section. Demonstrate the possession and control of compacting equipment sufficient to achieve density required by 120-10.2 for the full depth of a thicker lift.
2. Construct a test section of the length of one full LOT of not less than 500 feet.
3. Perform five Quality Control (QC) tests at random locations within the test section.
 - a. All five QC tests and a Department Verification test must meet the density required by 120-10.2.
 - b. Identify the test section with the compaction effort and soil classification in the Department's Earthwork Records System (ERS).
4. Obtain Engineer's approval in writing for the compaction effort after completing a successful test section.

In case of a change in compaction effort or soil classification, failing QC test or when the QC tests cannot be verified, construct a new test section. The Contractor may elect to place material in 6 inches compacted thickness at any time. Construct all layers approximately parallel to the centerline profile of the road.

The Engineer reserves the right to terminate the Contractor's use of thick lift construction. Whenever the Engineer determines that the Contractor is not achieving satisfactory results, revert to the 6 inch compacted lifts.

120-8.2.1.3 Equipment and Methods:

Provide normal dewatering equipment including, but not limited to, surface pumps, sump pumps and trenching/digging machinery. Provide normal dewatering methods including, but not limited to, constructing shallow surface drainage trenches/ditches, using sand blankets, sumps and siphons.

When normal dewatering does not adequately remove the water, the Engineer may require the embankment material to be placed in the water or on low swampy ground in accordance with 120-9.2.3.

120-8.2.2 Placing in Unstable Areas: When depositing fill material in water, or on low swampy ground that will not support the weight of hauling equipment, construct the embankment by dumping successive loads in a uniformly distributed layer of a thickness not greater than necessary to support the hauling equipment while placing subsequent layers. Once sufficient material has been placed so that the hauling equipment can be supported, construct the remaining portion of the embankment in layers in accordance with the applicable provisions of 120-9.2.2.

120-8.2.3 Placing on Steep Slopes: When constructing an embankment on a hillside sloping more than 20 degrees from the horizontal, before starting the fill, deeply plow or cut steps into the surface of the existing slope on which the embankment is to be placed.

120-8.2.4 Placing Outside the Standard Minimum Slope: The standard minimum slope is defined as the plane described by a one (vertical) to two (horizontal) slope downward from the roadway shoulder point or the gutter line, in accordance with Standard Plans, Index 120-001 and 120-002. Where material that is unsuitable for normal embankment construction is to be used in the embankment outside the standard minimum slope, place such material in layers of not more than 18 inches in thickness, measured loose. The Contractor may also place material which is suitable for normal embankment, outside such standard minimum slope, in 18 inch layers. Maintain a constant thickness for suitable material placed within and outside the standard minimum slope, unless placing in a separate operation.

120-8.3 Hydraulic Method:

120-8.3.1 Method of Placing: When the hydraulic method is used, as far as practicable, place all dredged material in its final position in the embankment by such method. Place and compact any dredged material that is reworked, or moved and placed in its final position by any other method, as specified in 120-9.2. Baffles or any other form of construction may be used if the slopes of the embankments are not steeper than indicated in the Plans. Remove all timber used for temporary bulkheads or baffles from the embankment, and fill and thoroughly compact all voids. When placing fill on submerged land, construct dikes prior to beginning of dredging, and maintain the dikes throughout the dredging operation.

120-8.3.2 Excess Material: Do not use any excess material placed outside the prescribed slopes or below the normal high-water table to raise the fill areas. Remove only the portion of this material required for dressing the slopes.

120-8.3.3 Protection of Openings in Embankment: Maintain openings in the embankments at the bridge sites. Remove any material which invades these openings or existing channels without additional compensation to provide the same existing channel depth as before the construction of the embankment. Do not excavate or dredge any material within 200 feet of the toe of the proposed embankment.

120-8.4 Reclaimed Asphalt Pavement (RAP) Method:

120-8.4.1 General: Use only RAP material stored at facilities with an approved Florida Department of Environmental Protection Stormwater permit or, transferred directly from a milling project to the Department project. Certify the source if RAP material is from an identifiable Department project. Do not use RAP material in the following areas: construction areas that are below the seasonal high groundwater table elevation; MSE Wall backfill; underneath MSE Walls or the top 6 inches of embankment.

Prior to placement, submit documentation to the Engineer for his approval, outlining the proposed location of the RAP material.

120-8.4.2 Soil and RAP Mixture: Place the RAP material at the location and spread uniformly, using approved methods to obtain a maximum layer thickness of 4 inches. Mix this 4 inches maximum layer of RAP with a loose soil layer 8 to 10 inches thick. After mixing, meet all embankment utilization requirements of Standard Plans, Index 120-001 for the location used. The total RAP and other embankment material shall not exceed 12 inches per lift after mixing and compaction if the contractor can demonstrate that the density of the mixture can be achieved. Perform mixing using rotary tillers or other equipment meeting the approval of the Engineer. The Engineer will determine the order in which to spread the two materials. Mix both materials to the full depth. Ensure that the finished layer will have the thickness and shape required by the typical section. Demonstrate the feasibility of this construction method by successfully completing a 500 foot long test section.

120-8.4.3 Alternate Soil and RAP Layer Construction: Construct soil in 6 to 12 inch compacted lifts and RAP in alternate layers with 6 inch maximum compacted lifts. Use soil with a minimum LBR value of 40 to prevent failure during compaction of the overlying RAP layer. Demonstrate the feasibility of this construction method by successfully completing a 500 foot long test section.

120-9 Compaction Requirements.

120-9.1 Moisture Content: Compact the materials at a moisture content such that the specified density can be attained. If necessary to attain the specified density, add water to the material, or lower the moisture content by manipulating the material or allowing it to dry, as is appropriate.

120-9.2 Compaction of Embankments:

120-9.2.1 General: Uniformly compact each layer, using equipment that will achieve the required density, and as compaction operations progress, shape and manipulate each layer as necessary to ensure uniform density throughout the embankment.

120-9.2.2 Compaction Over Unstable Foundations: Where the embankment material is deposited in water or on low swampy ground, and in a layer thicker than 12 inches (as provided in 120-8.2.2), compact the top 6 inches (compacted thickness) of such layer to the density as specified in 120-10.2.

120-9.2.3 Compaction Where Plastic Material Has Been Removed: Where unsuitable material is removed and the remaining surface is of the A-4, A-5, A-6, or A-7 Soil Groups (see AASHTO M 145), as determined by the Engineer, compact the surface of the excavated area by rolling with a sheepfoot roller exerting a compression of at least 250 psi on the tamper feet, for the full width of the roadbed (subgrade and shoulders). Perform rolling before beginning any backfill, and continue until the roller feet do not penetrate the surface more than 1 inch. Do not perform such rolling where the remaining surface is below the normal water table and covered with water. Vary the procedure and equipment required for this operation at the discretion of the Engineer.

120-9.2.4 Compaction of Grassed Shoulder Areas: For the upper 6 inch layer of all shoulders which are to be grassed, since no specific density is required, compact only to the extent needed for planting.

120-9.2.5 Compaction of Grassed Embankment Areas: Do not compact the outer layers of any embankments where plant growth will be established. Leave this layer in a loose condition to a minimum depth of 6 inches for the subsequent seeding or planting

operations. Do not place RAP or RAP blended material within the top 12 inches of areas to be grassed.

120-9.3 Compaction for Pipes, Culverts, etc.: Compact the backfill of trenches to the densities specified for embankment or subgrade, as applicable, and in accordance with the requirements of 125-9.2.

Thoroughly compact embankments over and around pipes, culverts, and bridges in a manner which will not place undue stress on the structures, and in accordance with the requirements of 125-9.2.

120-9.4 Compaction of Subgrade: If the Plans do not provide for stabilizing, compact the subgrade in both cuts and fills, to the density specified in 120-10.2. For cut areas, determine Standard Proctor Maximum Density in accordance with FM 1-T099 at a frequency of one per mile or when there is a change in soil type, whichever occurs first. For undisturbed soils, do not apply density requirements where constructing paved shoulders 5 feet or less in width.

Where trenches for widening strips are not of sufficient width to permit the use of standard compaction equipment, perform compaction using vibratory rollers, trench rollers, or other type compaction equipment approved by the Engineer.

Maintain the required density until the base or pavement is placed on the subgrade.

120-10 Acceptance Program.

120-10.1 General Requirements:

120-10.1.1 Initial Equipment Comparison: Before initial production, perform an initial nuclear moisture density gauge comparison with the Verification and Independent Assurance (IA) gauges. When comparing the computed dry density of one nuclear gauge to a second gauge, three sets of calculations must be performed (IA to QC, IA to Verification, and QC to Verification). Ensure that the difference between any two computed dry densities does not exceed 2 lb/ft³ between gauges from the same manufacturer, and 3 lb/ft³ between gauges from different manufacturers. Repair or replace any gauge that does not compare favorably with the IA gauge.

Perform a comparison analysis between the QC nuclear gauge and the Verification nuclear gauge any time a nuclear gauge or repaired nuclear gauge is first brought to the project. Repair and replace any QC gauge that does not compare favorably with the Verification gauge at any time during the remainder of the project. Calibrate all QC gauges annually.

120-10.1.2 Initial Production LOT: Before construction of any production LOT, prepare a 500 foot initial control section consisting of one full LOT. Notify the Engineer in writing at least 24 hours prior to production of the initial control section. Perform all QC tests required in 120-10.1.4 with the Engineer present. Do not begin constructing another LOT until successfully completing the initial production LOT

If the QC test result fails the density requirements of 120-10.2, correct the areas of non-compliance. The QC and Verification tests will then be repeated.

120-10.1.3 Density over 105%: When a QC computed dry density results in a value greater than 105% of the applicable Proctor maximum dry density, the Engineer will perform an Independent Verification (IV) density test within 5 feet. If the IV density results in a value greater than 105%, the Engineer will investigate the compaction methods, examine the applicable Standard Proctor Maximum Density and material description. The Engineer may

collect and test an IV Standard Proctor Maximum Density sample for acceptance in accordance with the criteria of 120-10.2.

120-10.1.4 Quality Control (QC) Tests:

120-10.1.4.1 Standard Proctor Maximum Density Determination:

Determine the QC standard Proctor maximum density and optimum moisture content by sampling and testing the material in accordance with the specified test method listed in 120-10.2.

120-10.1.4.2 Density Testing Requirements: Ensure compliance to the requirements of 120-10.2 by Nuclear Density testing in accordance with FM 1-T238. Determine the in-place moisture content for each density test. Use FM 1-T238, FM 5-507 (Determination of Moisture Content by Means of a Calcium Carbide Gas Pressure Moisture Tester), or ASTM D-4643 (Laboratory Determination of Moisture Content of Granular Soils by use of a Microwave Oven) for moisture determination.

120-10.1.4.3 Soil Classification: Perform soil classification tests on the sample collected in 120-10.1.4.1, in accordance with AASHTO T88, T89, T90, and FM 1-T267. Classify soils in accordance with AASHTO M145 in order to determine compliance with embankment utilization requirements as specified in Standard Plans, Index 120-001.

120-10.1.5 Department Verification: The Engineer will conduct Verification tests in order to accept all materials and work associated with 120-10.1.4. The Engineer will verify the QC results if they meet the Verification Comparison Criteria, otherwise the Engineer will implement Resolution procedures.

The Engineer will select test locations, including Station, Offset, and Lift, using a random number generator, based on the LOTs under consideration. Each Verification test evaluates all work represented by the QC testing completed in those LOTs.

In addition to the Verification testing, the Engineer may perform additional Independent Verification (IV) testing. The Engineer will evaluate and act upon the IV test results in the same manner as Verification test results.

When the project requires less than four QC tests per material type, the Engineer reserves the right to accept the materials and work through visual inspection.

120-10.1.6 Reduced Testing Frequency: Obtain the Engineer's written approval for the option to reduce density testing frequency to one test every two LOTs if Resolution testing was not required for 12 consecutive verified LOTs, or if Resolution testing was required, but the QC test data was upheld and all substantiating tests are recorded in the ERS.

Generate random numbers based on the two LOTs under consideration. When QC test frequency is reduced to one every two LOTs, obtain the Engineer's approval to place more than one LOT over an untested LOT. Assure similar compaction efforts for the untested LOTs. If the Verification test fails, and QC test data is not upheld by Resolution testing, the QC testing will revert to the original frequency of one QC test per LOT. Do not apply reduced testing frequency in construction of shoulder-only areas, shared use paths, sidewalks, and first and last lift.

120-10.1.7 Payment for Resolution Tests: If the Resolution laboratory results compare favorably with the QC results, the Department will pay for Resolution testing. No additional compensation, either monetary or time, will be made for the impacts of any such testing.

If the Resolution laboratory results do not compare favorably with the QC results, the costs of the Resolution testing will be deducted from monthly estimates. No additional time will be granted for the impacts of any such testing.

120-10.2 Acceptance Criteria: Obtain a minimum QC density of 100% of the standard Proctor maximum density as determined by FM 1-T099, Method C, with the following exceptions: embankment constructed by the hydraulic method as specified in 120-8.3; material placed outside the standard minimum slope as specified in 120-8.2.4 except when a structure is supported on existing embankment; and, other areas specifically excluded herein.

120-10.3 Additional Requirements:

120-10.3.1 Frequency: Conduct QC sampling and testing at a minimum frequency listed in Table 120-2 below. The Engineer will perform Verification sampling and tests at a minimum frequency listed in Table 120-2 below.

Test Name	Quality Control	Verification	Verification of Shoulder-Only Areas, Shared Use Paths, and Sidewalks
Standard Proctor Maximum Density	One per soil type	One per soil type	One per soil type
Density	One per LOT	One per four LOTS and for wet conditions, the first lift not affected by water	One per two LOTS
Soil Classification and Organic Content	One per Standard Proctor Maximum Density	One per Standard Proctor Maximum Density	One per Standard Proctor Maximum Density

120-10.3.2 Test Selection and Reporting: Determine test locations including stations and offsets, using the random number generator approved by the Engineer. Record data directly in the ERS. Do not use notepads or worksheets to record data for later transfer to the ERS. Notify the Engineer upon successful completion of QC testing on each LOT prior to placing another lift on top.

120-10.4 Verification Comparison Criteria and Resolution Procedures:

120-10.4.1 Standard Proctor Maximum Density Determination: The Engineer will verify the QC results if the results compare within 4.5 lb/ft³ of the Verification test result. Otherwise, the Engineer will take one additional sample of material from the soil type in question. The State Materials Office (SMO) or an AASHTO accredited laboratory designated by the SMO will perform Resolution testing. The material will be sampled and tested in accordance with FM 1-T099.

The Engineer will compare the Resolution test results with the QC test results. If all Resolution test results are within 4.5 lb/ft³ of the corresponding QC test results, the Engineer will use the QC test results for material acceptance purposes for each LOT with that soil type. If the Resolution test result is not within 4.5 lb/ft³ of the Contractor's QC test, the Verification test result will be used for material acceptance purposes.

120-10.4.2 Density Testing: When a Verification or IV density test fails the acceptance criteria, retest the site within a 5 foot radius and the following actions will be taken:

1. If the QC retest meets the acceptance criteria and meets the 120-10.1.1 criteria when compared with the Verification or IV test, the Engineer will accept those LOTS.

2. If the QC retest does not meet the acceptance criteria and compares favorably with the Verification or IV test, rework and retest the LOT. The Engineer will re-verify those LOTs.

3. If the QC retest and the Verification or IV test do not compare favorably, complete a new comparison analysis as defined in 120-10.1.1. Once acceptable comparison is achieved, retest the LOTs. The Engineer will perform new verification testing. Acceptance testing will not begin on a new LOT until the Contractor has a gauge that meets the comparison requirements.

Record QC test results in the ERS section of the Department's database.

120-10.4.3 Soil Classification: The Engineer will verify the QC test results if the Verification and the QC test results both match the soil utilization symbol listed in Standard Plans, Index 120-001. Otherwise, the Engineer will test the sample retained for Resolution testing. The SMO or an AASHTO accredited laboratory designated by the SMO will perform the Resolution testing. The material will be sampled and tested in accordance with AASHTO T 88, T 89, and T 90, and classified in accordance with AASHTO M 145.

The Engineer will compare the Resolution test results with the QC test results. If the Resolution test matches the QC soil utilization symbol, the Engineer will use the QC soil utilization symbol for material acceptance purposes. If the Resolution test result does not match the Contractor's QC soil utilization symbol, the Verification test results will be used for material acceptance purposes.

120-10.4.4 Organic Content: The Engineer will verify the QC test results if the Verification test results satisfy the organic content test criteria in Standard Plans, Index 120-001. Otherwise, the Engineer will test the sample retained for Resolution testing. The SMO or an AASHTO accredited laboratory designated by the SMO will perform Resolution testing. The material will be sampled and tested in accordance with FM 1-T 267. If the Resolution test results satisfy the required criteria, material of that soil type will be verified and accepted. If the Resolution test results do not meet the required criteria, reject the material and reconstruct with acceptable material.

120-10.5 Disposition of Defective Materials: Assume responsibility for removing and replacing all defective material, as defined in Section 6.

Alternately, submit an Engineering Analysis Scope in accordance with 6-4 to determine the disposition of the material.

120-11 Maintenance and Protection of Work.

While construction is in progress, maintain adequate drainage for the roadbed at all times. Maintain a shoulder at least 3 feet wide adjacent to all pavement or base construction in order to provide support for the edges.

Maintain all earthwork construction throughout the life of the Contract, and take all reasonable precautions to prevent loss of material from the roadway due to the action of wind or water. Repair, at no expense to the Department except as otherwise provided herein, any slides, washouts, settlement, subsidence, or other mishap which may occur prior to final acceptance of the work. Perform maintenance and protection of earthwork construction in accordance with Section 104.

Maintain all channels excavated as a part of the Contract work against natural shoaling or other encroachments to the lines and grades, shown in the Plans, until final acceptance of the project.

120-12 Construction.

120-12.1 Construction Tolerances: Shape the surface of the earthwork to conform to the lines and grades, and shown in the Plans. In final shaping of the surface of earthwork, maintain a tolerance of 0.3 foot above or below the finished graded surface with the following exceptions:

1. Shape the surface of shoulders to within 0.1 foot of the finished graded surface shown in the Plans.
2. Shape the earthwork to match adjacent pavement, curb, sidewalk, structures, etc.
3. Shape the bottom of conveyance ditches so that the ditch impounds no water.
4. When the work does not include construction of base or pavement, shape the entire roadbed (shoulder point to shoulder point) to within 0.1 foot above or below the Plan finished graded surface .
5. When the work includes permitted linear stormwater management facilities, shape the swales and ditch blocks to within 0.1 foot of the finished graded surface shown in the Plans.

Ensure that the shoulder lines do not vary horizontally more than 0.3 foot from the true lines shown in the Plans.

120-12.2 Operations Adjacent to Pavement: Carefully dress areas adjacent to pavement areas to avoid damage to such pavement. Complete grassing of shoulder areas prior to placing the final wearing course. Do not manipulate any embankment material on a pavement surface.

When shoulder dressing is underway adjacent to a pavement lane being used to maintain traffic, exercise extreme care to avoid interference with the safe movement of traffic.

120-13 Method of Measurement.

120-13.1 General: When payment for excavation is on a volumetric basis, the quantity to be paid for will be the volume, in cubic yards. The material will be measured in its original position by field survey or by photogrammetric means as designated by the Engineer, unless otherwise specified under the provisions for individual items.

Where subsoil excavation extends outside the lines shown in the Plans or authorized by the Engineer including allowable tolerances, and the space is backfilled with material obtained in additional authorized roadway or borrow excavation, the net fill, plus shrinkage allowance, will be excluded from the quantity of roadway excavation or borrow excavation to be paid for, as applicable.

The quantity of all material washed, blown, or placed beyond the limits of the finished graded surface will be determined by the Engineer and will be excluded from the quantity of roadway excavation or borrow excavation to be paid for, as applicable.

Subsoil excavation that extends outside the lines shown in the Plans or authorized by the Engineer including allowable tolerances will be excluded from the quantity to be paid for as subsoil excavation.

120-13.2 Roadway Excavation: The measurement will include only the net volume of material excavated between the original ground line or finished graded surface of an existing roadbed, as applicable, and the finished surface of new pavement, except that the measurement will also include all unavoidable slides which may occur in connection with excavation classified as roadway excavation.

The pay quantity will be the plan quantity provided that the excavation was accomplished in substantial compliance with the plan dimensions and subject to the provisions of 9-3.2 and 9-3.4. On designated 3-R Projects, regular excavation will be paid for at the Contract lump sum price provided that the excavation was accomplished in substantial compliance with the plan dimension.

120-13.3 Borrow Excavation: Measurement will be made on a loose volume basis, measured in trucks or other hauling equipment at the point of dumping on the road. If measurement is made in vehicles, level the material to facilitate accurate measurement.

Unsuitable material excavated from borrow pits where truck measurement is provided for and from any borrow pits furnished by the Contractor, will not be included in the quantity of excavation to be paid for.

120-13.4 Lateral Ditch Excavation: The measurement will include only material excavated within the lines and grades indicated in the Plans or as directed by the Engineer. The measurement will include the full length shown in the Plans or directed by the Engineer and acceptably completed. Excavation included for payment under Section 125 will not be included in this measurement.

The pay quantity will be the plan quantity provided that the excavation was accomplished in substantial compliance with the plan dimensions and subject to the provisions of 9-3.2 and 9-3.4.

120-13.5 Channel Excavation: The measurement will include only material excavated within the lines and grades indicated in the Plans or in accordance with authorized Plan changes. The measurement will include the full length shown in the Plans including any authorized changes thereto.

If shoaling occurs subsequent to excavation of a channel and the Engineer authorized the shoaled material to remain in place, the volume of any such material remaining within the limits of channel excavation shown in the Plans will be excluded from the measured quantity of channel excavation.

120-13.6 Subsoil Excavation: The measurement will include only material excavated within the lines and grades indicated in the Plans (including the tolerance permitted therefore) or as directed by the Engineer.

When no item for subsoil excavation is shown in the Contract but subsoil excavation is subsequently determined to be necessary, such unanticipated subsoil excavation will be paid for as provided in Article 4-4.

120-13.7 Embankment: The quantity will be at the plan quantity. Where payment for embankment is not to be included in the payment for the excavation and is to be paid for on a cubic yard basis for the item of embankment, the measurement will include material placed within the limits of the existing surface, to the finished graded surface as shown in the Plans, Standard Plans Index 120-001, or directed by the Engineer. Where embankment is constructed over an existing road, the embankment measurement will include only the material actually placed up to the finished graded surface. If there are authorized changes in plan dimensions or if errors in plan quantities are detected, plan quantity will be adjusted as provided in 9-3.2.

Any overrun or underrun of plan quantity for subsoil excavation which results in a corresponding increase or decrease in embankment will be considered as an authorized plan change for adjustment purposes as defined in 9-3.2.2.

No payment will be made for embankment material used to replace unsuitable material excavated beyond the lines and grades shown in the Plans or ordered by the Engineer.

In no case will payment be made for material allowed to run out of the embankment on a flatter slope than indicated on the Plans. The Contractor shall make his own estimate on the volume of material actually required to obtain the pay section.

120-14 Basis of Payment.

120-14.1 General: Prices and payments for the various work items included in this Section will be full compensation for all work described herein, including excavating, dredging, pumping, hauling, placing, and compacting; dressing the surface of the earthwork; maintaining and protecting the complete earthwork.

The Department will not allow extra compensation for any reworking of materials. The Department will compensate for the cost of grassing or other permanent erosion control measures directed by the Engineer as provided in the Contract.

120-14.2 Excavation:

120-14.2.1 Items of Payment: When no classification of material is indicated in the Plans, and bids are taken only on regular excavation, the total quantity of all excavation specified under this Section will be paid for at the Contract unit price for regular excavation.

When separate classifications of excavation are shown in the proposal, the quantities of each of the various classes of materials so shown will be paid for at the Contract unit prices per cubic yard for regular excavation, lateral ditch excavation, subsoil excavation, and channel excavation, as applicable, and any of such classifications not so shown will be included under the item of regular excavation (except that if there is a classification for lateral ditch excavation shown and there is no classification for channel excavation, any channel excavation will be included under the item of lateral ditch excavation). As an exception on designated projects, regular excavation will be paid for at the Contract lump sum price.

120-14.2.2 Basic Work Included in Payments: Prices and payments will be full compensation for all work described under this Section, except for any excavation, or embankment which is specified to be included for payment under other items. Such prices and payments will include hauling; any reworking that may be necessary to accomplish final disposal as shown in the Plans; the dressing of shoulders, ditches and slopes; removal of trash, vegetation, etc., from the previously graded roadway where no item for clearing and grubbing is shown in the Plans; and compacting as required.

120-14.2.3 Additional Depth of Subsoil Excavation: Where subsoil excavation is made to a depth of 0 to 5 feet below the depth shown in the Plans, such excavation will be paid for at the unit price bid.

Where subsoil excavation is made to a depth greater than 5 feet, and up to 15 feet, deeper than the depth shown in the Plans, such excavation will be paid for at the unit price bid plus 25% of such unit price. Additional extra depth, more than 15 feet below such plan depth, will be considered as a change in the character of the work and will be paid for as unforeseeable work.

Where no subsoil excavation is shown in a particular location on the original Plans, payment for extra depth of subsoil will begin 5 feet below the lowest elevation on the finished graded surface.

120-14.2.4 Borrow Excavation: When the item of borrow excavation is included in the Contract, price and payment will also include the cost of furnishing the borrow areas and any necessary clearing and grubbing thereof, the removal of unsuitable material that it is necessary to excavate in order to obtain suitable borrow material, and also the costs incurred in complying with the provisions of 120-6.3.

120-14.2.5 Materials Excluded from Payment for the Excavation: No payment for excavation will be made for any excavation covered for payment under the item of embankment.

No payment will be made for the excavation of any materials which is used for purposes other than those shown in the Plans or designated by the Engineer. No payment will be made for materials excavated outside the lines and grades given by the Engineer, unless specifically authorized by the Engineer. As an exception, in operations of roadway excavation, all slides and falls of insecure masses of material beyond the regular slopes that are not due to lack of precaution on the part of the Contractor, will be paid for at the Contract unit price for the material involved. The removal of slides and falls of material classified as lateral ditch excavation or as subsoil excavation will not be paid for separately, but will be included in the Contract unit price for the pay quantity of these materials, measured as provided in 120-14.

120-14.3 Embankment:

120-14.3.1 General: Price and payment will be full compensation for all work specified in this Section, including all material for constructing the embankment, all excavating, dredging, pumping, placing and compacting of material for constructing the embankment complete, dressing of the surface of the roadway, maintenance and protection of the completed earthwork, and the removal of rubbish, vegetation, etc., from the roadway where no clearing and grubbing of the area is specified in the Plans. Also, such price and payment, in each case, will specifically include all costs of any roadway, lateral ditch, or channel excavation, unless such excavation is specifically shown to be paid for separately, regardless of whether the materials are utilized in the embankment.

120-14.3.2 Excluded Material: No payment will be made for the removal of muck or overburden from the dredging or borrow areas. No payment will be made for embankment material used to replace muck or other unsuitable material excavated beyond the lines and grades shown in the Plans or ordered by the Engineer.

120-14.3.3 Clearing and Grubbing: No payment will be made for any clearing and grubbing of the borrow or dredging areas. Where no clearing and grubbing of such areas is specified in the Plans, the cost of any necessary clearing and grubbing will be included in the Contract unit or lump sum price for Embankment.

120-14.3.4 Cost of Permits, Rights, and Waivers: Where the Contractor provides borrow or dredging areas of his own choosing, the cost of securing the necessary permits, rights or waivers will be included in the Contract price for embankment.

120-14.4 Payment Items: Payment will be made under:

- | | |
|-------------------|---|
| Item No. 120- 1- | Regular Excavation - per cubic yard. |
| Item No. 120- 2- | Borrow Excavation - per cubic yard. |
| Item No. 120- 3- | Lateral Ditch Excavation - per cubic yard. |
| Item No. 120- 4- | Subsoil Excavation - per cubic yard. |
| Item No. 120- 5- | Channel Excavation - per cubic yard. |
| Item No. 120- 6- | Embankment - per cubic yard. |
| Item No. 120- 71- | Regular Excavation (3-R Projects) - lump sum. |

SECTION 347

**LOCAL AGENCY PROGRAM
PORTLAND CEMENT CONCRETE
CLASS NS**

SECTION 347
PORTLAND CEMENT CONCRETE - CLASS NS

347-1 Description.

The requirements of this Section are applicable to concrete designated as nonstructural portland cement concrete, (Class NS) hereinafter referred to as concrete. Use concrete composed of a mixture of portland cement, aggregates, water; and where specified chemical admixtures, or supplementary cementitious materials. Deliver concrete to placement site in a freshly mixed, unhardened state. Ensure the concrete is placed and cured in a manner to ensure that the strength and durability of the concrete is maintained.

347-2 Materials.

347-2.1 General: Certify that all materials used in concrete are from Department approved sources, and free from detrimental matter.

Meet the following requirements:

Portland Cement.....	Section 921
Coarse Aggregate*	Section 901
Fine Aggregate*	Section 902
Water.....	Section 923
Chemical Admixtures	Section 924
Supplementary Cementitious Materials ..	Section 929

* Recycled Asphalt Pavement (RAP) may replace up to 20% of the total aggregate in the design mix. Use RAP from a Department approved stockpile.

347-3 Production, Mixing and Delivery.

347-3.1 Concrete Production Requirements: Obtain concrete from a plant that is currently on the Department's Nonstructural Concrete Production Facility Listing. Producers seeking inclusion on the list must contact the local District Materials Office for approval.

When Volumetric Mixers are used, deliver concrete in accordance with the Volumetric Mixer Standards of the Volumetric Mixer Manufacturers Bureau (VMMB) VMMB 100-01.

Substitution of structural concrete in lieu of non-structural concrete may be used if approved by the Engineer. If structural concrete is used in lieu of non-structural concrete, obtain the concrete from a production facility meeting the requirements of Section 346.

Acceptance is based on the requirements of Section 347.

The Engineer may disqualify any concrete production facility for non-compliance with Specification requirements.

347-3.2 Delivery: The maximum allowable mixing, agitation, and placement time of concrete is 120 minutes.

347-3.3 Small Quantities of Concrete: With approval of the Engineer, small quantities of concrete, less than 3 cubic yards placed in one day and less than 0.5 cubic yards placed in a single placement may be accepted using a pre-bagged mixture.

347-4 Certification and Acceptance.

347-4.1 General: Furnish a delivery ticket with each batch of concrete before discharging concrete at the placement site. Ensure the delivery ticket includes material quantities

incorporated into the batch, sources of materials, batch adjustments, batch size, time loaded, time discharged, and the allowable jobsite water addition.

Ensure the batcher responsible for producing the concrete signs the delivery ticket, certifying that the batch was produced in accordance with the Contract Documents.

Record water added at the jobsite. Sign the delivery ticket certifying that the concrete was placed in accordance with the Contract Documents.

Acceptance by the Department will be by certification on the delivery ticket signed by the batcher and the Contractor. Certify that the concrete meets a minimum compressive strength of 2,500 psi at 28 days. The Engineer may verify the strength of the concrete.

347-4.2 Remedial Action: Delineate, remove to the full depth and width, and replace, at no cost to the Department, concrete that has:

1. Any cracking greater than 1/4 inch in vertical displacement.
2. Any spalling or flaking off of the surface layer that exposes the rough, pitted aggregate surface in excess of 10 square inches.
3. Any intersecting cracks visible in the hardened concrete (regardless of size) in sidewalk, ditch pavement, slope pavement, traffic separator, or curb and gutter.
4. Any uncontrolled cracks that appear during the life of the Contract unacceptable to the Engineer.

SECTION 443
LOCAL AGENCY PROGRAM
FRENCH DRAINS

SECTION 443 FRENCH DRAINS

443-1 Description.

Construct french drains, utilizing one of the authorized types of pipe, with coarse aggregate, or ballast rock when specified, and filter fabric.

443-2 Materials.

443-2.1 Pipe: Unless a particular type is specified in the Plans, pipe furnished may be any of the following types:

1. Concrete Pipe (Bell & Spigot): Slotted or perforated concrete pipe may be used. Meet the requirements of Section 449 for concrete pipe. Do not use gaskets. Fully insert the spigot in the bell, and bring home. Conform to Standard Plans, Index 443-001 for slotted pipe. Use perforated pipe having perforations equally located 360 degrees around the pipe. Use pipe having not less than 30 round perforations, 3/8 inch each, per square foot of inside pipe surface. Extend perforations to within 6 inches of the bell or spigot area. The Engineer will permit other perforations not less than 5/16 inch nor more than 3/8 inch in the least dimension if they provide an opening area not less than 3.31 in²/ft² of pipe surface.

2. Corrugated Aluminum Alloy Culvert Perforated Pipe: Meet the requirements of Section 945. Use perforated pipe having perforations equally located 360 degrees around the pipe. Locate perforations either on the inside crests or on the neutral axis of all corrugations except that perforations are not required within 4 inches of each end of each length of pipe or in a corrugation where seams are located.

Provide pipe having not less than 30 round perforations, 3/8 inch each, per square foot of pipe surface. The Engineer will permit other perforations not less than 5/16 inch nor more than 3/8 inch in the least dimension if they provide an opening area not less than 3.31 in²/ft² of pipe surface.

3. Corrugated Steel Perforated Pipe: Meet the requirements of Section 943. Meet the perforation requirements as specified in (2) above.

4. Bituminous Coated Corrugated Steel Perforated Pipe: Meet the requirements of Section 943. Meet the perforation requirements as specified in (2) above. Place the perforations prior to the bituminous coating. The Engineer will accept the minimum opening of not less than 3.31 in²/ft² of pipe if 50% of the opening area is maintained after coating.

5. Corrugated High-Density Polyethylene (HDPE) Perforated Pipe: Meet the requirements of Section 948. Meet the perforation requirements as specified in (2) above.

6. Polyvinyl Chloride (PVC) Perforated Pipe: Meet the requirements of Section 948. Meet the perforation requirements as specified in (2) above.

7. Corrugated Polypropylene Perforated Pipe: Meet the requirements of Section 948. Meet the perforation requirements as specified in (2) above.

443-2.2 Coarse Aggregate: Meet the requirements of 901-1.4 for No. 4 stone.

443-2.3 Select Fill: Use select fill meeting the requirements of Section 911.

443-3 Excavating Trench.

Excavate the trench in accordance with Section 125 unless specific trench excavation procedures are described in the Plans.

Carefully excavate the trench to such depths as required to permit the filter fabric, coarse aggregate and the pipe to be placed in accordance with the details shown in the Plans.

443-4 Laying Pipe.

Lay all pipe conforming with the lines and grades specified in the Plans and in accordance with these Specifications. Unless otherwise specified in the Plans, set the pipe with a 36 inch minimum cover and a maximum cover of 66 inches.

443-5 Placing Coarse Aggregate and Backfilling.

After placing the pipe and without disturbing the pipe, carefully place the coarse aggregate around the pipe to a depth shown in the Plans. Fold the filter fabric over the coarse aggregate. Backfill and compact as described below.

443-5.1 French Drains Under Pavement: Fill the area above the coarse aggregate with select fill material meeting the requirements of this Section. Place and compact the select fill according to the requirements for pipe as specified in Section 125. The Department will allow use of additional coarse aggregate over the top of the pipe instead of select fill material. In this case, the filter fabric shall be extended to wrap the additional coarse aggregate. The top of the coarse aggregate shall not be higher than the bottom of the base, unless shown in the Plans. The Department will not pay additional costs associated with substituting coarse aggregate for select fill.

443-5.2 French Drains not Under Pavement: Fill and compact the area above the coarse aggregate according to the requirements for pipe in Section 125, unless specific procedures are described in the Plans as specified in Section 125.

443-6 Method of Measurement.

The quantity of french drains to be paid for under this Section will be the length in feet, measured in place, completed and accepted as specified on Standard Plans, Index 443-001 for french drains.

443-7 Basis of Payment.

The quantities determined as provided above will be paid for at the Contract unit price per foot for french drains. Such prices and payments will be full compensation for all the work specified in this Section and will include all materials and all excavation, and will also include sheeting or shoring, if required, the disposal of surplus material, pavement restoration, backfilling and tamping, but will not include payment for items paid for elsewhere in the specifications.

Payment shall be made under:

Item No. 443- 70- French Drains - per foot.

EXHIBIT A

**FEDERAL DISASTER RELIEF
AND RECOVERY PROVISIONS**

1. Federal Funding.

The Town of Windermere has or may apply to the Federal government (either directly or through an intervening agency) for funds which will be used to pay the selected Contractor or reimburse the Town for payments made to Contractor under the Contract, including but not limited to the Federal Emergency Management Agency ("FEMA") under its public assistance program. The selected Contractor shall be familiar with and comply with all laws, rules, regulations, executive orders, and programmatic requirements of the applicable State and Federal agencies providing financial assistance, including but not limited to FEMA under its public assistance program, in the performance of work under the Contract. Accordingly, in addition to the terms and conditions otherwise contained in the purchase order or contract ("Contract") to which this Exhibit is attached, with respect to any and all goods, services, work, or other matters performed or provided by Contractor or its subcontractors under the Contract, the provisions of this Exhibit entitled "Disaster Relief and Recovery Provisions" attached hereto and incorporated herein by this reference shall apply. In the event of any conflict between the provisions of this Exhibit and the other terms and conditions contained in the Contract, the terms of this Exhibit shall apply. Contractor shall also comply with the terms and conditions of any federally funded subaward and grant agreement entered into between the City and the State of Florida.

2. Equal Employment Opportunity.

Contractor shall comply with the provisions of Section (C) of Appendix II of 2 CFR Part 200 entitled "Equal Employment Opportunity." Contractor and its subcontractors shall also comply with Executive Order 11246 of September 24, 1965, entitled "Equal Employment Opportunity," as amended by Executive Order 11375 of October 13, 1967, and as supplemented in Department of Labor regulations (41 CFR chapter 60). To the extent that such Orders and regulations apply and require the inclusion of any language into the Contract (including but not limited to the language contained in 41 CFR 60-1.4(b) and 60-4.3 if required), such language shall be deemed included and made a part of the Contract as if fully reproduced therein. Accordingly, in compliance with the regulation at 41 C.F.R. Part 60-1.4(b):

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

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

Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

- (2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity,

or national origin.

- (3) The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.
- (4) The contractor will send to each labor union or representative of workers with which has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- (5) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- (6) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- (7) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- (8) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a contractor becomes involved in, or is threatened

with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: Provided, That if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceeding.

3. Davis-Bacon Act.

If the Contract is a construction contract in excess of two thousand dollars (\$2,000.00) and if required by the applicable federal grant program legislation, Contractor and its subcontractors shall comply with the provisions of the Davis-Bacon Act (40 U.S.C. 276a to 276a-7) as supplemented by Department of Labor regulations (29 CFR Part 5). Contractor and any subcontractors shall insert in any subcontracts the clause above and such other clauses as Federal, State, Local regulations, Laws, and Policies may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontractors. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with all of these contract clauses. A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a contractor and subcontractor as provided in 29 CFR §5.12.

4. Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708).

If the Contract is in excess of \$100,000 and involves the employment of mechanics or laborers, Contractor shall comply with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, a contractor is required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence. If applicable as set forth above, Contractor shall comply with the following provisions:

Compliance with the Contract Work Hours and Safety Standards Act.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of \$26 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The Town shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses

set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

5. Environment Regulations; Clean Air Act; Federal Water Pollution Control Act.

If the Contract is in excess of one hundred fifty thousand dollars (\$150,000.00), Contractor and its subcontractors shall comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387), including Environmental Protection Agency regulations (40 CFR part 15). Contractor will report each violation to the City, and understands and agrees that the Town will, in turn, report each violation as required to assure notification to FEMA and the appropriate Regional Office of the Environmental Protection Agency (EPA). Contractor and its subcontractors shall incorporate these requirements into all subcontracts in excess of one hundred fifty thousand dollars (\$150,000.00).

6. E-Verify Program.

The Contractor shall utilize the U.S. Department of Homeland Security's E-Verify system, in accordance with the terms governing use of the system, to verify the employment eligibility of all new employees hired by the Contractor during the term of the Contract. In addition, Contractor shall require any subcontractors performing work or providing services pursuant to the Contract to verify the employment eligibility of all new employees hired by the subcontractor during the term of the Contract. The Contractor shall provide to the Town, within thirty (30) days of the effective date of this Contract, documentation of such enrollment in the form of a copy of the E-Verify "Edit Company Profile" screen", which contains proof of enrollment in the E-Verify Program (this page can be accessed from the "Edit Company Profile" link on the left navigation menu of the E-Verify employer's homepage). Contractor further agrees that it will require each subcontractor that performs work under this Contract to enroll and participate in the E-Verify Program on the same terms as Contractor. Contractor shall obtain from its subcontractor(s) a copy of the "Edit Company Profile" screen indicating enrollment in the E-Verify Program and make such record(s) available to the Town upon request.

7. Title VI Compliance.

Title VI of the Civil Rights Act, 42 U.S.C. 2000, provides in Section 601, that "No person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving Federal financial assistance." Contractor, for itself, its delegates, successors-in-interest, its assigns, and its subcontractors, and as a part of the consideration hereof, does hereby covenant and agree that:

(i) it shall comply with Section 601 of Title VI of the Civil Rights Act, 42 U.S.C. 2000, set forth above; and

(ii) it shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Contract. The failure by the Contractor to carry out these requirements is a material breach of this Contract, which may result in the termination of this Contract or such

other remedy as the TOWN deems appropriate as set forth below; and

(iii) in the furnishing of services to the TOWN hereunder, no person shall be excluded from participation in, denied the benefits of, or otherwise subjected to discrimination in regard to this Contract on the grounds of such person's race, color, creed, disability, national origin, religion or sex.

Contractor shall comply with all applicable provisions of Title I of the Omnibus Crime Control and Safe Streets Act of 1968, as amended, the Juvenile Justice and Delinquency Prevention Act, or the Victims of Crime Act, as appropriate; the provisions of the current edition of the Office of Justice Programs Financial and Administrative Guide for Grants, M7100.1; and all other applicable Federal laws, orders, circulars, or regulations. In addition, Contractor shall comply with the non-discrimination requirements of the Omnibus Crime Control and Safe Streets Act of 1968, as amended, or Victims of Crime Act (as appropriate); Section 504 of the Rehabilitation Act of 1973, as amended; Subtitle A, Title II of the Americans with Disabilities Act (ADA) (199); Title IX of the Education Amendments of 1972; the Age Discrimination Act of 1975; Department of Justice Non-Discrimination Regulations; and Department of Justice regulations on disability discrimination.

In the event of a breach of any of the nondiscrimination and other covenants described in this paragraph, such breach shall constitute a breach of the Contract and the TOWN shall have the right to immediately terminate the Contract in whole or in part, without liability, or seek such other remedy(ies) as the TOWN deems appropriate, including but not limited to suspension or debarment from future TOWN contracts. In addition to the Town, the United States shall also have the right to enforce such laws and regulations. This nondiscrimination is in agreement with Title VI of the Civil Rights Act of 1964, 78 Stat. 252, 42 U.S.C. 2000d to 2000d-7.

Contractor shall require that all of its subcontractors agree and comply with the requirements of this paragraph.

8. Small, Minority, and Women's Business Enterprises.

Contractor shall comply with the requirements of 2 CFR § 200.321 and take all necessary affirmative steps when subcontracting set forth in § 200.321(b)(1) - (5) to assure that minority businesses, women's business enterprises, and labor surplus area firms are used when possible, including but not limited to placing such firms when qualified on solicitation lists and soliciting them as potential sources whenever possible. The Town requires the prime contractor, if subcontracts are to be let, to take the affirmative steps listed below. These steps include:

- Placing qualified small and minority business and women's business enterprises on solicitation lists;
- Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;
- Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority business and women's business enterprises;
- Establishing delivery schedules where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises;

- Using the services and assistance, as appropriate, of such organizations as the Small Business Administration or the State of Florida Office of Supplier Diversity.

9. Debarment; Ineligibility.

The Contract may not be awarded to a party listed on the governmentwide Excluded Parties List System in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR Part 1986 Comp., p.

189) and 12689 (3 CFR Part 1989., p. 235). By executing the Contract, the Contractor certifies that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from participation in this transaction by any Federal department or agency. Contractor shall not employ any subcontractor that is debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from participation in this transaction by any Federal department or agency. Contractor shall include such requirement in writing in its subcontracts. In the event that Contractor or any of its subcontractors becomes debarred, suspended, proposed for debarment, ineligible or excluded from performing any work hereunder, Contractor shall immediately cease, or cause its sub-contractor to cease, all work and notify the Town in writing. Contractor and its subcontractors shall each execute and submit to the Town prior to performing any work hereunder a debarment certification in the form and content included with the solicitation as Attachment "A". In accordance with State of Florida Division of Emergency Management ("Division") sub-grant requirements which require the inclusion of certain provisions in contracts regarding suspension and debarment, Contractor acknowledges and agrees that:

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

10. Lobbying (Byrd Anti-Lobbying Amendment – 31 U.S.C. 1352).

Contractor shall comply with the requirements of Appendix II to 2 CFR Part 200 regarding lobbying activities related to federal grants and contracts which requires each tier to certify to the tier above it that it will not and has not used federal appropriated funds to pay any person

or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier must also disclose any lobbying with non-federal funds that takes place in connection with obtaining any federal award. Contractor shall include such requirement in writing in its subcontracts. Contractor and its subcontractors shall execute and submit to the Town prior to performing any work hereunder a lobbying certification in the form and content included with the solicitation as Attachment "B". In

accordance with State of Florida Florida Division of Emergency Management ("Division") sub- grant requirements which require the inclusion of certain provisions in contracts regarding the Byrd Anti-Lobbying Amendment, Contractor acknowledges and agrees that:

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

11. American with Disabilities Act of 1990 ("ADA").

Contractor and, as required, its subcontractors shall comply with the ADA, the regulations of the Federal government issued thereunder, and assurance by the Town of Windermere pursuant thereto.

12. American Materials Required for Public Use; Domestic Preference for Procurements.

All unmanufactured and manufactured articles, materials and suppliers which are acquired for public use under the Contract must have been produced in the United States as required under 41 U.S.C. 10a unless it would not be in the public interest or unreasonable in cost. The Town of Windermere requires Contractor to comply with 2 CFR §200.322 "Domestic Preferences for Procurements" in providing goods and services to the Town of Windermere and, as appropriate (taking into consideration such factors as, but not limited to total cost, quality, and availability) and to the extent consistent with law, provide a preference in its performance of this Contract for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products). The requirements of this section must be included in all subawards including all contracts and purchase orders for work or products under this award. For purposes of 2 CFR §200.322 "Produced in the United States" means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States And "Manufactured products" means items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

13. State and Federal Law; Inclusion in Subcontracts.

Contractor and its subcontractors (of all tiers) shall comply with and be bound by the provisions of all applicable federal, state and local laws, rules, regulations, executive orders, licensing requirements, and FEMA policies, procedures, and directives, governing the work performed hereunder, including but not limited to the provisions of 2 CFR Chapter II Part 200 (Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards). In addition, Contractor and its subcontractors (of all tiers) shall comply with all laws, rules and regulations applicable to each program under which the Town is eligible for funding for payment or reimbursement for work performed by the Contractor, including but not limited to The Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 USC 5121), 2 CFR Chapter II Part 200 (Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards), and related regulations contained in Title 44 of the Code of Federal Regulations for disaster relief work. Contractor shall physically incorporate a copy of this Exhibit and all attachments hereto, in all subcontracts of all tiers. In the event of any ambiguity or question by Contractor or any of its subcontractors of any tier regarding the program under which the Town is or will be seeking payment or reimbursement for any work, Contractor shall immediately contact the Town and request clarification from the Town prior to proceeding with the work or authorizing a subcontractor to proceed with such work.

**ORANGE COUNTY UTILITIES
STANDARDS AND CONSTRUCTION SPECIFICATIONS
MANUAL**

Orange County Utilities

STANDARDS and CONSTRUCTION SPECIFICATIONS Manual

October 10, 2021



THIS PAGE INTENTIONALLY LEFT BLANK

Orange County Utilities

STANDARDS AND CONSTRUCTION SPECIFICATIONS MANUAL

Board of County Commissioners

Jerry L. Demings
County Mayor

Nicole Wilson
District 1

Christine Moore
District 2

Mayra Uribe
District 3



**Maribel Gomez
Cordero**
District 4

Emily Bonilla
District 5

Victoria P. Siplin
District 6

Byron Brooks, AICP
County Administrator

Ed Torres, M.S., P.E., LEED AP
Director of Orange County Utilities

Manual Committee
Utilities Field Services Division
Utilities Engineering Division
Utilities Water Division
Utilities Water Reclamation Division

Effective October 10, 2021

Revision Approved by the Director on August 23, 2021

THIS PAGE INTENTIONALLY LEFT BLANK

PREFACE

October 10, 2021

This MANUAL presents Orange County's minimum acceptable standards for the design and construction of water distribution and transmission facilities, wastewater collection and transmission facilities including wastewater pump stations, and reclaimed water distribution and transmission facilities.

It is the sincere hope of the staff that the material presented herein is more readily accessible and up-to-date with the latest and proven technology. The entire process for approval and acceptance of water and water reclamation systems by UTILITIES is clear and timelier. If this has been accomplished, then the many hours of work that went into its preparation will have been worthwhile.

There has been a number of staff involved in the review process and compilation of this MANUAL. UTILITIES would like to recognize some of the staff, with a special thanks to the STANDARDS COMMITTEE, which provided a substantial amount of effort in the development of the MANUAL.

- Orange County Utilities Department: Andres Salcedo, P.E. Deputy Director.
- Engineering Division: Lindy Wolfe, P.E., Manager; Doug Hettrich, P.E.; Brandon Bryant, P.E.; David Arms, P.E.; Kelly Nowell, P.E.; Laura Tatro, P.E.
- Field Services Division: Troy Layton, P.E., BCEE Manager; Brian Matejcek, P.E.; Bryan Hackebeitl; Marc Brown; Tim Jones; Laura Woodbury, P.E.

In addition, UTILITIES would like to provide special recognition to the Appendix D committees for their in-depth technical review and comments regarding Appendix D.

- Field Services Division: Troy Layton, P.E.; Brian Matejcek, P.E.; Bryan Hackebeitl; Marc Brown; Victor Gonzalez; Lorenzo Hunter; Bill Salyers.
- Water Reclamation Division: Kevin Begy; Milton Rodriguez.
- Utilities Fiscal & Admin Support: Jon Smith.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

October 10, 2021

PREFACE

CHAPTER 1 GENERAL INFORMATION

- 1110..... Introduction
- 1111..... Policies and Procedures
- 1112..... Definitions
- 1113..... Abbreviations

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

2100 General

- 2110..... General Submittal Requirements
- 2111..... Project Documents and Submittals
- 2115..... Directional Drilling
- 2116..... Jack and Bore

2200 Water

- 2210..... Water Main Design Standard

2300 Wastewater Collection

- 2310..... Gravity Main Design Standard
- 2311..... Wastewater Force Main Design Standard

2400 Wastewater Pump Stations

- 2410..... Wastewater Pump Station Design Standard

2500 Reclaimed Water

- 2510..... Reclaimed Water Main Design Standard

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

3100 General

- 3110..... General Construction Requirements
- 3111..... Project Record Documents and Submittals
- 3112..... Site Preparations, Surface Removal, and Restoration
- 3113..... Excavations, Backfill, Compaction and Grading
- 3114..... Installation of Pipe
- 3115..... Directional Drilling
- 3116..... Jack and Bore
- 3117..... System Connections
- 3119..... Coatings and Linings

3200 Water

- 3210..... Water Pipes, Valves, and Appurtenances

3300 Wastewater Collection

- 3310..... Wastewater Pipes, Valves, and Appurtenances
- 3311..... Wastewater Manholes
- 3312..... Collection System Bypass
- 3410..... Wastewater Pump Stations

TABLE OF CONTENTS

October 10, 2021

3400 Wastewater Pump Stations
3411..... Submersible Wastewater Pumps
3412..... Wastewater Pump Station Electrical Power & Control System
3413..... SCADA RTU Panel
3510..... Reclaimed Water Pipes, Valves, and Appurtenances
3500 Reclaimed Water
3511..... Reclaimed Water Master Meter Electrical Control Systems

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

4100 General
4110..... General Inspection Requirements
4200 Water
4210..... Testing and Inspection for Acceptance of Water Systems
4300 Wastewater Collection
4310..... Testing & Inspection for Acceptance of Wastewater
Collection and Transmission Systems
4400 Wastewater Pump Stations
4410..... Testing & Inspection for Acceptance of Pump Stations
4500 Reclaimed Water
4510..... Testing & Inspection for Acceptance of Reclaimed Water Systems

TABLE OF CONTENTS

October 10, 2021

APPENDIX A STANDARD DRAWINGS

Table of Contents
General.....A100
Water Distribution.....A200
Wastewater CollectionA300
Wastewater Pump StationA400
Reclaimed Water DistributionA500
Roadway and Utilities Corridor GuidesA900

APPENDIX B FORMS

Pump Station Start-UpB101
Water Main Disinfection Certification.....B102
System ConnectionB103
Pressure Log Test.....B104
Fee Simple Conveyances to OCU by Separate InstrumentB105
Granting Easements to OCU by Separate Instrument.....B106
Bill of Sale (Water, Wastewater, and Water Reclamation Systems)B107
Surety Sample (Bond Template).....B108
Surety Sample (Letter of Credit “LOC” Template)B109

APPENDIX C UTILITY SERVICE AREAS

Water Service AreasC101
Wastewater Service Areas.....C102
Reclaimed Water Service Area.....C103

APPENDIX D PRODUCTS

Approval Process for New ProductsD101
General Information.....D102
List of Approved ProductsD103

APPENDIX E ERU/ERC DESIGN FACTORS

ERU/ERC Design Factors.....E101

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF TABLES AND FIGURES

October 10, 2021

Table #	Description	Section-Page
Table 2111-1:	Minimum Accuracies	2111-1
Table 2210-1:	Minimum Pipe Cover Required for Pipe at Gate Valves	2210-6
Table 2210-2:	Flow and Selection of Meter Size.....	2210-11
Table 2310-1:	Wastewater Peaking Factors	2310-2
Table 2310-2:	Minimum Slope Requirements of Gravity Main.....	2310-3
Table 2310-3:	Minimum Manhole Diameters.....	2310-5
Table 2310-4:	Sizing Requirements for Grease Interceptors.....	2310-8
Table 2410-1:	Required Number of Pumps Based on Peak Design Flow	2410-1
Table 2410-2:	Pump Station Major Component Requirements	2410-4
Table 2510-1:	Reclaimed Water Offsite Service Extension.....	2510-2
Table 2510-2:	Flow and Selection of Reclaimed Water Meter Size	2510-8
Table 3111-1:	Minimum RECORD DRAWING Accuracies per Asset (Water, Wastewater, Reclaimed Water and Existing).....	3111-6
Table 3111-2:	As-Built Asset Attribute Data Table, Examples.....	3111-7
Table 3111-3:	Pipe Deflection Table Example.....	3111-10
Table 3114-1:	Pipe Color	3114-2
Table 3114-2:	Hardware ASTM Standards.....	3114-4
Table 3114-3:	Minimum Pipe Cover.....	3114-7
Table 3115-1:	Minimum Dimension Ratios for PVC Pipe	3115-2
Table 3115-2:	PVC Pipe Deflection Information.....	3115-3
Table 3115-3:	Minimum Dimension Ratios for HDPE Pipe	3115-3
Table 3115-4:	HDPE Pipe Deflection Information (DIP Sizes).....	3115-4
Table 3115-5:	Directional Drilling Rod Average Deflection Information	3115-5
Table 3115-6:	Maximum Pilot or Back-Reamer Diameter	3115-9
Table 3115-7:	Allowance for Make-up Water Under Test Pressure*	3115-11
Table 3116-1:	Casing Pipe Minimal Nominal Diameter and Wall Thickness	3116-2
Table 3119-1:	Color Codes	3119-9
Table 3119-2:	Ferrous Metals System 1 - Zinc / Urethane / Fluoropolymer	3119-10
Table 3119-3:	Ferrous Metals System 2 (Hydrants Only) - Zinc / Epoxy / Urethane	3119-10
Table 3310-1:	Joints for Dissimilar Pipe	3310-2
Table 3310-2:	Gear Maximum Allowable Number of Turns.....	3310-8
Table 3410-1:	Carbon Media Parameters.....	3410-6
Table 3410-2:	Pump Station Block Wall Color.....	3410-13
Table 3410-3:	Pump Hook Size	3410-19
Table 3413-1:	Pump Station SCADA Panel Matrix	3413-1
Table 3511-1:	Wire Color Code	3511-4
Table 4110-1:	UTILITIES' Schedule of Notification(s).....	4110-1

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 1

GENERAL INFORMATION

Section 1110: Introduction

October 10, 2021

PART 1 GENERAL

The Orange County Utilities Department (UTILITIES) Standards and Construction Specifications Manual (MANUAL) identifies minimum design standards and specifications, submittal requirements and approval or acceptance procedures for water, wastewater and reclaimed water systems. The MANUAL applies to water, wastewater and reclaimed water infrastructure to be dedicated, inspected, operated, permitted, owned, maintained and / or utilized to convey flows to or from facilities owned by UTILITIES. The MANUAL shall also apply to but not be limited to: UTILITIES Development (private and public utility infrastructure), and Utilities' Capital Improvement Program projects.

It is not intended that the MANUAL address every situation that may arise. The application of engineering/surveying principles, construction techniques and judgment, combined with the information contained in the MANUAL, are necessary to complete UTILITIES projects and protect the safety, health and welfare of the public. Approval of plans by UTILITIES shall not relieve the designer or developer from required compliance with the provisions of the MANUAL, unless a written variance is received from UTILITIES. The appeal procedures are outlined in "Section 1111, Policies and Procedures".

The MANUAL will be updated no more frequently than annually to address revisions and improvements, such as design criteria, construction techniques, materials, standard drawings, updated procedures for submittals and revised re-inspection fees. The web page, accessed through the County's website, will be utilized for posting the latest MANUAL revisions.

PART 2 ORGANIZATION

This MANUAL is presented in four (4) chapters and five (5) appendices. A summary of the chapters and appendices is provided below to facilitate the use of the MANUAL. Words shown in ALL CAPS are terms that are defined in Section 1112, "Definitions".

- A. Chapter 1 – General Information:** Outlines the policies and procedures and provides definitions and abbreviations used throughout the MANUAL.
- B. Chapter 2 – General Requirements and Design Standards:** Contains the minimum criteria governing the design of water, wastewater and reclaimed water systems to be maintained, operated or served by UTILITIES.
- C. Chapter 3 – Construction Specifications:** This chapter contains detailed technical specifications governing construction of water, wastewater and reclaimed water main facilities to be maintained, operated or served by UTILITIES.
- D. Chapter 4 – Field Testing and Inspection Procedures:** Outlines testing and inspection requirements for acceptance of water, wastewater and reclaimed water systems.
- E. Appendices**
 - 1. Appendix A – Standard Drawings
 - 2. Appendix B – Forms
 - 3. Appendix C – Utility Service Areas

CHAPTER 1

GENERAL INFORMATION

Section 1110: Introduction

October 10, 2021

4. Appendix D – Approval Process for New Products and List of Approved Products
5. Appendix E – ERC /ERU Design Factors

PART 3 ORANGE COUNTY UTILITIES WEB ACCESS

The web page is accessible through the County’s web site at www.ocfl.net. The specifications can be obtained via the UTILITIES’ website at <https://www.orangecountyfl.net/PlanningDevelopment/UtilitiesPlanningandConstruction.aspx>

The MANUAL is available for digital download from the web page. Questions regarding the MANUAL should be emailed to the Standards Committee at Standards.Committee@ocfl.net.

PART 4 SUBMITTALS

Submittals shall be in accordance with Section 2111, “Project Documents and Submittals” and Section 3111, “Project Record Documents and Submittals” as applicable for the specific project.

CHAPTER 1

GENERAL INFORMATION

Section 1111: Policies and Procedures

October 10, 2021

PART 1 GENERAL

- A. These policies and procedures have been established to ensure projects that will be maintained and operated by UTILITIES are reliable, durable and ultimately meet the needs of our customers, the citizens of Orange County and UTILITIES. Items specifically addressed in this Section include the jurisdiction of the MANUAL, the creation of the STANDARDS COMMITTEE, the MANUAL revision procedure, appeal process, clarification in the use of the MANUAL, interpretation of the MANUAL and construction plan approval time limitations.

PART 2 AUTHORITY

- A. This MANUAL has been approved by the COUNTY and accepted as an official standard. The MANUAL shall be enforced, and no part thereof altered without approval of the DIRECTOR.

PART 3 JURISDICTION

- A. This MANUAL shall apply to water, wastewater and reclaimed water infrastructure to be dedicated, inspected, owned, operated, permitted, maintained and / or utilized to convey flows to or from UTILITIES.
 1. The improvements to be dedicated to UTILITIES shall be constructed in compliance with the WATER AND WASTEWATER ORDINANCE, SUBDIVISION REGULATIONS and the SITE DEVELOPMENT ORDINANCES, as amended.
 2. Improvements to be dedicated under the SITE DEVELOPMENT ORDINANCES shall require the DEVELOPER's ENGINEER to submit certification to UTILITIES that the improvements have been constructed substantially according to the approved construction documents. If UTILITIES notifies the DEVELOPER or DEVELOPER's ENGINEER regarding non-compliance with the approved construction documents of faulty materials or workmanship, then such WORK shall be corrected. WORK on the project will be suspended and/or certificate of occupancy withheld if health, safety and welfare of the public are impacted. Laboratory tests (when appropriate) may be required for UTILITIES to review for acceptance.
- B. Privately owned and operated water, wastewater and reclaimed water systems that connect to UTILITIES systems shall be constructed in accordance with the MANUAL, and the construction plans approved by UTILITIES, and shall meet state and federal regulations, as applicable. UTILITIES shall require testing and inspection on private water wastewater, and reclaimed water systems prior to connection.

CHAPTER 1 GENERAL INFORMATION

Section 1111: Policies and Procedures

October 10, 2021

PART 4 STANDARDS COMMITTEE

- A. The STANDARDS COMMITTEE is charged with updating the MANUAL on a periodic basis to propose revisions for the standards, design criteria, construction specifications, drawings, forms, procedures, and systematically evaluate and approve products. The STANDARDS COMMITTEE will be comprised of the managers, or designees, from the Utilities Engineering Division, Water Division, Water Reclamation Division and the Field Services Division.

PART 5 APPEAL PROCESS

- A. The appeal process applies only to private water, wastewater and reclaimed water infrastructure to be dedicated, maintained and / or utilized to convey flows to or from UTILITIES. The appeal process does not apply to UTILITIES Capital Improvement Program projects.
- B. Appeals to STANDARDS COMMITTEE
 1. Any person aggrieved by a decision, relative to this MANUAL, of an individual staff member may appeal such decision to the STANDARDS COMMITTEE. Such appeal shall be made by requesting a hearing in a letter to the STANDARDS COMMITTEE and shall include a summary of the decision being appealed and the basis of the appeal. The STANDARDS COMMITTEE will have fifteen (15) days to render a decision.
- C. Appeals to DIRECTOR
 1. Any person aggrieved by a decision, relative to this MANUAL, of an individual staff member may appeal such decision by STANDARDS COMMITTEE to the DIRECTOR. Such appeal must be made within thirty (30) days by submitting a letter to the DIRECTOR and shall include a summary of the decision being appealed and the basis of the appeal.
- D. Appeals to COUNTY
 1. Any decision of the DIRECTOR may be appealed to the COUNTY by submitting a letter to the DIRECTOR. Such appeal must be made within thirty (30) days of decision by DIRECTOR and shall include a summary of the decision being appealed and the basis of the appeal.

PART 6 MANUAL REVISION PROCEDURE

- A. To meet the needs of UTILITIES and the changes in technology, it is necessary to revise and update the MANUAL on a timely basis. These revisions will be handled administratively under the direction of the DIRECTOR. Such revisions, amendments and additions shall be binding and in full force and effect when published in the manner set forth below.

CHAPTER 1 GENERAL INFORMATION

Section 1111: Policies and Procedures

October 10, 2021

1. Any proposed revisions to this MANUAL will be emailed to REGISTERED HOLDERS of the MANUAL for comment. Recipients of the proposed revisions will have twenty one (21) calendar days to provide written comments to the web site.
 2. Informal workshop(s) will be scheduled to discuss the proposed revisions. All REGISTERED HOLDERS of this MANUAL will receive electronic mail notification of scheduled workshops.
 3. After at least one (1) workshop, the UTILITIES' staff will recommend revisions in the best interest of UTILITIES and note dissenting viewpoints to the DIRECTOR for action.
 4. Proposed revisions will be posted on the web site for a period of sixty (60) calendar days prior to the DIRECTOR taking action.
 5. All proposed revisions approved by the DIRECTOR would become part of the MANUAL.
 6. The revisions will be described on the web site and the registered holders of the MANUAL will be notified in a timely manner by electronic mail of the effective date of the change. The effective date of such revisions shall be thirty (30) calendar days from the date of approval and shall supersede the MANUAL.
- B. The STANDARDS COMMITTEE has strived to develop a MANUAL that is free from imperfections. Whenever errors or conflicts occur that can impact the public health, safety and welfare, environment, or in the best interests of UTILITIES, a recommendation will be forwarded to the DIRECTOR for approval of a revision to resolve or remove the conflict. The effective date for this type of revision will be the date of the approval by the DIRECTOR. REGISTERED HOLDERS will be notified of the change in a timely manner via electronic mail.
- C. As changes or revisions are made, it will be each REGISTERED HOLDER's responsibility to maintain a current MANUAL.

PART 7 PRODUCT APPROVAL PROCESS

- A. The product approval procedure is described in Appendix D.

PART 8 CLARIFICATION IN THE USE OF CHAPTERS 2, 3, AND APPENDIX A

- A. Chapter 2 "General Requirements and Design Standards," Chapter 3 "Construction Specifications" and Appendix A "STANDARD DRAWINGS" are provided as minimum criteria to assist consulting ENGINEERS in the development of the design documents. This MANUAL shall not be used as a substitute for actual design. The applicable STANDARD DRAWINGS shall be used as presented, however UTILITIES may accept modifications on a case-by-case basis.

CHAPTER 1 **GENERAL INFORMATION**

Section 1111: Policies and Procedures

October 10, 2021

PART 9 INTERPRETATION OF THE MANUAL

- A. The UTILITIES' interpretation of the MANUAL shall be binding and controlling for any portion of the MANUAL, differences between sections, or a controlling supplemental specification such as federal, state, or COUNTY regulations.

PART 10 CONSTRUCTION PLAN TIME LIMITATIONS

A. Plan Submittal

- 1. Construction PLANS submitted for review shall comply with the latest approved version of the MANUAL at the time of initial plan submittal as long as PLANS are approved within 180 days from initial submittal.
- 2. If approval is not obtained within 180 days from initial submittal, the construction PLANS shall be consistent with the latest approved version of the MANUAL.

B. APPROVED CONSTRUCTION PLANS

- 1. Commencement of construction shall be within one (1) year of the date of construction PLAN approval.
- 2. If construction has not commenced within one (1) year of construction PLAN approval, an extension may be granted by the COUNTY. If no extension has been approved, documents must be resubmitted for approval and shall meet the current requirements of the MANUAL in effect at the time resubmitted.

CHAPTER 1

GENERAL INFORMATION

Section 1112: Definitions

October 10, 2021

Except where specific definitions are used within a specific MANUAL section, the following terms, phrases, words and their derivation shall have the meaning given herein when consistent with the context in which they are used. Words used in the present tense include the future tense, words in the plural number include the singular number and words in the singular number include the plural number. **The word “shall” is mandatory, and the word “may” is permissive.**

AASHTO: American Association of State Highway and Transportation Officials. Any reference to AASHTO standards shall mean latest edition.

ANSI: American National Standards Institute. Any reference to ANSI standards shall mean latest edition.

APPROVED CONSTRUCTION PLANS: Plans permitted by UTILITIES to be constructed.

ARCHITECT: Architect registered with the State of Florida Department of Business and Professional Regulation to provide professional architectural services.

ASTM: American Society for Testing Materials. Any reference to ASTM standards shall mean latest edition.

AS-BUILT SURVEY: SURVEYOR shall obtain field measurements of vertical and horizontal dimensions of constructed improvements so that the constructed facilities can be delineated in such a way that the location of the construction may be compared with the construction PLANS. A coordinate asset table shall be provided and certified by the SURVEYOR (Refer Table 3111-2 Coordinate Asset Table and Table 3111-1 Minimum RECORD DRAWING Accuracies per Asset). An as-built map is not required.

AWWA: American Water Works Association. Any reference to AWWA Standards shall mean latest edition.

BOUNDARY SURVEY: Boundary survey, map and report certified by a SURVEYOR that meets the requirements of Chapter 61G17-6 ‘Minimum Technical Standards,’ FAC.

CIP: UTILITIES Capital Improvement Program.

CLEAR ZONE: The open space between all structures encompassing the utility easement and right-of-way. (Refer to the 900 series STANDARD DRAWINGS for visual representation).

COUNTY: Orange County Board of County Commissioners, Orange County, Florida.

CONTRACTOR: Person, firm, or corporation licensed by the State of Florida pursuant to F.S. Ch 489 with whom the contract for work has been made for the OWNER, the DEVELOPER or UTILITIES.

CHAPTER 1

GENERAL INFORMATION

Section 1112: Definitions

October 10, 2021

DDCVA: Double detector check valve assembly.

DEVELOPER: Person, firm, or corporation engaged in developing or improving real estate for use or occupancy.

DIGITAL UTILITY PLAN: For approvable construction projects, a digital utility plan of the affected construction area shall be submitted in encompassing digital file(s) for importing into UTILITIES GIS. The digital file includes existing, new or altered structures in the work area, geodetic control and survey data.

DIRECTOR: Director of UTILITIES or the designated representative.

DRY LINE: A constructed distribution, collection, or transmission system serving an infrastructure project for future development with no additional flows at time of utility system construction; per Chapter 403, Florida Statutes (F.S.), and Chapters 62-4 and 62-604, Florida Administrative Code (F.A.C.).

ENGINEER: Person or firm that is licensed by the State of Florida as a professional engineer pursuant to F.S. Ch 471.

FAC: Florida Administrative Code.

FDEP: Florida Department of Environmental Protection.

FDOT: Florida Department of Transportation.

FS: Florida Statutes

IEC: International Electrotechnical Commission. Any reference to IEC shall mean latest edition.

LOCAL ROADWAY: Public right-of-way roadways that include residential driveway connections serving single family residences and are not classified as private roads, interstate, freeway, expressway, arterial or collector, per Federal Highway Administration.

MANUAL: Orange County Utilities Standards and Construction Specifications Manual (including current revisions).

MASTER PLAN: A document prepared by an ENGINEER that demonstrates that the proposed water, wastewater, and/or reclaimed water system has been hydraulically modeled and designed to meet UTILITIES standards.

MULTI-FAMILY: Includes apartments, condominium, student housing, etc. They are often built on a single-lot and subdividing is not usually necessary.

CHAPTER 1

GENERAL INFORMATION

Section 1112: Definitions

October 10, 2021

NON-LOCAL ROADWAY: All Public right-of-way roadways not meeting the definition of LOCAL ROADWAYS.

NEMA: National Electrical Manufacturers Association. Any reference to NEMA Standards shall be the latest edition.

NORMAL WORKING DAY: Monday through Friday, excluding COUNTY holidays.

NORMAL WORKING HOURS: Hours are between the hours of 8:00 a.m. to 5:00 p.m. of a NORMAL WORKING DAY.

NSF: National Sanitation Test Laboratory Foundation. Any reference to NSF Standards shall be the latest edition.

OCU: Orange County Utilities (See UTILITIES for definition).

OWNER: Person, firm, corporation, or governmental unit holding right of possession of the real estate upon which construction is to take place.

PLANS: Drawings prepared by an ENGINEER or ARCHITECT to show the proposed construction.

PRIVATE GRAVITY SYSTEMS: Wastewater collection systems that are not owned, operated or maintained by UTILITIES.

PUBLIC WORKS: Public Works Department of the Orange County Board of County Commissioners, Orange County, Florida.

RECLAIMED WATER REGULATIONS: In accordance with the most current edition of Chapter 37 of the Orange County Code, as such provisions may be periodically amended.

RECLAIMED WATER SYSTEM: Reclaimed water transmission and distribution piping, pump stations, fittings, valves, services, meters and miscellaneous related appurtenances.

RECORD DOCUMENTS: Including but not limited to AS-BUILT SURVEY, RECORD DRAWINGS, BOUNDARY SURVEY, digital asset table, deflection table, scanned PDF of signed and sealed documents, AutoCAD compatible drawings and all hard copy and digital documents as outlined in Section 3111.

RECORD DRAWINGS: Modified APPROVED CONSTRUCTION PLANS - depicting and incorporating the AS-BUILT SURVEY horizontal and vertical locations of installed utilities for the completed WORK with an equivalent level of detail in format, content, style, scale, page layout, disciplines, appearance, etc. as the APPROVED CONSTRUCTION PLANS. RECORD DRAWINGS shall be certified (signed and sealed) by the ENGINEER.

CHAPTER 1

GENERAL INFORMATION

Section 1112: Definitions

October 10, 2021

REGISTERED HOLDERS: Users of the MANUAL that have provided current email information to the STANDARDS COMMITTEE so they may be notified of pending revisions to the MANUAL.

RIGHT-OF-WAY UTILIZATION REGULATIONS: In accordance with “Article VI, ‘Right-Of-Way Utilization Regulations,’ Chapter 21, Orange County Code,” as such provisions may be periodically amended.

ROAD CONSTRUCTION SPECIFICATIONS: Orange County Road Construction Specifications, latest edition.

SAMPLES: Physical examples of materials, equipment, or workmanship that are representative of some portion of the WORK and which establish the standards by which such portion of the WORK will be judged.

SHOP DRAWINGS: All drawings, diagrams, illustrations, schedules, and other data or information, which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the WORK.

SITE DEVELOPMENT ORDINANCES: Those portions of “Chapter 30, ‘Planning and Development’, Orange County Code” and “Chapter 38, ‘Zoning,’ Orange County Code” that are applicable to UTILITIES design and construction.

SPECIFIC PURPOSE SURVEY: Survey, map, and report certified by a SURVEYOR of an easement with water, wastewater, and/or reclaimed water pipes maintained by UTILITIES and meets the requirements of Chapter 61G17-6 ‘Minimum Technical Standards,’ FAC. The report shall describe the locations where the pipe centerline was not constructed within two feet of the centerline of the easement.

STANDARDS COMMITTEE: Committee whose voting members shall consist of the manager, or their designee, of the following UTILITIES divisions: Engineering, Water, Water Reclamation and Field Services. The committee evaluates and proposes revisions for the design standards, specifications, drawings, products and procedures for the MANUAL.

STANDARD DRAWINGS: Detailed drawings contained in Appendix A of this MANUAL related to water, wastewater and reclaimed water system materials and installation.

STANDARD FDOT SPECIFICATIONS: State of Florida Department of Transportation, Standard Specifications for Road & Bridge Construction, latest edition.

SUBCONTRACTOR: An individual or entity licensed by the State of Florida pursuant to FS Ch 489, having a direct contract with CONTRACTOR or with any other subcontractor for the performance of a part of the WORK.

CHAPTER 1

GENERAL INFORMATION

Section 1112: Definitions

October 10, 2021

SUBDIVISION REGULATIONS: “Chapter 34, ‘Subdivisions Regulations,’ Orange County Code,” as such provisions may be periodically amended.

SURVEYOR: A person licensed by the State of Florida as a professional surveyor and mapper pursuant to Chapter 472, F.S.

TOWNHOME: Single family attached dwelling unit with a fee simple lot. This type of ownership is where the owner owns the unit and the lot. .

TRAFFIC CONTROL AND SAFE PRACTICES MANUAL: Florida Department of Transportation Manual on Traffic Control and Safe Practices for Street and Highway Construction, Maintenance and Utility Operation and the Manual of Uniform Traffic Control Devices (MUTCD), latest editions.

UTILITIES: Utilities Department of the Orange County Board of County Commissioners, Orange County, Florida, and/or its designated representative(s).

UTILITY ACCOMMODATION GUIDE: State of Florida Department of Transportation Utility Accommodation Guide, latest edition.

WASTEWATER SYSTEM: Wastewater transmission pipes including gravity sewers and force mains, wastewater pump stations, fittings, valves, service laterals and miscellaneous related appurtenances.

WATER AND WASTEWATER ORDINANCE: “Chapter 37, ‘Water and Wastewater,’ Orange County Code,” as such provisions may be periodically amended.

WATER SYSTEM: Water transmission and distribution pipes, water pump stations, fittings, valves, hydrants, services, meters and miscellaneous related appurtenances.

WORK: Labor, materials, equipment, supplies, services and other items necessary for the execution, completion and fulfillment of the APPROVED CONSTRUCTION PLANS.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 1

GENERAL INFORMATION

Section 1113: Abbreviations

October 10, 2021

The following is a listing of primary abbreviations used in this MANUAL.

A

AASHTO	American Association of State Highway and Transportation Officials
AC	asbestos cement pipe
AC	alternating current
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AMCA	Air Conditioning and Mechanical Contractors Association
amp	ampere
ANSI	American National Standard Institute Inc
ARV	air release valve
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society of Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association

B

BLDG	building
BM	benchmark
BMP	Best Management Practices
BT	buried telephone cable

C

CCTV	closed circuit television
CD-R	compact disc
cfm	cubic feet per minute
CGB	circuit group blocking message
CGP	Construction General Permit
CIP	cast iron pipe or Capital Improvement Program
CIPP	cured in place pipe
CLF	chain link fence
CMP	corrugated metal pipe
CMU	concrete masonry unit
CO	clean out
CONC	concrete
CPU	central processing unit
CSA	Canada Standards Association
CTU	central telemetry unit

CHAPTER 1

GENERAL INFORMATION

Section 1113: Abbreviations

October 10, 2021

D

db	decibels
DC	direct current
DCCA	Directional Crossing Contractors Association
deg	degree
DFT	dry film thickness
dia	diameter
DIP	ductile iron pipe
DIPRA	Ductile Iron Pipe Research Association
dpi	dots per inch
DR	Dimension Ratio
DRI	Development of Regional Impact
DVD	digital video disc/digital versatile disc
DW	driveway
dwg	AutoCADD file format
dxf	data exchange file

E

EOP	edge of pavement
EPA	United States Environmental Protection Agency
EPROM	erasable programmable read-only memory
ERC	Equivalent Residential Connection
ERU	Equivalent Residential Unit

F

FAC	Florida Administrative Code
FCC	Federal Communications Commission
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FH	fire hydrant
FIFO	“first-in”, “first-out” memory or field inspection field office
FIG	figure
FIP	female iron pipe
FLG	flange
FM	forcemain
FOC	fiber optic cable
fps	feet per second
FS	Florida Statute
FRP	fiber reinforced plastic
ft	foot
ft-lb	foot-pound

CHAPTER 1

GENERAL INFORMATION

Section 1113: Abbreviations

October 10, 2021

G

GIS	Geographic Information System
gpd	gallons per day
gpm	gallons per minute
GPS	Global Positioning System
GSP	galvanized steel pipe
GV	gate valve

H

HARN	Horizontal Accuracy Reference Network
HDD	horizontal directional drilling
HGL	Hydraulic Grade Line
HDPE	high-density polyethylene
HMI	human machine interface
HORIZ	horizontal

K

Kv	kilovolt
KVA	kilovolt-ampere
Kw	kilowatts

I

ID	identification number
ID	inside diameter
IEEE	Institute of Electrical and Electronics Engineers
I/O	input/output
IPS	iron pipe size
ISA	Instrument Society of America
ISO	International Standards Organization

L

LCD	liquid crystal display
LF	linear feet
LPA	Planning and Zoning Board (Local Planning Agency)
LUP	Land Use Plan

CHAPTER 1

GENERAL INFORMATION

Section 1113: Abbreviations

October 10, 2021

M

ma	milliamps
MAX	maximum
MGD	millions gallons per day
MH	manhole
MHF&C	manhole frame and cover
MHz	megahertz
mil	millionths
MJ	mechanical joint
mpd	minutes per day
MPEG	digital video file format
ms	millisecond
MS4	Municipal Separate Storm Sewer System

N

NACE	National Association of Corrosion Engineers
NASSCO	National Association of Sewer Service Companies
NCPI	National Clay Pipe Institute
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NETA	International Electrical Testing Association
NFPA	National Fire Protection Association
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
NPT	National Pipe Thread
NSF	National Sanitation Test Laboratory Association

O

OC	on center
OCU	Orange County Utilities
OD	outside diameter
ODBC	open database connectivity
OMB	Office of Management and Budget
OS&Y	outside screw and yoke
OSHA	Federal Occupational Safety and Health Administration
OUC	Orlando Utilities Commission

CHAPTER 1

GENERAL INFORMATION

Section 1113: Abbreviations

October 10, 2021

P

PACP	Pipeline Assessment Certification Program
PCCP	pre-stressed concrete cylinder pipe
PD	Planned Development
PDF	Adobe Acrobat file format
PL	property line
PLC	programmable logical controller
ppb	parts per billion
ppm	parts per million
PRIV	private asset
PRV	pressure regulating or reducing valve
psf	pounds per square foot
psi	pounds per square inch
PSP	Preliminary Subdivision Plan
PV	plug valve
PVC	polyvinylchloride pipe

R

RAM	random access memory
REQ'D	required
RJ	restrained joint
ROW	right-of-way
RPBA	reduced-pressure principle, backflow assembly
RTK	real-time kinematic
RTD	real-time differential
RTU	radio telemetry unit

S

SCADA	Supervisory Control and Data Acquisition
SDS	Safety Data Sheets
SSO	sanitary sewer overflow
SQ	square
SST	stainless steel
SWPPP	Stormwater Pollution Prevention Plan

T

TBM	temporary benchmark
TCP/IP	transmission control protocol/internet protocol
THW	thermoplastic heat and water-resistant insulated wire (UL)
THWN	thermoplastic heat and water-resistant nylon coated wire (UL)
TIFF	tagged image file format
TVSS	transient voltage surge suppressor
TYP	typical

CHAPTER 1 **GENERAL INFORMATION**

Section 1113: Abbreviations

October 10, 2021

U

UL	Underwriters Laboratories Inc
USC/FCCC&HR	University of Southern California/Foundation for Cross- Connection Control and Hydraulic Research
USGS	United States Geological Survey
UV	ultraviolet light

V

VAC	volt-alternating current
VCP	vitriified clay pipe
VDC	volt-direct current
VFD	variable frequency drive

W

WM	water main
WSF	wood stockade fence
WWF	welded wire fabric

Y

yd	yard
----	------

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2110: General Submittal Requirements

October 10, 2021

PART 1 GENERAL

1.01 Overview

- A. This Section covers water, wastewater and reclaimed water improvements that are constructed in compliance with SITE DEVELOPMENT ORDINANCES, and SUBDIVISION REGULATIONS, as amended, and are dedicated to UTILITIES. Such water, wastewater and reclaimed water improvements shall be designed, reviewed, constructed and accepted in accordance with the criteria established in this MANUAL.

1.02 Design and Plan Review

- A. Design of water, wastewater and reclaimed water improvements associated with COUNTY approved subdivisions shall be in compliance with Chapter 2 – “General Requirements and Design Standards”, and Chapter 3 – “Construction Specifications” of this MANUAL. PLANS will be reviewed and approved by UTILITIES as part of the subdivision or commercial site plan review process. Refer to SUBDIVISION REGULATIONS, and SITE DEVELOPMENT ORDINANCES for other requirements governing plan review and approval.

1.03 Compliance with Other Regulatory Requirements

- A. It shall be the responsibility of the DEVELOPER/CONTRACTOR to obtain and comply with all applicable federal, state and local regulatory permits. All development projects shall be subject to “Chapter 21, ‘Highways, Bridges and Miscellaneous Public Places’, Orange County Code”.
- B. For all projects greater than or equal to an acre in size (including work area, stockpile, lay-down area) the DEVELOPER/CONTRACTOR shall file and pay for a Notice of Intent (NOI) to use Generic Permit for Stormwater Discharge from Large and Small Construction Activities from FDEP, comply with the conditions and requirements of the Generic Permit, prepare and follow a Stormwater Pollution Prevention Plan (SWPPP) and upon final stabilization of the work, submit a Notice of Termination (NOT) for the project.

<http://www.dep.state.fl.us/water/stormwater/npdes/construction1.htm>

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2111: Project Documents and Submittals

October 10, 2021

PART 1 GENERAL

1.01 Overview

- A. This Section outlines the project documents that are required to be submitted for review and approval of PLANS for utility improvements to be connected to UTILITIES' infrastructure.
- B. **NOTE:** All forms are located on the Orange County Utilities Department website at <http://www.ocfl.net/PlanningDevelopment/UtilitiesPlanningandConstruction>

1.02 Project Documents

- A. The COUNTY has adopted geographic information system (GIS) technologies to store, manage and maintain geographic/spatially-related data. Likewise, the majority of the civil engineering community has evolved to the point where the predominating design environment is computer aided design and drafting (CAD). This Section includes standards to ensure consistent electronic and paper deliverables.

1.03 Survey Control and Datum

- A. Drawings shall be geographically registered in the Florida State Plane Coordinate System, East Zone.
- B. A SURVEYOR shall set all project control (horizontal and vertical) as shown on the Project Plans within the limits of the WORK.
 1. Horizontal Datum: Florida State Plane System, Florida East Zone, North American Datum of 1983, (2011 Adjustment)
 2. Vertical Datum: North American Vertical Datum of 1988 (NAVD)
- C. In the event there is a State Statute change and/or an updated Datum shift, all procedures must follow current Datum standards as approved by the COUNTY. Changes in State Statues or Datum may not be made to this MANUAL, concurrently. If unsure or not certain of possible changes to Statue or Datum, please contact UTILITIES.

Table 2111-1: Minimum Accuracies

Asset	Horizontal Accuracy (feet)	Elevation Accuracy (feet)	Location: horizontal center and vertical top, unless otherwise specified
Bench Marks	N/A	0.01	Point
Horizontal Control	0.01	N/A	Point
Baseline Control	0.01	0.01	Point

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2111: Project Documents and Submittals

October 10, 2021

1.04 Soil Borings and Subsurface Investigations

- A. All existing utilities shall be field verified (vertically and horizontally) at all points of connection and at all areas of conflict with UTILITIES infrastructure prior to PLAN approval.
- B. The ENGINEER shall examine the site and undertake subsurface investigations including soil borings before commencing the WORK. UTILITIES will not be responsible for presumed or existing soil conditions in the WORK area.

PART 2 HYDRAULIC GRADE LINE (HGL)

2.01 Overview

- A. The purpose of an HGL letter is to obtain tie-in pressures, system requirements, and connection locations needed to perform hydraulic calculations.

2.02 Submittal Requirements

- A. Submit a written request to Orange County Utilities (HGL.Requests@ocfl.net) for hydraulic grade line elevation in order to properly design the water, wastewater, and/ or reclaimed water system for your project.
 1. For water and reclaimed water systems, include:
 - a. Fire flow demand. (water requests only)
 - b. Average day demand,
 - c. Maximum day demand (water requests only)
 - d. Peak hourly demand.
 - e. Location of your proposed connection point. Provide a sketch with an address or parcel ID.

Note: Result of Fire hydrant flow test(s) are not to be used for MUP HGL calculations. Contact the Field Support Center (FSC) at (407) 836-6818 or send an email to UD-FSC@ocfl.net to schedule a fire hydrant flow test.

2. For wastewater systems, include:
 - a. Average daily flow.
 - b. Peak hourly flow.
 - c. Location of proposed connection point. Provide a sketch with an address or parcel ID.
 - d. Request for pressure at the connection location.
- B. UTILITIES will provide the results of a hydraulic modeling analysis on an individual basis upon receipt of a written request from the applicant.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2111: Project Documents and Submittals

October 10, 2021

- C. Submit requests via email or mail to the address provided below. Allow a minimum of ten (10) business days for analysis and response. HGL letters shall expire after two (2) years and a new HGL letter shall be requested.

Utilities Engineering Division/Planning Section
9150 Curry Ford Road, Orlando, Florida 32825
Phone: 407-254-9900
Email: HGL.Requests@ocfl.net

PART 3 MASTER PLAN

3.01 Overview

- A. For projects that propose to construct public water, wastewater, and/or reclaimed water infrastructure, a MASTER PLAN for water, wastewater and/or reclaimed water is required.
- B. The MASTER PLAN is prepared by an ENGINEER and demonstrates that the proposed water, wastewater, and/or reclaimed water system has been hydraulically designed to meet UTILITIES standards.
- C. Master plans must be submitted to UTILITIES a minimum of 30 days prior to the construction plan submittal and must be approved by UTILITIES and fees paid by the DEVELOPER prior to construction plan approval.
- D. The PLANS shall be consistent with an approved MASTER PLAN. If the plans are not consistent with an approved MASTER PLAN, the DEVELOPER shall submit a revised and updated MASTER PLAN.
- E. The MASTER PLAN shall be signed, sealed and dated by an ENGINEER.
- F. For projects that propose private infrastructure, hydraulic calculations may be submitted with the construction plan submittal. Hydraulic calculations shall, at minimum, follow the same requirements as a MASTER PLAN.

3.02 Submittal Requirements

- A. Hardcopy submittal
 1. One (1) letter of transmittal with description of submittal items and quantity of each item.
 2. One (1) copy of the MASTER PLAN sufficiency checklist.
 3. One (1) signed and sealed hardcopy MASTER PLAN.
 4. Hardcopy signature and seal shall follow the requirements of Chapter 61G15-23, F.A.C.
- B. Electronic submittal
 1. One (1) letter of transmittal with description of submittal items and quantity of each item.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2111: Project Documents and Submittals

October 10, 2021

2. One (1) copy of the submittal form.
3. Electronic files shall be in a format and submitted in a manner acceptable to the COUNTY.
4. Digital signature and seal shall follow the requirements of Chapter 61G15-23, F.A.C.

3.03 Content

- A. Narrative – provide a narrative that includes a description, location, existing conditions. Executive summary of hydraulic model results. One narrative for all, or individual narratives for water, wastewater, and/or reclaimed water. Describe phases. Refer to approved Land Use Plan, LUP.
- B. Exhibits – provide a separate exhibit for the water, wastewater, and/or reclaimed water system superimposed on a project map. Include junctions, pipes, pumps, and reservoirs labeled to correlate with the calculations. Provide a separate exhibit showing the gravity system layout. Include manholes, mains, and lift station(s). Each exhibit shall include:
 1. Minimum scale of one (1) inch equals two hundred (200) feet using a standard engineering scale
 2. Topography (1 foot contours preferred)
 3. Existing and proposed public roads
 4. Lines indicating planned development phasing (include existing, proposed and future development)
 5. Existing/proposed improvements in sufficient detail for demonstration of design intent
- C. Identity of utilities service providers
- D. A copy of the latest approved LUP, or equivalent
- E. Demand tables – See below.
- F. Hydraulic models – See below. Provide a hydraulic model for water, wastewater and reclaimed water. Provide a gravity depth and capacity analysis.
- G. HGL letter – Include an HGL letter provided by UTILITIES.
- H. For electronic submittals, provide bookmarks in each major section of the PDF, including, but not limited to: Water, Wastewater, Reclaimed Water, Exhibits and HGL Letter.

3.04 Water

- A. Demand Tables
 1. In tabular format, provide a summary of the water demands of each unit or tract (existing, proposed and future). Include type of use (single-family residential, multi-family residential, restaurant, office, warehouse, hospital,

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2111: Project Documents and Submittals

October 10, 2021

other commercial, etc.), number of ERCs, average, max, and peak flows, and fire flows.

2. Unit flows shall be calculated based on the factors found in Appendix E, “ERC/ERU Design Factors”.
3. Calculations for water demand shall be based on projected ultimate buildout.

B. Hydraulic Model

1. Hydraulic model shall include a pipe network analysis for flow and pressure distribution. A model nodal diagram (separate from exhibit) shall be provided.
2. Hydraulic model shall include entire system up to the location of the HGL as provided in the HGL letter.
3. Include scenario(s) that reflects existing, proposed, and future units or tracts by construction phases.
4. Provide max day plus fire flow and peak hour flow models for each scenario.
5. Include all hydraulically dependent development.
6. A minimum of one (1) velocity analysis with worst case scenario fire flow applied per each phase.

3.05 Wastewater

A. Demand Tables

1. In tabular format, provide a summary of the wastewater demands of each unit or tract (existing, proposed and future) to each pump station. Include type of use (single-family residential, multi-family residential, restaurant, office, warehouse, hospital, other commercial, etc.), number of ERUs, average and peak flows.
2. Unit flows shall be calculated based on the factors found in Appendix E, “ERC/ERU Design Factors”.
3. Calculations for wastewater demand shall be based on projected ultimate buildout.

B. Hydraulic Model

1. Hydraulic model shall include a gravity depth and capacity analysis that illustrates pipe sizes and slopes can accommodate peak flows for buildout condition.
2. Hydraulic model shall include lift station design calculations that design pumps versus system head, including, but not limited to, force main sizing within the wet well and downstream to point of connection. Two models are required for each phase of development:
 - a. High head model shall include force main up to the point of connection, or HGL location, as specified in the HGL letter.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2111: Project Documents and Submittals

October 10, 2021

- b. Low head (runout) model shall include force main up to the next pump station or gravity manhole downstream.
 - c. Include scenario(s) that reflects existing, proposed, and future units or tracts by construction phases.
 - d. Provide peak hour flow models for each scenario.
 - e. Include all hydraulically dependent development.
3. A model nodal diagram (separate from exhibit) shall be provided.
 4. Hydraulic model shall include a pipe network analysis for flow and pressure distribution when multiple pump stations manifold.

3.06 Reclaimed Water

A. Demand Tables

1. In tabular format, provide a summary of the reclaimed water demands of each unit or tract (existing, proposed and future). Include type of use (single-family residential, multi-family residential, restaurant, office, warehouse, hospital, other commercial, etc.), average and peak flows.
2. Calculations for reclaimed water demand shall be based on projected ultimate buildout,.

B. Hydraulic Model

1. Hydraulic model shall include a pipe network analysis for flow and pressure distribution. A model nodal diagram (separate from exhibit) shall be provided.
2. Hydraulic model shall include entire system up to the location of the HGL as provided in the HGL letter.
3. Include scenario(s) that reflects existing, proposed, and future units or tracts by construction phases.
4. Provide peak hour flow models for each scenario.
5. Include all hydraulically dependent development.

PART 4 CONSTRUCTION PLANS

4.01 Overview

- A. The PLANS shall present a clear scope of work, which will define the scope of the associated construction permit. The scope shown on the PLANS must match the scope of the FDEP permit and follow the phasing and intent in the approved MASTER PLAN and hydraulic design calculations. The scope of the PLANS will also be the scope encompassed by the UTILITIES and FDEP certificates of completion and the RECORD DRAWINGS. Once a project is under construction, changes in scope will require a revision to the APPROVED CONSTRUCTION PLANS to be resubmitted to UTILITIES for review.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2111: Project Documents and Submittals

October 10, 2021

- B. Typical line types and callouts shall be utilized to distinguish between existing and proposed utilities, structures, roads, etc. Future facilities to be constructed under a different permit or in a future phase, if shown, shall be identified as not part of the current permit using distinguishing line types with callouts such as “future by others”, “not in contract”, or similar language. A COUNTY permit number shall be called out on the plans for existing and future facilities, when known.
- C. PLANS shall be signed, sealed and dated by the ENGINEER.
- D. One copy of the CONSTRUCTION PLAN sufficiency checklist
- E. The Engineer shall provide digital plan and profile CAD drawings to the Contractor/ Surveyor for the creation of the AS-BUILT SURVEY which may aid in the formatting of the final RECORD DRAWINGS.

4.02 Submittal Requirements

- A. Hardcopy submittal
 - 1. One (1) letter of transmittal with description of submittal items and quantity of each item.
 - 2. One (1) signed and sealed hardcopy PLANS.
 - 3. Hardcopy signature and seal shall follow the requirements of Chapter 61G15-23, F.A.C.
- B. Electronic submittal
 - 1. One letter of transmittal with description of submittal items and quantity of each item.
 - 2. One digitally signed and sealed PLANS.
 - 3. Electronic files shall be in a format and submitted in a manner acceptable to the COUNTY.
 - 4. Digital signature and seal shall follow the requirements of Chapter 61G15-23, F.A.C.

4.03 Content

- A. Overview
 - 1. Drawings shall show and call-out location of underground and above ground water, wastewater and reclaimed water piping and related appurtenances within the project area.
 - 2. All main extensions, in the ROW or easement shall extend along the frontage of the property to the midpoint of the property, or to a distance of ten (10) feet beyond the furthest driveway serving the property, whichever is greater.
 - 3. Details of connection to the existing, field verified system. Show in a detail drawing proposed fittings and restraints.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2111: Project Documents and Submittals

October 10, 2021

4. Existing and proposed ROW lines, property lines and utility easement boundaries. Distinguish between existing and proposed utility easements, show and call-out as public or private. Provide book and page numbers for existing easements.
5. The drawings shall provide sufficient information for the calculation of capital charges in accordance with APPENDIX E, “ERU/ERC Design Factors”.

B. CAD Standards

1. PLANS shall be formatted to a standard size sheet (22 inches by 34 inches) and have a title block.
2. The PLANS shall include a legend defining the meaning of all line types and symbols used on the PLANS.
3. General information such as north arrow, name of ENGINEER, revision block with dates, graphic scale(s) and sheet number shall be included on every sheet (north arrow and scale may be left off the detail sheets).
4. Graphic scale(s) shall be provided on each sheet and lettering shall be 11 point or larger.
5. Special details shall be of sufficiently large scale to show pertinent construction information.

C. Plan Set Requirements

1. Cover Sheet
 - a. Cover sheet shall include a vicinity map and an index to drawings. If there are more than three (3) profile sheets, include a key map sheet and key map on each sheet to identify the plan and profile sheet numbers. The project number shall be included upon assignment. Include contact information for owner, developer, surveyor, engineer, etc.
2. Existing Conditions Plan (Survey)
 - a. See Survey Requirements below.
3. Overall Utilities Plan
 - a. The overall utilities plan shall be on a separate sheet and include Needed Fire Flow requirements.
 - b. The overall utilities plan shall be prepared at a scale not to exceed one (1) inch equals one hundred (100) feet.
 - c. Meter bank details for water and reclaimed water services shall be included on the overall utilities plan or on a separate sheet.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2111: Project Documents and Submittals

October 10, 2021

4. Plan and Profile sheets
 - a. WATER, WASTEWATER AND RECLAIMED WATER SYSTEMS shall be shown on the same plan and profile sheets. As a minimum, PLANS shall include the following information:
 - i. Gravity sewers, force mains, water mains, and reclaimed water mains shall be drawn in plan and profile, including existing and proposed utility locations and elevations.
 - ii. Plan and corresponding profile shall be on the same sheet. The profile shall be vertically aligned at the beginning station or left match line for each sheet.
 - iii. Plan and profile sheets must be legible and shall not exceed a scale of one (1) inch equals forty (40) feet horizontally and one (1) inch equals four (4) feet vertically.
 - iv. Horizontal and vertical scale shall be called out on profile view.
 - v. Utilities infrastructure to be privately owned may be shown in plan view only.
 - vi. Cross sections shall be required for conflict areas.
 - vii. All connections to UTILITIES infrastructure and crossings with other utilities, drainage systems and structures shall be shown in detail with field verified elevations.
 - viii. PLANS shall include the following note “All existing utilities have been field verified (vertically and horizontally) at all points of connection and at all areas of conflict with OCU infrastructure.” The PLANS will not be approved without this note.
 - ix. Manholes with invert and rim elevations shall be on the corresponding profile or plan view.
 - x. Include retaining walls, site walls, tie backs, footers, mast arms, entry signs, permanent structures and hardscape in PLANS.
 - xi. Existing and proposed pipe data including size, length and material type. Provide slopes for gravity mains.
 - xii. Size, type and locations of existing and proposed meters, fittings, valves, hydrants, air/vacuum release and other related appurtenances.
 - xiii. Limits of pipe joint deflection for ductile iron pipe with design radius.
 - xiv. Limits of linings and coatings.
 - xv. Limits of special bedding requirements.
 - xvi. Limits and location of areas where additional restraints for existing piping shall be required. In locations where the PLAN requires

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2111: Project Documents and Submittals

October 10, 2021

modification, relocation or removal of existing pipe; additional restraints on the existing pipe shall be required due to the proposed piping configuration (i.e., dead ends, fittings, tee, wet taps, line stops, etc.).

- xvii. Limits of demolished infrastructure. All County owned and maintained assets proposed to be abandoned shall be completely removed and properly disposed. Grouting of mains may only be approved on a case-by-case basis by both UTILITIES and the authority maintaining the ROW.

5. Site Specific Pump Station Site Plan

- i. A site specific Pump Station Site Plan is required. It shall, at a minimum, match the level of detail as shown in the STANDARD DRAWINGS for duplex or triplex pump stations.
- ii. A site specific Pump Station Site Plan shall show the layout of the pump station, including all components as shown in STANDARD DRAWINGS. Components shall be drawn to scale. Provide actual dimensions instead of minimum dimensions.
- iii. Site plan horizontal scale shall be at one (1) inch equals ten (10) feet.
- iv. Show the top elevation of the proposed wet well and the elevation of the centerline of the road at the extension of the access driveway to the pump station. Provide a detailed site grading and drainage plan in accordance with STANDARD DRAWINGS and Section 2410 with maximum 2% slope within pump station tracts or easements and minimum 2% slope offsite to outfall.
- v. Include construction notes regarding cover, horizontal and vertical control, special construction requirements, and references to details.
- vi. Show and call out location and elevation of the 100-year floodplain.
- vii. Show and call out tract and easement corners.
- viii. Include and complete the relevant STANDARD DRAWINGS pump station design specifications table. Minimum dimensions and elevations specified shall be replaced with actual dimensions and elevations, and shall correspond to the approved MASTER PLAN design.

6. Asset Descriptions

- i. Utility assets and infrastructural features shall be labeled on the PLANS. On the PLANS, asset callouts at minimum shall include size, description, and space for future unique asset numbers. The size and material of each main shall be defined at minimum once per plan sheet. Unique ID Numbers are not required for plan approval, but may be added in order to create a link between the PLANS and the future

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2111: Project Documents and Submittals

October 10, 2021

Asset Attribute Data Table. Providing only the asset number on PLANS, plan /profile, shall not be acceptable.

Example 8" PVC WM-XXX, 45FMF-XXX, 22.5 RMF-XXX, 8" WMGV-XXX, etc.

- ii. Leaders shall be provided for each asset on the plan view. Leaders may be provided on the profile view for clarity. Single leader to cluster or group of assets requires an enlargement detail of cluster or directional description on the PLANS.
- iii. A blank design Asset Attribute Data Table (see Table 3111-2) shall be included in the PLANS per the STANDARD DRAWINGS. Plan sheets dedicated for Tables 3111-2 shall be inserted unpopulated into the PLANS for creation of RECORD DRAWINGS.
- iv. The UTILITIES' electronic blank Asset Attribute Data Table in Excel format is provided on the Orange County Government website www.orangecountyfl.net. The UTILITIES provided Excel table format may be used on the plan sheets. This may be performed with the Excel copy and paste functions.
- v. All of the applicable types of assets as listed in Table 3111-1 shall be included on the APPROVED CONSTRUCTION PLANS for creation of RECORD DRAWINGS.
- vi. Privately owned and maintained pump stations, manholes, hydrants, oil / water separators, lint traps, and grease interceptors shall be included on the Asset Attribute Data Table in the PLANS. The remaining infrastructure not specified above that will be privately owned and maintained is not required to be included in the Asset Attribute Data Table.

7. Standard Details

- i. The PLANS shall include OCU General Notes, printed on the general notes sheet of the PLANS. Obtain General Notes from Figure GN of Appendix A, and preserve original numbering.
- ii. The PLANS shall include all applicable STANDARD DRAWINGS as shown in this MANUAL. Additional details shall be prepared by the ENGINEER for conditions not included in the STANDARD DRAWINGS, such as underwater crossings of rivers, streams, canals and ditches or pump stations with four or more pumps. Additional review may be required.

D. Other Submittal Items

1. The following shall be provided when applicable, including but not limited to if applicable: recorded cross-access utility agreement, signed and sealed wastewater pump station calculations, fire flow hydraulic calculations, grease

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2111: Project Documents and Submittals

October 10, 2021

interceptor sizing calculations, and estimated utility construction cost and FDEP permit applications.

E. Digital Utility Plan

1. A drawing of the affected construction area shall be created in an encompassing digital CAD file that includes the overall utility system layout and the associated parcel features. Feature point, line and polygon information for new or altered structures in the work area and all accompanying geodetic control and survey data shall be included. The minimum requirements are as follows.
 - a. Project Coordinate System
 - i. Features in drawing files that are stored in drawing units shall be translated to real world scale and geographically registered to the geodetic control chosen.
 - ii. State plane coordinates exist for most quarter section corners in Orange County. Control assistance can be obtained from the survey section of PUBLIC WORKS.
 - iii. If the geodetic control point is located within the project limits, it shall be symbolically indicated and annotated in the design file. If the nearest geodetic control is located well outside of the project area then it shall be tied to one of the other geodetic control points used and a reference tie annotated and indicated in the design file. The two (2) geodetic control points described above are the least survey grade geo-referencing information that can be used to create the plan view drawing.
 - b. The spatial accuracy of the feature data contained in the digital drawing shall be equal to or better than the graphical data contained in the plan/profile sheets.
 - c. File format shall be AutoCAD (dwg) or drawing interchange file (dxf).
2. CAD Guidelines
 - a. Pressure piping twelve (12) inches and less are to be entered as a single line between tees, wyes, and reducers. Pressure piping sixteen (16) inches and greater are to be entered to scale between tee, wyes, and reducers. Pipe sections should be continuous through structures such as valves and other fittings. Pipes should be broken and joined by a suitable fitting when a line changes its diameter or material properties. For wastewater force mains, the line feature(s) shall be input using the same direction from point to point as the proposed or existing flow. Therefore, the starting point of force main line segments within these layers shall be the upstream point and the downstream point shall be the endpoint of that segment. This procedure is recommended to indicate the continuity of flow and connectivity within the wastewater layers.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2111: Project Documents and Submittals

October 10, 2021

- b. Gravity lines shall be entered as a single line, digitized in the direction of the design flow and broken at manholes. The beginning point of the line would be the upstream end and the ending point would be the downstream end.
- c. Text identifying piping shall be aligned with the piping. Point and linear feature attribute text shall be visible on the drawing in a standard font and the lower left-hand corner of the text shall be just clear of the linear or point feature to which it corresponds, unless legibility requires that the label be moved and accompanied by a leader arrow. The labels shall be placed onto a separate layer and not to be placed in the feature layer. For reading from the bottom or right side of the plan sheet, the rotation angle shall be between -90 degrees and 90 degrees.
- d. Features shall be placed on their appropriate layers and assigned colors by layer for consistency. Features shown in the AutoCAD files shall be in model space and be contained in the AutoCAD files as opposed to being linked to externally referenced files. CAD systems which use a numbering system for layers instead of names shall also include a conversion chart explaining which layer number corresponds with which layer name.
- e. The graphical data shall be reviewed for duplicate objects, short objects, crossing objects, undershoots, clustered nodes, pseudo nodes, dangling objects or overshoots and zero-length objects. Lines shall be continuous from structure to structure. Topology is provided by the end points of pipelines snapped to the end points of connecting lines, with a structure node being snapped to the end point. A point feature will be used to represent a structure such as a manhole or valve. The point feature shall be a symbol block with its block insertion point at the point of intersection or end point of a line.

F. Survey Requirements

1. Horizontal and vertical controls shall be shown on the PLANS sufficiently to determine locations and elevations for the contractor to establish the work.
2. The SURVEYOR's name, registration number, and the date the survey was performed shall be indicated on the PLANS.
3. Baselines shall be parallel to the ROW and monumented at the beginning and end of the project and at all changes in direction. The PLANS shall indicate the types of monuments used and shall include state plane coordinates with vertical elevations (x,y,z) for all monuments.
4. All proposed utility easements and tracts shall be shown with dimensions and offsets tied to the baseline of the design survey.
5. Found or set monuments for existing ROWs, easements, or pump station sites shall be adequately depicted on the PLANS.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2111: Project Documents and Submittals

October 10, 2021

6. Surveyor shall survey the existing underground utilities marked by the respective utility owners. All existing utilities shall be shown on the plans in accordance with the CI/ASCE 38-02, ASCE Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data. Utility quality level notes, abbreviations and legend, and a quality level A data table shall be included in the PLANS (see Exhibit 2111-1. Existing Utility Quality Levels below). Utility quality labels shall be provided on the PLANS for all existing utilities within the ROW. Utility quality level A locations and attribute information are required for the following existing utilities outside of pavement:
 - a. All utilities within existing ROWs along the proposed pipe within ten (10) feet from either side of the centerline of the proposed pipe at minimum intervals of one hundred (100) feet.
 - b. Proposed pipe crossings of existing utilities, and
 - c. Proposed pipe connections to existing utilities.

Exhibit 2111-1. Existing Utility Quality Levels

Example Index Notes:

1. Quality Level A (QLA): Utility information which has been visually verified, survey located (both horizontally and vertically) and accurately reduced onto these drawings. This is typically shown as a HV verification excavation hole.
2. Quality Level B (QLB): Utility information derived by marking the approximate surface horizontal location of a utility using electronic methods. Marking is subsequently field survey located and accurately reduced onto these drawings.
3. Quality Level C (QLC): Utility information obtained as below for quality level D, plotted to correlate with surface utility features which have been field verified, survey located and accurately reduced onto these drawings. Included in this category are aerial utility information and utility depictions, which in the professional opinion of the subsurface utility engineer, represent the most probable approximate horizontal location, type and / or existence of a utility.
4. Quality Level D (QLD): Utility information plotted on the drawing based solely on record information, individual recollections or the existence of utility service. It shall be noted that all information shown (other than at test hole locations, see QLA above) with reference to a utilities size, capacity, material composition, condition or service status shall be considered QLD even though the utility may be plotted and labeled QLC or QLB.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2111: Project Documents and Submittals

October 10, 2021

Legend and Abbreviations:

- QLA = Quality Level A
- QLB = Quality Level B
- QLC = Quality Level C
- QLD = Quality Level D
- WM-- = Water Main
- SAN-- = Sanitary Sewer
- CO = San. Clean-Out
- FM-- = WW Force Main
- RWM-- = Reclaimed WM
- UT-- = Buried Telephone
- OH TEL = Overhead Telephone
- UFOC-- = Buried Fiber Optic Cable
- UE-- = Buried Elect. Cable
- OH ELEC-- = Overhead Elect. Cable

Example:

- QLB----8” WM--- = Quality Level B for 8” Water Main
- HV #36 = #36 Horizontal and Vertical Location (QLA)

**HORIZONTAL AND VERTICAL
(Utility Quality Level A Data)**

Location ID	Horizontal Coordinates	Elevation (ft)	Utility Owner	Size & Material
HV-1	N 1554786 E 624789	110	Florida Gas	2” galv
HV-2	N 1554788 E 624789	108	AT&T	1” cable
HV-3	N 1554784 E 624788	106	OCU	6” PVC

Survey field work for HV locations was on “date”

NOTE: This plan was prepared in conformance with ASCE standard CE/ASCE 38-02 “American Society of Civil Engineers Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data”.

PART 5 PLATS AND EASEMENTS

5.01 Overview

- A. For projects within unincorporated Orange County:
 - 1. Utility easements and tracts can be dedicated by plat or separate instrument.
 - a. If by separate instrument, legal descriptions and sketches shall be submitted prior to plan approval.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2111: Project Documents and Submittals

October 10, 2021

- i. Utility easements, across lands outside of the DEVELOPER owned project limits, shall be recorded prior to plan approval.
 - ii. Utility easements not included within the plat, across lands within the DEVELOPER owned project limits, shall be recorded prior to clearance.
- B. For projects within other municipal jurisdictions:
 1. All UTILITIES tracts and easements must be conveyed by separate instrument.
 - i. Legal descriptions and sketches shall be submitted prior to plan approval.
 2. Tracts and easements must be reviewed and approved by COUNTY and recorded prior to clearance.
- C. Cross access utilities agreements, for private shared utilities, shall be recorded prior to plan approval.

PART 6 CLOSEOUT DOCUMENTS

6.01 Overview

- A. During Construction, the project documents shall be updated and maintained, and shall be submitted to UTILITIES at the completion of construction prior to FDEP clearances per Section 3111, Project Record Documents and Submittals. The project RECORD DRAWINGS and associated FDEP clearances shall be signed and sealed by the ENGINEER.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2115: Directional Drilling

October 10, 2021

PART 1 GENERAL

- A. Horizontal directional drilling is a method of installation commonly referred to as directional drilling or guided horizontal boring.
- B. Refer to applicable water, reclaimed water and force main design standards.

PART 1 LOCATION

- A. Directional drilling is allowed for pressurized main and is not allowed for gravity mains.
- B. Directional drilling of restrained PVC and ductile iron is allowed in COUNTY ROW. Ductile iron shall only be utilized for water and reclaimed water mains.
- C. Directional drilling of HDPE pipe shall be limited to wetlands, canal crossings and road crossings as approved by UTILITIES.

PART 2 DESIGN AND CONSTRUCTION

- A. Horizontal and vertical alignment, drilling limits, sending and receiving pits shall be as shown on the PLANS. The pipe shall have a minimum 36 inches of cover on LOCAL ROADWAYS and shall have a minimum 48 inches of cover on NON-LOCAL ROADWAYS. The ENGINEER shall consider fracking, and site specific conditions when designing drill depth, including geotechnical borings for the crossing.
- B. The maximum allowable depth shall be determined based on 18 inches of clearance from the existing or proposed utilities, storm, conflicts or infrastructure to be crossed, and shall not exceed depth per Section 3115 of this MANUAL.
- C. For subaqueous crossings, a minimum cover of 5 feet shall be maintained over the pipe.
- D. Compound curvatures may be used, but shall not exceed 75% of the maximum deflections, as set forth by the pipe manufacturer or AWWA Standards, whichever is more stringent.
- E. Entry angle shall not exceed 15 degrees. Exit angle shall be 6 to 12 degrees to facilitate pullback. Entry angle and exit angle shall not exceed manufacturer recommendations on deflection, angle or radius of curvature.
- F. A design profile drawn to scale shall be provided on the PLANS showing the proposed bore path and all existing utilities within the directional drill corridor.
- G. The design profile for directional drill shall be designed based on the pipe material to be proposed. Deflection for PVC or HDPE shall not exceed 75% of the manufacturer's allowable radius. It is recommended to include designs for both materials so that a plan revision is not required during construction.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2115: Directional Drilling

October 10, 2021

- H. Isolation valves shall be designed and installed at both ends of the directional drill.
- I. Air Release Valves (ARV's) shall be designed as required on both ends of the directional drill based on the profile of the existing and proposed piping and grade.
- J. Transition from the directional drill to DIP or PVC pipe:
 - 1. HDPE directional drill transition to connecting pipe shall be via ductile iron fittings with butt fusion of HDPE mechanical joint (MJ) adapter and shall be shown on the PLANS. Pipe shall be restrained as shown in the details.
 - 2. PVC directional drills transition to connecting pipe shall be via ductile iron fittings and shall be shown on the PLANS.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2116: Jack and Bore

October 10, 2021

PART 1 GENERAL

- A. Refer to applicable water, reclaimed water and force main design standards.

PART 2 LOCATION

- A. Jack and bore is allowed for pressurized main and is not allowed for gravity mains.
- B. Jack and bore of restrained PVC and ductile iron is allowed in COUNTY ROW. Ductile iron shall only be utilized for water and reclaimed water mains.

2.01 DESIGN AND CONSTRUCTION

- A. Horizontal and vertical alignment, boring limits, sending and receiving pits shall be as shown on the PLANS. The casing shall have a minimum of 48 inches of cover.
- B. The maximum depth shall be determined based on 18 inches of clearance from the existing or proposed utilities to be crossed, provided that the minimum depth requirements of FDOT and PUBLIC WORKS are met.
- C. A cross section drawn to scale shall be provided on the PLANS showing the proposed bore path and all existing utilities within the jack and bore corridor.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2210: Water Main Design Standard

October 10, 2021

PART 1 GENERAL

1.01 Overview

- A. Water mains shall be designed for the estimated tributary population, as delineated in the approved UTILITIES' MASTER PLAN (latest edition). When DEVELOPER's water MASTER PLANS are required, water mains shall be designed for the estimated ultimate build out, as approved by UTILITIES. DEVELOPER shall be required to satisfy the domestic water and fire protection design flow for their Planned Development (PD), Development of Regional Impact (DRI), Specific Area Plan (SAP), overlay, village, study area, or other large scale planning area considered by COUNTY.

PART 2 LOCATION

- A. Mains shall be located within dedicated ROW or utility easements.

1. Right-of-way (ROW)

- a. When installed in ROW, mains shall maintain a consistent alignment with respect to the centerline of the road. No parallel mains shall be allowed. Water mains shall be installed on the opposite side of the ROW as the reclaimed water main and the force main. Mains shall be installed along one side of the road, with crossings kept to a minimum.

2. Easements for Mains within ROW

- a. An easement shall be provided adjacent to the ROW when mains are installed within ROW, but inaccessible from ROW limits, or when excavation without a trench box will encroach on private property due to the main's close proximity to ROW.

3. Easements Outside of ROW

- a. If piping is constructed within an easement not adjacent to the ROW, the centerline of the pipe shall be located within 2 feet of the centerline of the easement. Proposed easements not adjacent to and paralleling the ROW shall only be considered on a case-by-case basis.
- b. Mains adjacent to, but installed outside of ROW – minimum 15 feet;
- c. Mains installed not adjacent to ROW – minimum 20 feet;
- d. Additional easement width, as determined by UTILITIES, shall be required under the following conditions.
- i. Pipe sizes greater than 12 inches;
- ii. When the pipe invert depth is greater than 5 feet, the easement width shall be increased by 3 feet for each additional foot of depth;

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2210: Water Main Design Standard

October 10, 2021

- iii. More than one (1) parallel pipe within the easement; or
 - iv. Pipe is not centered in the easement.
- B. Mains shall not be placed under buildings, retention ponds, courts, swimming pools, fountains, transformers, walls, or other structures. Landscape, retaining and privacy walls and columns, foundations, and gravity wall with tie-backs shall not be placed parallel over mains, and shall be designed to allow for excavation of the main without impacting the integrity of the wall or structure.
- C. Mains shall not be installed parallel under or parallel over other mains, (i.e. stacked), including but not limited to: storm piping, sanitary, or pressurized pipe. Placement of mains under pavement shall be kept to a minimum. Mains shall not be located along interior side or rear lot lines, unless approved by UTILITIES.
- D. Placement of mains along interior side or rear lot lines or storm water retention pond berms may be allowed on a case-by-case basis if such a configuration results in efficient placement and utilization of the system, as determined by UTILITIES.
- E. Services, ARVs and other valves shall not be placed along interior side or rear lot lines. ENGINEER shall include cross sections on the PLANS demonstrating that these criteria are met.
- F. Proposed commercial and residential development offsite mains shall be extended a minimum of 10 feet beyond the furthest entrance to the development. Water main extensions to private residences shall extend to the property midpoint, or to a distance of 10 feet beyond the furthest driveway serving the property, whichever is greater.
- G. Water mains shall be designed with uniform positive or negative slopes to avoid undulations and minimize high points and low points in the profile.
- H. Reference STANDARD DRAWINGS, “Roadway and Utilities Corridor Guides” A900 series, for location details regarding pipe offsets, maximum allowable pipe diameter, distance from structures, and CLEAR ZONE requirements.

PART 3 DESIGN BASIS

- A. Average Daily Flow and Peak Flows:
- 1. Average daily water flow shall be calculated by referencing the equivalent residential connection (ERC) flow rates as outlined in Appendix E, “ERC/ERU Design Factors”. Water flow rates shall be based on a maximum day to average day peaking factor of 2.0 and a peak hour to average day peaking factor of 4.0.
- B. Fire Flow Requirements:
- 1. Fire flow requirements shall be determined in accordance with applicable COUNTY/city fire codes and SUBDIVISION REGULATIONS. Where fire flow requirements exceed the anticipated available fire flow from the central water

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2210: Water Main Design Standard

October 10, 2021

system, on site fire protection system or other COUNTY/city fire department approved mitigation measures shall be utilized.

C. Design Calculations:

1. DEVELOPER's ENGINEER shall submit signed, sealed and dated design calculations with the PLANS for all water distribution projects. Calculations shall show that the water mains will have sufficient hydraulic capacity to transport the greater of peak hourly flows or the combination of maximum daily flows and fire flows while meeting the requirements of this Section and FDEP. Minor head losses shall be incorporated in calculations including losses through meters, detector checks and backflow prevention assemblies.

PART 4 DESIGN AND CONSTRUCTION

A. Pipe Cover:

1. A minimum cover of 30 inches shall be provided for 4 - 8 inch pipe located within LOCAL roadways or within an easement. Water mains located within NON-LOCAL ROADWAYS shall require a minimum cover of 36 inches for mains sized 12 inch and below and a minimum cover of 48 inches for mains sized 16 inch and greater.
2. Additional depth at valves shall be required to allow minimum cover over valves based on size and manufacturer as well as additional cover at road crossings. No pipe cover shall exceed 72 inches unless approved by UTILITIES. See Table 2210-1 for minimum cover required for pipe at gate valves.

B. Road Widening Plan:

1. Utilities work on roads identified in FDOT, COUNTY, or a city five (5) year widening plan shall be coordinated by the DEVELOPER / ENGINEER with the respective agency for future depth and location of utilities. Additional depth and / or easements shall be required to accommodate future proposed work of Agencies and all practical measures shall be taken to avoid conflicts / relocations due to future proposed work.

C. Pressure:

1. All water mains shall be designed in accordance with this Section. The system shall be designed to maintain a minimum pressure of 20 psi at all points in the distribution system under all conditions of flow. Due to internal water demands, higher minimum pressures may be required at commercial, industrial and high-density residential areas. The design pressure in the distribution system should be no less than 45 psi during average day demand and no less than 35 psi on the upstream side of a meter during peak hour flow conditions. For excessive pressures, privately owned pressure-reducing provisions may be required.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2210: Water Main Design Standard

October 10, 2021

D. Design Friction Losses:

1. Friction losses through mains shall be based on the Hazen and Williams or Darcy-Wiesbach formulas. In the use of Hazen and Williams formula, the value for “C” shall be 120 for ductile iron pipe and 130 for PVC and HDPE pipe. “C” values greater than 130 shall not be allowed.

E. Design Pressure and Restraint:

1. The main and fittings, including all restrained joint fittings shall be designed to withstand pump operating pressures and pressure surges, but not less than 150 psi.
2. All pipe shall be restrained at minimum per the restraint tables as specified in the STANDARD DRAWINGS.
3. All new pipe installed under pavement shall be completely restrained at each bell. All pipe installed in ROW but deemed by the COUNTY to be in a location under future pavement shall be completely restrained at each bell.

F. Velocity and Diameter:

1. Only 4, 6, 8, 12, 16, 20, 24, 30, 36, 42, 48 and 54 inch diameter water mains shall be permitted.
2. Four (4) inch water mains shall be required in residential cul-de-sacs / dead-ends with a maximum length of 500 feet of pipe. In residential cul-de-sacs, double service lines shall be required if reclaimed water is provided, if reclaimed water is not provided, single services shall be required per the STANDARD DRAWINGS.
3. A minimum of 6 inch looped systems shall be required in low-density residential projects. Where looping of mains is not practical, minimum 8 inch mains shall be required.
4. Mains shall be sized so velocities do not exceed 10 feet per second for DIP mains and do not exceed 8 feet per second in PVC mains under all scenarios.

G. Material:

1. Water transmission / distribution pipe greater than 8 inches shall be DIP.
2. Water distribution pipe less than or equal to 8 inches shall be either PVC or DIP.
3. Approved drilling pipe materials and HDPE may only be used in specific applications as specified in this MANUAL or as approved by UTILITIES.

H. Pipe Deflection:

1. Fittings shall be used for all changes in direction.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2210: Water Main Design Standard

October 10, 2021

2. Ductile Iron Pipe Mains - Allowable deflection for design of ductile iron pipe shall not exceed 50% of the manufacturer's recommended allowable joint deflection. No pipe bending shall be permitted. Where pipe is not straight and deflection is utilized, the Engineer shall provide limits of deflection on the plan and profile sheets including the radius of curvature and angle of deflection for each segment of pipe to be deflected.
 3. PVC Pipe - No allowable deflection is permitted for design of PVC mains. Fittings shall be designed in lieu of deflection for changes in direction. Sleeves shall not be used for deflection.
- I. Fire Hydrant Location and Spacing:
1. At a minimum, specifications outlined in the latest version of SUBDIVISION REGULATIONS and applicable COUNTY fire codes shall apply. Hydrants shall be placed on the same side of the roadway as the water mains and shall be placed at 500 foot intervals in commercial, multifamily and industrial areas.
 2. Hydrant spacing for single-family residential and other areas shall be 1,000 foot intervals.
 3. Fire hydrants shall be connected to a 6 inch water main or greater.
- J. Dead Ends:
1. In order to provide increased reliability of service and reduce head loss, dead ends shall be minimized by making appropriate tie-ins whenever practical, as determined by UTILITIES.
 2. Where dead end mains service a residential development, hydrants shall be located as close to the intersection as possible and no further than 500 feet from the last resident or dead end, while maintaining proper fire code. Pipe sizes from the hydrant to the blow-off shall be minimized.
 3. Hydrant shall not be placed at the end of a residential cul-de-sac.
 4. Where permanent dead end mains occur, they shall be provided with an approved flushing device and blow off assembly for flushing purposes. Automatic flushing devices may be required to maintain water quality in water mains, as determined by UTILITIES.
 5. The CONTRACTOR shall install automatic flushing devices for all dead-ends on mains larger than 4 inches unless exempt by UTILITIES. When gravity sewer is available, the permanent flushing device shall have a dedicated sewer service for connection to be directly flushed and connected with an air gap, to the WASTEWATER SYSTEM per the STANDARD DRAWINGS. Connection to storm water system shall require an approved backflow prevention device and approval from PUBLIC WORKS. If no connection is available, a concrete pad with flume or inverted crown shall be poured to curb or away from the road based on configuration and traffic.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2210: Water Main Design Standard

October 10, 2021

K. Valves:

1. Resilient seat gate valves shall be installed vertically in accordance with the specifications in Chapter 3 and Appendix D to isolate water mains. Sufficient valves shall be provided on water mains so that inconvenience and sanitary hazards will be minimized during repairs.
2. Valves shall be located no more than 500 feet apart in commercial, industrial and high-density residential areas and no more than 1,000 feet in all other areas. Valves shall be spaced to isolate a maximum of forty (40) single-family residential lots.
3. A minimum of three (3) valves per tee and four (4) valves per cross shall be required to isolate and maintain adequate service, unless the ENGINEER can demonstrate equivalent isolation availability with fewer valves.
4. Gate valves shall be placed at phase lines and located at the end of all water main extensions, except at cul-de-sacs. The pipe profile shall show valves with the minimum pipe cover at valves as specified in Table 2210-1.
5. Hydrant assembly valves shall be placed on the anchoring tee. Additional valves at the hydrant are required for hydrants further than 10 feet from anchoring tee. All pipe material from anchoring tee to the hydrant shall be DIP.

Table 2210-1: Minimum Pipe Cover Required for Pipe at Gate Valves

Pipe Diameter (Inches)	Vertical Gate Valve Cover	
	LOCAL ROADWAY	NON-LOCAL ROADWAY
4" - 8"	30"	36"
12"	36"	36"
16"	54"	54"
20" (*)	72"	72"
24" (*)	75"	75"
30" (*)	81"	81"
36" (*)	90"	90"
42" (*)	102"	102"
48" (*)	110"	110"
54" (*)	106"	106"
60" (*)	122"	122"
66" (*)	122"	122"

Note: (*) Based on gate valve manufacturer, depths may vary. Top of operating nut shall be a minimum of 24 inches below grade. See STANDARD DRAWING A108-2 for details.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2210: Water Main Design Standard

October 10, 2021

- L. Separation Requirements for Water Mains, Reclaimed Water and Sewers:
1. Separation of potable water, reclaimed water, storm and sanitary sewer systems shall comply with FDEP regulations and STANDARD DRAWINGS.
 2. Water and reclaimed water pipes shall not pass through any part of a storm sewer or manhole. A 3 foot minimum separation from storm water structures shall be maintained to facilitate maintenance and operation.
- M. Air Release Valves:
1. Provisions shall be made to remove air at high points in all water mains where elevation changes exceed 5 feet. Water mains greater than 12 inches in diameter with elevation changes in excess of 5 feet shall require automatic air release valves located at high points.
- N. Sample Stations:
1. Permanent sample stations may be required as directed by UTILITIES.
- O. Pigging and Cleaning Access:
1. Provision for the installation of permanent access points into and egress points out of the piping system for pigging and cleaning purposes shall be incorporated into the design for pipe diameters greater than 12 inch. Permanent and temporary access and egress points shall conform to the STANDARD DRAWINGS.
- P. BOUNDARY SURVEY:
1. A current BOUNDARY SURVEY for all Master Meters shall be required prior to clearance. The DEVELOPER shall bear the entire expense of rectifying WORK improperly installed due to the construction of improvements not totally within the site dedicated to UTILITIES. An electronic version and copy of the certified BOUNDARY SURVEY shall be required.
- Q. Control Valves:
1. Single Family residential developments may be required to have a pressure reducing valve at all main connections to UTILITIES WATER SYSTEMS.
- R. Booster Pumps:
1. In-line booster pumps are not permitted on UTILITIES WATER SYSTEMS.
- *-----

PART 5 SYSTEM CONNECTION AND SERVICE CONNECTIONS

- A. Water connections shall conform to the applicable provisions of this MANUAL.
- B. New Services:
1. Water services shall conform to the applicable provisions of this MANUAL. Services shall be installed at 90 degrees from the main. Only 1, 2, 4, 6, 8, and

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2210: Water Main Design Standard

October 10, 2021

12 inch services will be permitted. Services shall not terminate in driveways. Where water services greater than 12 inches are required, additional services shall be provided. It is recommended that hospitals install at least two services.

2. Dual/double services shall be provided per the STANDARD DRAWINGS, except in the following scenarios, where single services are required:
 - a. Reclaimed water is unavailable then provide single water service;
 - b. Reclaimed water is available with lots greater than 1/3 acre; provide single water service and single reclaimed water service.
 - c. An obstruction (hydrant, catch basin, storm structure, drainage curb inlets, etc.) prevents a double service from being installed 90 degrees from the main
3. Two (2) inch services shall have a 2 inch iron body resilient wedge gate valve with 2 inch operating nut installed at the connection point.
4. One (1) and 2 inch services shall be minimum DR9 polyethylene tubing. Services 4 inch and larger shall be restrained joint DIP from the point of connection to the main to the meter assembly, if the existing main is on the same side of the street as the property. If the main is on the opposite side of the street, as a minimum, the segment of pipe immediately upstream from the meter assembly shall be DIP.
5. ENGINEER shall incorporate consideration for future fire sprinkler system connections as part of water main design.

C. Service Connections on Existing Mains:

1. For all commercial connections, and for services and connections larger than 2 inches, the CONTRACTOR shall make the connection to existing water mains. The CONTRACTOR shall furnish service connections for new water main extensions. The CONTRACTOR shall install all taps and services on existing mains, if new main extensions are installed as part of the project scope. The CONTRACTOR shall furnish all service connections for new water main extensions.
2. For projects not consisting of new main extensions, UTILITIES may, on a case by case basis, install residential services up to 2 inches. OWNER shall be responsible for payment of applicable fees and charges prior to service installation.
3. TOWNHOME developments may require a 4 inch stub out for each building, or groups of buildings for future fire sprinkling system.

D. Connections:

1. For proposed projects connecting to existing, inactive, DRY LINE infrastructure, the entire system shall be re-tested prior to FDEP clearance, including but not

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2210: Water Main Design Standard

October 10, 2021

limited to pressure testing, chlorination, and wire check by the CONTRACTOR and shall comply with the specifications and standards approved at time of original installation. The DEVELOPER shall fix, repair, or replace all defects by a method approved by UTILITIES at no cost to the COUNTY.

2. For projects connecting to existing valves, the ENGINEER shall incorporate methods, materials or requirements in the design for pressure testing of the new systems without reliance on the condition of the existing valve. Existing valves due to age, condition, maintenance are not guaranteed by the COUNTY to meet the pressure test requirements set forth for new materials testing.

E. Relocation of Residential Services:

1. In the event future proposed projects or phases lot lines are shifted and existing installed services no longer align with lot lines, the existing services shall be removed and capped at the main. New services shall be installed to meet current standards and require UTILITIES approval for relocation.

PART 6 WATER METERING

A. General:

1. Water service connections shall be metered. In general, the method of metering will follow the guidelines listed below and require UTILITIES approval.
2. All meter(s) shall be located within a utility easement immediately adjacent to the ROW at the property line located in between lots as indicated in the STANDARD DRAWINGS.
 - a. All meters 4 inches and above, double detector check valve assemblies (DDCVAs), and fire line master meter assemblies (FLMMAs) shall be located outside the ROW immediately adjacent to the property line in a minimum 10 foot x 15 foot utility easement.
 - b. Two (2) inch and 1 1/2 inch meters shall be located outside the ROW immediately adjacent to the property line in a minimum 5 foot x 5 foot utility easement.
3. A DDCVA shall be provided if an unmetered dedicated fire line or fire sprinkling system is required to protect a TOWNHOME or duplex structure. The DDCVA and the fire sprinkling system are to be owned and maintained by the homeowner or Homeowner's Association.
4. Metering and back flow prevention shall be reviewed on a case-by-case basis if a fire sprinkler system is required to protect a single family residence.

B. Single Family, Duplex, and Single Family Attached (TOWNHOMES) with Public Right-of-Way:

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2210: Water Main Design Standard

October 10, 2021

1. Each unit shall be individually metered. Services shall be installed as indicated by the STANDARD DRAWINGS.
- C. Single Family, Duplex and TOWNHOMES with Private Streets:
1. Individual meters may be permitted in accordance with this section if the private streets are designed in accordance with the latest edition of the ROAD CONSTRUCTION SPECIFICATIONS for an urban design cross section. Easements shall be dedicated over the entire private street common areas. In addition, sufficient area must be available outside of paved areas to locate water mains, services, and meters.
- D. Commercial, Industrial and Institutional Projects without Private Fire Lines:
1. In general, each building shall be individually metered. Meter(s) shall be located in the public ROW at the property line.
- E. Commercial, Industrial, Institutional, Multi-Family with Private Streets and Fire Lines (including timeshares, condo hotels, duplexes, triplexes, quadplexes, apartments and condominiums projects):
1. Apartments, condominiums, hotels, schools, shopping malls (containing interior hallways) and multi-family projects:
 - a. Requires installation of fire line master meter.
 2. Commercial, industrial and institutional projects:
 - a. Master meter; or
 - b. Dual systems as approved by UTILITIES. Dual systems shall require installation of a DDCVA on the fire line. Domestic line shall also be metered.
 3. Shopping centers (contain no interior hallways):
 - a. A master domestic meter or individual domestic meters to each building. Individual meters shall be located at the ROW;
 - b. Dual systems may be required with individual meters for developments requiring fire protection systems, as approved by UTILITIES. Dual systems shall require installation of a DDCVA on the fire line.
- F. Meter Installation:
1. Meters (5/8 - 2 inches) will be installed by UTILITIES after payment of applicable fees and charges.
 2. All meters 1 inch and less in size may be installed underground in an approved meter box.
 3. Meters 1-1/2 to 10 inches in size shall be installed above ground, within a utility easement adjacent to the public ROW.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2210: Water Main Design Standard

October 10, 2021

4. Master meter assemblies will be delivered to the site after payment of applicable fees and charges and shall be installed by the CONTRACTOR.

G. Meter Sizing:

1. UTILITIES shall determine the size and quantity of all meters. The DEVELOPER’s ENGINEER shall provide sufficient information on estimated average, peak and minimum flows so that meter size can be determined in accordance with Table 2210-2, below.

H. Sites with potable irrigation shall have a separate irrigation meter. Irrigation meters shall be sized using Table 2210-2, where the Peak Irrigation Flow is defined as the highest flow resulting from a combination of zones designed to flow simultaneously. In addition, the DEVELOPER’s ENGINEER shall provide the square footage of the area to be irrigated.

Table 2210-2: Flow and Selection of Meter Size

Meter Size (inches)	Domestic Meter Average Daily Flow Up to (GPM)	Irrigation Meter Peak Flow Up to (gpm)
5/8	8	10
1	20	25
1.5	40	50
2	65	80**
4 x 1	***	N/A
6 x 2	***	N/A
8 x 2	***	N/A
10 x 2	***	N/A

Notes: For flows between 20 gpm to 130 gpm a minimum of 2 meters shall be required.

** For peak irrigation flows above 80 gpm, contact Development Engineering for guidance.

*** Size meter to maintain adequate pressure during the fire flow conditions.

PART 7 MATERIALS, INSTALLATION AND TESTING

A. Applicable provisions of this MANUAL shall apply.

PART 8 LOCATION AND IDENTIFICATION

A. A means for locating and identifying all water mains and valves shall be provided in accordance with this MANUAL, STANDARD DRAWINGS and Chapter 2 Section 2111 “Project Documents and Submittals.”

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2210: Water Main Design Standard

October 10, 2021

PART 9 CROSS CONNECTION CONTROL

A. General:

1. In order to protect the potable water supply system from contamination due to cross connections, UTILITIES approved backflow prevention devices shall be installed on the potable water system. Some of the common instances requiring installation of cross connection control devices are listed below.
2. UTILITIES is protecting public health through the enforcement of requirements and standards for design, construction, operation and maintenance of public potable water supply systems and reclaimed water systems. Refer to “Orange County Utilities Cross Connection Control Program Manual” for design guidelines. Copies of this Manual may be obtained from Orange County Utilities web site at: http://www.orangecountyfl.net/cms/DEPT/utilities/cross_connection_backflow_prevention.htm. These minimum requirements are also outlined in the following regulations.
 - a. State of Florida Safe Drinking Water Act; “Drinking Water Standards, Monitoring and Reporting”, Chapter 62-550, FAC, “Permitting Construction, Operation and Maintenance”, Chapter 62-555, FAC and “Reuse of Reclaimed Water and Land Application”, Chapter 62-610, FAC;
 - b. “Chapter 4A-46, ‘Fire Protection Contractors and Systems’, Division of State Fire Marshall”;
 - c. “Fire Prevention and Control”, Chapter 633, F.S.; and
 - d. “Section 9-203, ‘Florida Building Code, Plumbing, Adopted’, Article V, Chapter 9, Orange County Code”.

B. Commercial, Industrial, and Multi-Family Residential:

1. Commercial, industrial, and multi-family residential projects shall, as a minimum, require installation of an approved reduced pressure zone valve assembly (RPZ).
2. Modifications or projects with existing double check valves are required to upgrade to an RPZ or submit a backflow pressure test performed by a certified Backflow Prevention Assembly Tester prior to construction plan approval. UTILITIES may require an upgrade to an RPZ based on results or level of hazard.

C. Irrigation Systems:

1. Pressure type vacuum breakers or reduced pressure backflow prevention device shall be utilized on all potable water irrigation systems.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2210: Water Main Design Standard

October 10, 2021

D. Location and Installation:

1. Backflow prevention devices are to be located directly following the water meter on DEVELOPER's property. Backflow prevention devices shall be installed above ground to facilitate maintenance and testing. It shall be the DEVELOPER's responsibility to provide, install and test all backflow prevention devices.

E. General areas of concern for installation of backflow prevention assemblies connecting to COUNTY water service:

1. Commercial/Industrial properties: Potable domestic, lawn irrigation and fire suppression system.
2. Temporary meter connections: fire hydrants or other water services not intended to be permanent.
3. Residential: potable domestic if (auxiliary water supply, well or reclaimed irrigation is present), potable lawn irrigation and fire suppression systems.

F. Backflow Assembly Standards:

1. Any backflow assembly below shall be installed and placed on the discharge side of the potable water meter connection no more than 18 inches from the meter or property line if meter is not used.
2. The standard type of assembly is based on degree of hazard from the water user. Backflow assemblies shall meet at least one of the following standards including but not limited to:
 - a. Approved listing from FCCC&HR of SC, or ASSE
 - b. AWWA standards C510, Double Check Valve Assembly
 - c. AWWA standards C511, Reduced-Pressure Principle, Backflow Assembly (RPBA)
 - d. ASSE - 1011 Hose Bib Vacuum Breakers, Hose connection
 - e. ASSE - 1013 Reduced-Pressure Principle, Backflow Assembly
 - f. ASSE - 1015 Double Check Valve Assembly
 - g. ASSE - 1020 Pressure-Type Vacuum Breakers normally lawn irrigation
 - h. ASSE - 1047, & (FM) approval, Reduced Pressure Detector Check Assembly, (chemical use protection from antifreeze, corrosion inhibitors) on dedicated fire systems.
 - i. ASSE - 1048, & (FM) approval Double Check Detector Check Assembly, dedicated fire systems.
 - j. ASSE - 1024 Dual Check

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2210: Water Main Design Standard

October 10, 2021

3. Commercial/Industrial

- a. All Commercial/Industrial connection from the potable water system shall have the following:
 - i. Minimum protection for any Commercial/Industrial connection: RPBA-ASSE 1013
 - ii. Toxic chemical used on site: RPBA - ASSE 1013
 - iii. Non-toxic chemicals used on site: DCVA ASSE 1015
 - iv. Irrigation: RPBA - ASSE 1013 or PVB - ASSE 1020
 - v. Master Meter connections (fireline and domestic combination): DCVA - ASSE 1015

G. Dedicated Fire Lines Minimum Type of Protection:

1. All commercial/industrial or residential fire suppression systems without chemical additives or additional auxiliary non-potable water supply including on site fire hydrants: DCDA ASSE - 1048, Double Check Detector Assembly and (FM) approval.
2. All commercial/industrial or residential fire suppression systems with chemical additives or additional auxiliary non-potable water supply including on site fire hydrants: RPPDA ASSE - 1047, Reduced Pressure Principle Detector Assembly and (FM) approval.

H. Hydrant or temporary constructions: RPBA - ASSE 1013

I. Residential:

1. Residential properties maintaining auxiliary water supply (wells, other auxiliary water or reclaimed water): RPBA - ASSE 1013.
2. Residential properties irrigating with potable water: RPBA - ASSE 1013
3. Residential properties irrigating with reclaimed water: Dual Check Valve – ASSE 1024.
4. Residential fire suppression systems, using one potable meter for both homes & fire system: DCVA - ASSE 1015
5. Residential fire suppression systems: DCDA ASSE - 1048 and (FM) approval.
6. UTILITIES will install all dual check backflow preventers with all 5/8 inch and 1 inch residential meter sets. The CONTRACTOR shall install all other backflow preventers prior to the meter set.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2310: Gravity Main Design Standard

October 10, 2021

PART 1 GENERAL

- A. UTILITIES will not approve PLANS for combined wastewater gravity systems. Gravity mains shall be designed to exclude infiltration/inflow.
- B. Wastewater gravity system shall be designed for the estimated ultimate tributary population, as delineated in the approved UTILITIES' MASTER PLAN (latest edition). When the DEVELOPER's MASTER PLAN is required, wastewater gravity mains shall be designed for the estimated ultimate build out, as approved by UTILITIES.

PART 2 LOCATION

- A. Mains, manholes, service laterals, and cleanouts shall be located within dedicated ROW or utility easements. Utility easements for sanitary sewer shall only be approved on a case-by-case basis.
 - 1. Right-of-way:
 - a. When installed in ROW, mains and manholes shall be generally constructed along the centerline of the roadway or pavement. On curvilinear roads, the outside of the mains shall fall no less than 36 inches horizontally from the edge of pavement.
- B. Easements:
 - 1. If piping is constructed within an easement, the centerline of the pipe shall be located within 3 feet of the centerline of the easement.
 - 2. Mains installed not adjacent to ROW – minimum 20 feet;
 - 3. Additional easement width, as determined by UTILITIES, shall be required under the following conditions.
 - a. Pipe sizes greater than 12 inches;
 - b. When the pipe invert depth is greater than 5 feet, the easement width shall be increased by 3 feet for each additional foot of depth;
 - i. More than one (1) parallel pipe within the easement; or
 - ii. Pipe is not centered in the easement.
- C. Mains, manholes, service laterals, and cleanouts shall not be placed under buildings, retention ponds, courts, swimming pools, fountains, transformers, walls, or other structures. Landscape, retaining and privacy walls, foundations, and retaining walls with tie-backs shall not be placed parallel to or over mains, and shall be designed to allow for excavation of the main without impacting the integrity of the wall or structure. Placement of mains outside of pavement shall only be approved on a case-by-case basis. Mains and service laterals shall not be located along interior side or rear lot lines,

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2310: Gravity Main Design Standard

October 10, 2021

- unless approved by UTILITIES. Placement of mains along interior side or rear lot lines or storm water retention pond berms may be allowed on a case-by-case basis if such a configuration results in efficient placement and utilization of the system, as determined by UTILITIES. ENGINEER shall include cross sections on the PLANS demonstrating that these criteria are met.
- D. Gravity mains may be accepted for maintenance if the private streets are designed in accordance with the ROAD CONSTRUCTION SPECIFICATIONS for an urban design cross section. Easements are dedicated over the entire private street common areas. In addition, sufficient area must be available outside of paved areas to maintain gravity mains.
- E. Reference STANDARD DRAWINGS, “Roadway and Utilities Corridor Guides” A900 series, for location details regarding pipe offsets, maximum allowable pipe diameter, distance from structures, and CLEAR ZONE requirements.

PART 3 DESIGN BASIS

A. Average Daily Flow:

1. The gravity main design shall be based on ultimate development or projected flow. Average daily wastewater flow shall be calculated by the Equivalent Residential Unit (ERU) flow factors as outlined in Appendix E, “ERC/ERU Design Factors”.

B. Peak Design Flow:

1. Gravity mains shall be designed on the basis of ultimate development maximum rates of flow, which shall be the product of selected peak factors multiplied by the accumulative average daily flow as calculated above. The minimum peaking factor, provided in Table 2310-1 shall be applicable for the range of average daily flow rates.

Table 2310-1: Wastewater Peaking Factors

Minimum Flow Range (gpd)	Peak Factor
Flows to 100,000	4.0
100,001 to 250,000	3.5
250,001 to 1,000,000	3.0
Flows greater than 1,000,000	2.5

C. Design Calculations:

1. DEVELOPER’s ENGINEER shall submit signed, sealed and dated design calculations with the PLANS for all sewer projects. Calculations shall show that gravity mains shall not be more than 75% full at peak flow.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2310: Gravity Main Design Standard

October 10, 2021

PART 4 DESIGN AND CONSTRUCTION

A. Minimum Size:

1. Gravity mains conveying wastewater shall be 8 inches in diameter or greater.

B. Pipe Cover:

1. The minimum cover over gravity mains shall be no less than 3 feet below the finished grade. Gravity main invert depth shall not exceed 15 feet below finished grade.

C. Slope:

1. Gravity mains shall be designed and constructed to the UTILITIES Design Percent slope. The minimum slopes as shown in Table 2310-2 shall be provided; however, slopes greater than these are desirable.
2. Gravity mains shall have uniform slope between manholes.

Table 2310-2: Minimum Slope Requirements of Gravity Main

Gravity Main Diameter (inches)	UTILITIES Design Percent Slope (%)	Minimum Constructed Percent Slope *
8	0.31	0.28
10	0.24	0.21
12	0.20	0.17
15	0.15	0.12
18	0.12	0.10
21	0.10	0.08
24	0.09	0.07
27	0.08	0.06
30	0.07	0.05
36	0.06	0.04

Note: * Minimum constructed percent slope based on Manning's formula using an "n" value of 0.012 for PVC, when flowing full, and velocities of no less than two feet per second.

D. Size and Alignments:

1. Pipe size shall remain constant between manholes and pipe alignment must remain straight between manholes.

E. Additional Requirements:

1. No person shall discharge stormwater, surface water, groundwater, well water, roof runoff, subsurface drainage, swimming pool drainage, condensate, boiler blow-down, noncontact cooling water, and other unpolluted or uncontaminated

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2310: Gravity Main Design Standard

October 10, 2021

water to any sanitary sewer. Storm drain systems, areaway drains, swimming pool drains, roof downspouts, yard drains, air conditioner condensation lines and water-to-water air conditioner lines shall not connect directly or indirectly to the gravity main system.

F. Future Connections / Stub-outs:

1. All gravity main extensions for future connections shall terminate at a manhole at the property / ROW line or phase line.
 - a. Public manholes shall be located within an easement or ROW.
 - b. Private manholes shall be located within private property, immediately adjacent to the ROW.
2. In the event that an existing 8 inch gravity main has been stubbed out and capped, it shall be the responsibility of the DEVELOPER to provide a new termination manhole prior to connecting any new line for service.
3. Connections to existing manholes shall be core drilled in the field. Cores shall be placed a minimum of 12 inches from existing cores, penetrations, and joints. If existing manhole cores, penetrations, or joints are less than 12 inches apart, the existing manhole shall be removed and a new manhole shall be installed. The new manhole may need to be upsized to accommodate additional connections at no cost to the COUNTY.
4. For proposed projects connecting to existing, inactive, DRY LINE infrastructure, the entire system shall be re-inspected prior to FDEP clearance, including but not limited to CCTV inspection by the CONTRACTOR and shall comply with the specifications and standards approved at the time of original installation. The DEVELOPER shall fix, repair, or replace all defects found by a method approved by UTILITIES at no cost to the COUNTY.
5. Any connection to existing vitrified clay pipe (VCP) shall require the entire line segment(s) from manhole to manhole to be cured in place pipe (CIPP) lined following the WORK by a method approved by the COUNTY.

PART 5 MANHOLES

A. Location:

1. Manholes shall be installed at the end of each gravity main; at all changes in grade, size or alignment; at all gravity main intersections; and at distances not greater than 400 feet. Manholes shall also be provided at phase lines in multiphase projects.
2. Private gravity main systems 8 inches or larger must be separated from UTILITIES gravity main system by a private manhole located within private property, immediately adjacent to the ROW.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2310: Gravity Main Design Standard

October 10, 2021

- a. If private gravity main system is less than 8 inches, cleanouts may be used at the ROW line to separate public from privately owned portions of the gravity collection system.
- b. Under no circumstances shall a cleanout be permitted on an 8 inch main to separate public from privately owned portions of the gravity collection system.

B. Type:

1. Standard Manhole:
 - a. Where the difference in elevation between the incoming gravity main invert and the manhole invert is less than 24 inches, the manhole invert shall be filleted to prevent solids deposition.
2. Drop Manhole:
 - a. An outside drop pipe shall be provided for wastewater gravity main entering a manhole where the invert elevation is 24 inches or more above the manhole invert.
3. Dog house manholes or constructing a new manhole around an existing line is not permitted.

C. Diameter:

1. A minimum access cover diameter of 24 inches shall be provided in all manholes. Manholes shall meet the minimum diameters as shown in the following table.

Table 2310-3: Minimum Manhole Diameters

Gravity Main Diameter (inches)	Minimum Inside Manhole Diameter (inches)
Up to 21 *	48
24 to 30 *	60
36 and larger *	72

Note: * For mains 16 inches and larger with a flow directional change exceeding 45 degrees or more than two (2) pipe penetrations are required, the manhole diameter shall be upsized by 12 inches.

D. Flow Channel:

1. The flow channel through manholes shall be made to conform in shape and slope to that of the gravity mains with a minimum flow line elevation drop of 0.05 feet across the manhole shall be provided. Flow direction changes in excess of 90 degrees shall not be included in gravity main alignments without special consideration. When directional changes exceeding 45 degrees occur, a

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2310: Gravity Main Design Standard

October 10, 2021

flow line elevation drop of 0.1 feet across manholes shall be provided. Benching shall have a minimum slope of 2 inches per foot.

2. No brick shall be used to construct channels. Flow channels shall be as shown in the STANDARD DRAWINGS.

E. Materials:

1. Manholes shall be constructed of precast units as specified in Section 3311, "Wastewater Manholes". Brick or cast-in-place manholes shall not be permitted.

F. Castings:

1. Bolt down and/or gasketed covers shall be provided where manholes are located in areas outside of improved ROW and subject to ponding or flooding.

G. Access:

1. A minimum 10 foot wide access, 1½ inch paved asphalt road, shall be provided for all manholes that are located outside of COUNTY roadways. A minimum 14 foot wide access, 1½ inch paved asphalt road shall be provided for pump stations. The base material shall be a minimum of 6 inches of limerock or soil cement and compacted to a minimum of 98% of AASHTO T-180. The top 12 inches of the access road subgrade shall be stabilized to minimum Limerock Bearing Ratio of 40, and compacted to a minimum of 98% of AASHTO T 180 regardless of the chosen base material.

H. Coating or Lining:

1. When coating or lining is required, existing manholes shall be coated or lined and new manholes shall be lined.
2. An approved coating or liner shall be provided for a minimum of the last three (3) manholes from all directions upstream of the pump station wetwell or all manholes within five-hundred (500) linear pipe ft. of the pump station wetwell, whichever is greater.
3. If a force main enters a collection system, a liner or coating shall be provided for the manhole the force main enters and the next manhole downstream of that connection.
4. See Appendix D, "List of Approved Products" for the approved materials.

PART 6 SERVICE LATERAL CONNECTIONS

- A. Service connections shall be as shown in the STANDARD DRAWINGS.
- B. Service connections shall be permanently marked by cutting an "S" in the curb in direct alignment with the wye and the installation of a stake at the temporary plug to indicate the location of the service pipe as per the STANDARD DRAWINGS.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2310: Gravity Main Design Standard

October 10, 2021

1. Locator balls shall be placed under all sanitary sewer service cleanouts.

C. Size and Length:

1. Service laterals and fittings shall be 6 inches in diameter. Service laterals shall terminate at the ROW with double-sweep tee cleanout(s) installed at each property line.
2. All service laterals shall be less than 60 feet in length between sewer main or manhole to the property line. Service laterals designed within a 100 foot ROW or greater shall be evaluated on a case-by-case basis.

D. Slope:

1. Service laterals shall have a minimum slope of 1%.

- E. If a floor slab elevation is less than 18 inches higher than the closest manhole top elevation, then a private prefabricated pump station shall be required to pump wastewater to the lateral at the cleanout in the road ROW. The lateral receiving the pump station discharge shall be a single lateral, not shared by an adjacent property, and the pump discharge line shall include a check valve. The private pump station shall be operated and maintained by the property OWNER.

F. Connection:

1. Service laterals shall not be directly connected to sanitary manholes, except at terminal manholes. A maximum of two (2) service laterals may connect directly to a terminal manhole.
2. Service laterals shall be installed perpendicular to the main.

G. Future Phases:

1. All lateral connections on new sanitary sewer gravity main shall be made at time of installation of new gravity main. Realigning, adjusting, or adding lateral connections shall require replacement of the gravity main.

H. Connections to Existing (Active or DRY LINE) Sanitary Sewer

1. A maximum of one (1) service wye / double wye may be cut into an existing sanitary sewer segment between manholes. The installation shall not disturb or lift the existing sanitary sewer piping. Connection shall consist of a DR26 fittings including service wye with two (2) hard coupling sleeves adjacent to either side.
2. If multiple services are required in a line segment, then the entire line shall be removed and replaced beginning at the first location of the new service or preexisting retrofitted service and ending with the last location on the new service. Connections shall utilize hard coupling sleeves on each end with all pipe and existing appurtenances removed and new pipe and appurtenances installed. Multiple connections shall require removal and replacement of the entire line segment from manhole to manhole as required by the UTILITIES.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2310: Gravity Main Design Standard

October 10, 2021

PART 7 GREASE TRAPS, INTERCEPTORS AND SEPARATORS

- A. A grease interceptor is required for all commercial establishments where food or beverages will be processed, cooked, or prepared in any way. All kitchen and/or food and beverage preparation waste lines will be routed through the grease interceptor. However, no domestic waste will be allowed to enter the grease interceptor. All wastewater flow from kitchen areas and/or food and beverage preparation areas shall flow through approved grease interceptors prior to entering the UTILITIES system.
- B. Grease interceptors shall be located outside of buildings in accordance with the most current edition of Chapter 37 of the Orange County Code, as such provisions may be periodically amended. Interceptors shall be placed where the proposed food waste line will have adequate slope and be accessible for maintenance and inspection at all times.
- C. The grease interceptor will be sized as defined in Table 2310-4 below and will have a minimum pretreatment volume of 750 gallons and may not exceed a maximum pretreatment volume of 1,250 gallons. When interceptors are installed in series, the combined interceptor pretreatment capacity required may be calculated based on the reduced capacity requirements per seat or per meal as shown in Table 2310-4. The grease interceptor shall be designed and installed in accordance with the manufacturer’s instructions, the requirements of this section, and per the STANDARD DRAWINGS.

Table 2310-4: Sizing Requirements for Grease Interceptors

Type of Facility	Unit	Grease Interceptor Pretreatment Capacity Single (gallons)	Grease Interceptor Pretreatment Capacity In Series (gallons)
Restaurant, Food, or Beverage Preparation	seat	20	10
Restaurant – Fast Food	seat	10	5
Restaurant – 24-hour	seat	30	15
Convention Center, Catering Facility, or Cafeteria	meal	3	1.5

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2310: Gravity Main Design Standard

October 10, 2021

D. Interior Under-the-Counter or Subfloor Grease Traps:

1. UTILITIES may approve an interior under-the-counter or subfloor grease trap in lieu of an exterior grease interceptor on a case-by-case basis and only for the following circumstances:
 - a. A commercial establishment where food or beverages will be cooked, grilled, fried, processed, or handled will only be considered for an under-the-counter or sub floor grease trap if there is a utility (electric, water, sewer or gas) conflict impeding the installation of a grease interceptor device.
 - b. If there is no utility conflict, a commercial establishment where food or beverages will be prepared, processed or handled will only be considered for an under-the-counter or sub floor grease trap if no frying, cooking or grilling will occur on the premises.
2. The following conditions must also apply for a grease trap variance to be considered:
 - a. The restaurant or food/beverage preparation establishment must have less than 600 gpd (two ERUs) wastewater flow;
 - b. An under-the-counter or subfloor grease trap must be installed on all drain fixtures in the food preparation areas, including hand sinks, food or beverage preparation sinks, and dish or glassware washing sinks.
 - c. The ENGINEER shall consult with UTILITIES personnel to request and receive approval of a code variance for the grease trap before finalizing the design and installing a grease trap device.
3. Refer to the following calculation to determine minimum grease trap sizing (flow- through rating) requirements:

$$\text{Minimum Grease Trap Capacity (gpm)} = \frac{[\text{Combined Sink** Storage Volume (units in gallons)}] \times 0.75}{1.0 \text{ minute (sink drain decant time)}}$$

Note: ** Include all hand sinks and food/beverage prep sink interior bowl/basin volumes in this calculation.

4. For a list of grease traps already evaluated by the Orange County Environmental Compliance Section, please contact the Environmental Compliance Section at environmental.compliance@ocfl.net
- E. Lint Interceptors/Traps: Lint interceptors/traps are required for all commercial laundry operations, laundry mats, hotels, and resorts having more than two (2) residential sized laundry machines or one or more commercial laundry machine. Lint interceptors/traps must be a minimum of 100 gallons in size, and be equipped with a screening device capable of separating lint and other solid materials from the wastewater. Lint traps shall be sized based on number of washing machines, wastewater flow rate, wastewater retention time and storage factor.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2310: Gravity Main Design Standard

October 10, 2021

1. Refer to the following calculation to determine minimum lint interceptor/trap sizing requirements:

Minimum Lint Interceptor/Trap Size (in gallons) = (TGC) x (CPH) x (RT) x (ST)

Where:

TGC = Total Gallons per Standard Wash Cycle

CPH = Cycles per hour

RT = Retention time;

1.5 for Institutional Laundry

2.0 for Standard Commercial Laundry

1.5 Light Commercial Laundry

ST = Storage Factor, based on hours of operation;

1.0 for 8 hours of operation

1.5 for 12 or more hours of operation

F. Oil and Water Separators:

1. Oil and water separators are required for all facilities where commercial vehicles or equipment are repaired, maintained or washed, including vehicle repair garages, car-washing facilities, factories, commercial facilities with hydraulic lifts, hydraulic elevators, and all other facilities where oily liquid wastes are produced.
2. Oil and water separators shall be individually designed and sized for each site-specific application.
3. Where automobiles are serviced, greased, repaired or washed or where gasoline is dispensed, oil and water separators shall have a minimum capacity of 6 cubic feet for the first 100 square feet of area to be drained, plus 1 cubic foot for each additional 100 square feet of area to be drained into the separator.
4. All commercial vehicle-washing systems shall be equipped with a water recycling system that has no untreated discharge connection to the county sanitary sewer system. For the purposes of this Section, commercial vehicle washing systems shall include systems associated with businesses that sell or lease cars, trucks, boats, and other motorized vehicles. Hand-held hoses are exempt from this provision.

G. Sand and grit separators/traps: Sand and grit separators/traps are required for all commercial facilities discharging fine particles, floatables, or other debris that could cause clogs or blockages in the county collection system. Examples include sand, dust, metal shavings, rags, strings, feathers, glass, etc. Sand and grit separators shall be individually designed and sized for each site-specific application.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2311: Wastewater Force Main Design Standard

October 10, 2021

PART 1 GENERAL

- A. Force main systems shall be designed for the estimated tributary population, as delineated in the approved UTILITIES' MASTER PLAN (latest edition). When DEVELOPER's wastewater MASTER PLANS are required, force mains shall be designed for the estimated ultimate build out, as approved by UTILITIES.

PART 2 LOCATION

- A. Mains shall be located within dedicated rights-of-way or utility easements.
1. Right-of-way
 - a. When installed in ROW, mains shall maintain a consistent alignment with respect to the centerline of the road. No parallel mains shall be allowed. Force mains and reclaimed water mains shall be installed on the opposite side of the ROW as the water main. Mains shall be installed along one side of the road, with crossings kept to a minimum.
 2. Easements for Mains within Right-of-way
 - a. An easement shall be provided adjacent to the ROW when mains are installed within ROW, but inaccessible from ROW limits, or when excavation without a trench will encroach on private property due to the main's close proximity to ROW.
 3. Easements Outside of Right-of-way
 - a. If piping is constructed within an easement not adjacent to the ROW, the centerline of the pipe shall be located within 2 feet of the centerline of the easement. Easements not adjacent to and paralleling the ROW shall only be considered on a case-by-case basis.
 - b. Mains adjacent to, but installed outside of ROW – minimum 15 feet;
 - c. Mains installed not adjacent to ROW – minimum 20 feet;
 - d. Additional easement width, as determined by UTILITIES, shall be required under the following conditions.
 - i. Pipe sizes greater than 12 inches;
 - ii. When the pipe invert depth is greater than 5 feet, the easement width shall be increased by 3 feet for each additional foot of depth;
 - iii. More than one (1) parallel pipe within the easement; or
 - iv. Pipe is not centered in the easement.
- B. Mains shall not be placed under buildings, retention ponds, courts, swimming pools, fountains, transformers, walls, or other structures. Landscape, retaining and privacy walls and columns, foundations, and gravity wall with tie-backs shall not be placed parallel over mains, and shall be designed to allow for excavation of the main without

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2311: Wastewater Force Main Design Standard

October 10, 2021

- impacting the integrity of the wall or structure. Mains shall not be installed parallel under or parallel over other mains, (i.e. stacked), including but not limited to; storm piping, sanitary, or pressurized pipe. Placement of mains under pavement shall be kept to a minimum. Mains shall not be located along interior side or rear lot lines, unless approved by UTILITIES. Placement of mains along interior side or rear lot lines or storm water retention pond berms may be allowed on a case-by-case basis if such a configuration results in efficient placement and utilization of the system, as determined by UTILITIES. Services, air release valves and other valves shall not be placed along interior side or rear lot lines. ENGINEER shall include cross sections on the PLANS demonstrating that these criteria are met.
- C. Proposed commercial and residential development offsite mains shall be extended a minimum of 10 feet beyond the furthest entrance to the development.
 - D. Force mains shall be designed with uniform positive or negative slopes to avoid undulations and minimize high points and low points in the profile.
 - E. Reference STANDARD DRAWINGS, “Roadway and Utilities Corridor Guides” A900 series, for location details regarding pipe offsets, maximum allowable pipe diameter, distance from structures, and CLEAR ZONE requirements.

PART 3 DESIGN BASIS

- A. Average Daily Flow and Peak Flows:
 - 1. Average daily wastewater flow shall be calculated by referencing the equivalent residential unit flow factors as outlined in Appendix E, “ERC/ERU Design Factors.” Peak hourly wastewater flow rates shall be calculated by referencing the minimum peaking factors as specified in Section 2310, “Gravity Main Design Standard.”
- B. Design Calculations:
 - 1. The ENGINEER shall submit signed, sealed and dated design calculations with the PLANS for all UTILITIES projects. Calculation shall show that the mains will have sufficient hydraulic capacity for peak hourly flows while meeting the requirements of this Section. Minor head losses shall be incorporated in calculations.

PART 4 DESIGN AND CONSTRUCTION

- A. Pipe Cover:
 - 1. A minimum cover of 36 inches shall be provided. Offsite force main within 300 feet of an intersection or parallel to a NON-LOCAL ROADWAY shall require a minimum cover of 48 inches. No pipe cover shall exceed 72 inches unless approved by UTILITIES.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2311: Wastewater Force Main Design Standard

October 10, 2021

B. Road Widening Plan:

1. Utilities work on road identified in FDOT, COUNTY, or a city five (5) year widening plan shall be coordinated by the DEVELOPER / ENGINEER with the respective agency for future depth and location of utilities. Additional depth and / or easements shall be required to accommodate future proposed work of Agencies and all practical measures shall be taken to avoid conflicts / relocations due to future proposed work.

C. Velocity and Diameter:

1. At design pumping rates, a cleansing velocity of at least 2.5 feet per second shall be maintained. Maximum velocity at design pumping rates should not exceed 5 feet per second. The minimum force main diameter shall be 4 inches. Only 4, 6, 8, 12, 16, 20, 24, 30, 36, 42, 48 and 54 inch diameter force mains shall be permitted.

D. Design Friction Losses:

1. Friction losses through mains shall be based on the Hazen Williams or Darcy-Wiesbach formula. In the use of Hazen Williams formula, the value for "C" shall be 120 for all force main and pump station pipe. "C" values shall not exceed 120 per FDEP 62-604.300(8)(a).

E. Design Pressure and Restraint

1. The main and fittings, including all restrained joint fittings shall be designed to withstand pump operating pressures and pressure surges, but no less than 150 psi.
2. All pipe shall be restrained at minimum per the restraint tables as specified in the STANDARD DRAWINGS.
3. All new pipe installed under pavement shall be completely restrained at each bell. All pipe installed in ROW but deemed by the COUNTY to be in a location under future pavement shall be completely restrained at each bell.

F. Connections:

1. For proposed projects connecting to existing, inactive, "DRYLINE" infrastructure, the entire system shall be re-inspected prior to FDEP clearance, including but not limited to pressure testing, and wire check by the CONTRACTOR and shall comply with the specifications and standards approved at time of original installation. The DEVELOPER shall fix, repair, or replace all defects found by a method approved by UTILITIES at no cost to the COUNTY.
2. For projects connecting to existing valves, the ENGINEER shall incorporate methods, materials or requirements in the design for pressure testing of the new systems without reliance on the condition of the existing valve. Existing valves due to age, condition, maintenance are not guaranteed by the COUNTY to meet the pressure test requirements set forth for new materials testing.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2311: Wastewater Force Main Design Standard

October 10, 2021

G. Pipe Deflection:

1. Fittings shall be used for all changes in direction.
2. No allowable deflection is permitted for design of PVC mains. Fittings shall be designed in lieu of deflection for all changes in direction. Sleeves shall not be used for deflection.

H. Separation:

1. Separation of potable water, reclaimed water, storm and sanitary sewer systems shall comply with FDEP regulations and STANDARD DRAWINGS.

PART 5 TERMINATION

- A. Force mains shall enter the gravity sewer system no greater than 1 foot above the lowest invert of the receiving manhole, and orientated to facilitate flow. The interior surfaces of the receiving manhole and the first immediate downstream manhole shall have a protective coating or lining.
- B. Force mains shall terminate directly into a wastewater manhole or force main. Termination into gravity mains is not allowed.

PART 6 AIR RELEASE AND VACUUM RELIEF VALVES

- A. Air release valves or air/vacuum relief valves (ARV) shall be provided, as necessary, to prevent air locking and vacuum formation. All such valves are also required at the high points if the vertical change in elevation is 2 feet or greater.
- B. Valves shall be clearly delineated on the force main profile as shown in the STANDARD DRAWINGS.
- C. A dedicated service lateral shall be provided for discharge of odorous airs and leakage to enter back into the collection system when a gravity system is designed within 60 feet of the ARV. Connecting to existing sewer may be required on a case-by-case basis.

PART 7 VALVES

- A. Valves shall be located on force main systems to facilitate effective isolation of the pipe system for repairs and maintenance. On straight runs of force mains, valve spacing shall not exceed 2,000 feet. Additional valves shall be provided where force mains intersect to facilitate isolation of pipe segments.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2311: Wastewater Force Main Design Standard

October 10, 2021

- B. Valves shall also be provided at the division of UTILITIES versus private ownership such as at the ROW line. Plug valves at the ROW shall have a minimum size of 4 inches.
- C. Tapping valves shall be horizontally installed and abandoned in the open position followed by a plug valve.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2410: Wastewater Pump Station Design Standard

October 10, 2021

PART 1 GENERAL

- A. The design standards outlined in this Section apply to all wastewater pump stations maintained by UTILITIES. All such pump stations shall be submersible type stations. The basis of design shall be reviewed and approved by UTILITIES.
- B. Wastewater pump stations shall be designed for the estimated ultimate tributary population, as delineated in the approved UTILITIES' MASTER PLAN (latest edition). When a DEVELOPER's master plan is required, wastewater pump stations shall be designed for the estimated ultimate build out, as approved by UTILITIES.

PART 2 LOCATION

- A. Pump station sites shall be tracts of land adjacent to ROW. The actual location of all equipment shall be in accordance with the Appendix A, "STANDARD DRAWINGS" or as approved by UTILITIES.

PART 3 DESIGN BASIS

- A. Average Daily Flow:
 1. The wastewater pump station design shall be based on ultimate development or projected flow. Average daily wastewater flow shall be calculated by the Equivalent Residential Unit flow factors as outlined in Appendix E, "ERC/ERU Design Factors".
- B. Peak Design Flow:
 1. The design pumping capability of the station shall be based upon the peak design flow, which shall be calculated by multiplying the design average flow with the applicable minimum peaking factors as outlined in Table 2310-1, "Wastewater Peaking Factors".
- C. Number of Pumps:
 1. Minimum number of pumps is determined by the peak design flow as shown in Table 2410-1.

Table 2410-1: Required Number of Pumps Based on Peak Design Flow

Peak Design Flow (gpm)	Number of Pumps
Less than 1,000	2
1,000 to less than 2,500	3
2,500 to less than 4,000	4
4,000 or greater	6 or more

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2410: Wastewater Pump Station Design Standard

October 10, 2021

D. Pump and Motor Selection:

1. The pump station shall be capable of pumping the peak design flow with the largest pumping unit out of service. The horsepower of the motors provided shall be capable of functioning without overloading over the entire range of the published performance curve. This is so that the motor will not overload if the system hydraulic conditions for the pump change in the future.

E. Design Calculations:

1. The DEVELOPER's ENGINEER shall submit signed, sealed and dated design calculations for all wastewater pump stations. Calculations shall include high head and low head condition system curves plotted on the manufacturer's pump curve, hydraulic analysis of force main system including all friction and minor losses, operating cycles with wetwell sizing, and buoyancy calculations. System curves shall verify that the pumps are operating at peak efficiency and are suitable for the design flow application.
2. Pump and motor selection shall be designed based on the hydraulic grade line at the point of connection provided by UTILITIES.
3. The DEVELOPER'S ENGINEER may submit design calculations for all pump manufacturers approved in Appendix D. However, no pump substitutions shall be permitted during construction and only pump selections utilized in the design calculations shall be approved for installation during construction.
4. Risers, valves and station manifold piping preferred velocity range is 5 – 10 fps at the design (high head) operating point. The minimum velocity through all pipe shall be 2.5 fps.

PART 4 DESIGN AND CONSTRUCTION

A. Flooding:

1. Wastewater pump stations should remain fully operational and accessible during the 100-year flood. Top elevation of wetwell shall be 1 foot or higher above both the 100-year flood elevation and the elevation of the crown of the road. On a case-by-case basis the top elevation of the wetwell may be lower if it can be shown that no drainage runoff from the surrounding areas will flow to the pump station site. Regulations of local, state and federal agencies regarding flood plains shall be considered.

B. Accessibility:

1. The pumping station shall be readily accessible by maintenance vehicles during all weather conditions. The pump station driveway shall be concrete in accordance with the STANDARD DRAWINGS. The facility shall not be located in road ROW. In a phased development, a paved asphalt access road or

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2410: Wastewater Pump Station Design Standard

October 10, 2021

concrete driveway to the pump station shall be required during the initial phases until the permanent access road is installed.

2. Accessibility shall meet Section 2310, Part 5, G, of this MANUAL.
3. An accessibility requirement for large equipment requires a minimum 51 foot turning radius curb to curb and 54 foot turning radius from obstruction to obstruction to access the pump station.
4. The concrete driveway pavement slab shall be 8 inches thick with a minimum of 3,000 psi compressive strength reinforced with fiber mesh. Provide sawcut joints at a minimum of 12 feet on center and expansion joints at a minimum of 40 feet on center. Sawcut joints shall be located at changes in geometry, re-entrant corners, etc. Sawcut joints shall be 2 inches deep and placed in accordance with the fiber mesh manufacturer requirements. Compact the subgrade to 98% maximum density per AASHTO T-180; stabilize the top 12 inches to LBR 40.

C. BOUNDARY SURVEY:

1. A current BOUNDARY SURVEY shall be required at the pump station startup test and inspection. The DEVELOPER shall bear the entire expense of rectifying WORK improperly installed due to the construction of improvements not totally within the site dedicated to UTILITIES. An electronic version and copy of the certified BOUNDARY SURVEY shall be required.

D. Pump Requirements:

1. Pump rails and base elbow shall be capable of installing a Flygt pump (Flygt adaptable) by sliding a Flygt pump down the rails and accomplish a positive seal to the base elbow with no adapters. Adapters permanently attached to the pump are allowable for the purpose of mating to the specified Flygt base elbow.
2. Submersible pumps shall be readily removable and replaceable without dewatering the wetwell or disconnecting any piping in the wetwell.
3. Each pump base elbow shall be supported by a steel plate mounted to the wetwell flooring area. Plates shall be at least 6 inches greater than the pump area and be constructed from 1 inch thick steel plating material.
4. All pump installations shall meet Flygt specifications including mounting height of pumps from wetwell floor area.
5. Pumps shall be capable of handling raw sewage and passing solids of at least 3 inches in diameter, unless approved variance from FDEP and UTILITIES. Pump suction and discharge openings shall be at least 4 inches in diameter.
6. Pumps rated 25 horsepower and above shall have a minimum 6 inch diameter base elbow unless approved by UTILITIES.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2410: Wastewater Pump Station Design Standard

October 10, 2021

7. No pumps with less than 5 horsepower motors will be acceptable.
8. If the design requires a pump 25 horsepower pump or above for a duplex pump station (less than 1,000 gpm), a minimum 10 foot inside diameter wetwell is required.

E. Major Component Requirements:

The major requirements for a pump station are specified in the following table.

Table 2410-2: Pump Station Major Component Requirements

COMPONENT		NUMBER OF PUMPS		
		2	3	4 or More
1	Site Plan	(See #1 below)	(See #1 below)	(See #1 below)
2	Number of wetwells	1	1	2
	Wetwell structure type	Precast	Precast	Cast-in-Place
3	Piping (below or above ground)	Above	Above	Above
4	Site Enclosure	Chain Link or Wall	Wall	Wall
	Gate	Rolling, sliding	Rolling, sliding	Rolling, sliding
5	Flow Meters	(See #5 below)	Yes	Yes
6	Biotrickling filter	No	Yes	Yes
7	SCADA	Yes	Yes	Yes
8	Emergency Generator	(See #8 below)	Yes	Yes
9	A/C MCC	No	No	Yes
10	VFD/Soft Starts	Yes Soft Starts	Yes Soft Starts	Yes VFD / Soft Starts
11	Wetwell Liner	Yes	Yes	Yes
12	Level Control	Transducer and back up float ball	Transducer and back up float ball	Transducer and back up float ball
13	Automatic Gear Actuator	No	No	Yes
14	Mixer	No	No	Yes

Note: Please refer below for component explanation.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2410: Wastewater Pump Station Design Standard

October 10, 2021

1. Site Sizing, Tract and Easement Requirements:
 - a. Pump station sites shall be sized as delineated in the STANDARD DRAWINGS for the duplex, triplex, or more than three (3) pumps per the pump station site plans.
 - b. The boundary of all new pump station tracts shall be located a minimum of 50 feet away from any existing, proposed or future single family residential lot (including TOWNHOMES) and off-site single family residential land use.
 - c. Maintain 50 feet spacing from pool decks, amenity areas and other public gathering spaces.
 - d. New or proposed residential lots shall not be placed within 50 feet of existing pump station or pump station tracts.
 - e. The DEVELOPER shall dedicate the pump station site and driveway by plat or separate instrument to UTILITIES. Dedicated easements shall be shown as specified on the pump station site plans in the STANDARD DRAWINGS.
 - f. Temporary access road shall also be dedicated to UTILITIES, with an ingress/egress/utility easement.
 - g. If an emergency generator is required by FDEP for duplex pump stations then provide a site sized for a triplex pump station.
2. Wetwell Requirements:
 - a. Single wetwell:
 - i. The wetwell for a duplex pump station shall have a minimum of 6 feet inside diameter and shall have a minimum 5 feet between the invert of the gravity pipe elevation and floor of the wetwell. Sufficient depth shall be provided to accommodate cycle time and motor submergence.
 - ii. The wetwell for a triplex pump station shall have a minimum of 12 foot inside diameter and shall have a minimum 5.5 feet between the invert of the gravity pipe elevation and floor of the wetwell. Sufficient depth shall be provided to accommodate cycle time and motor submergence.
 - iii. In determining the cycle time no consideration of volume shall be used for the volume below the top of the pump volute or manufacturer's minimum submergence recommendation whichever is greater.
 - iv. Pumping levels shall be set to provide a minimum capacity between operational water levels sufficient to allow a minimum of 10 minutes in one (1) pumping cycle (the minimum time between successive starts assuming the backup pump is inoperable).

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2410: Wastewater Pump Station Design Standard

October 10, 2021

- v. Pump off water levels shall provide adequate submergence to preclude pump inlet cavitation. Design maximum water levels shall not exceed 12 inches below the invert elevation of the influent pipe.
 - vi. The wetwell floor shall have a minimum slope of one to one (1:1) to the hopper bottom. The horizontal area of the hopper bottom shall be no greater than necessary for proper installation and function of the pump inlet.
 - vii. No interior ladders are permitted.
 - viii. Only one (1) gasketed, water-tight influent inlet connection shall be permitted to a wetwell.
 - ix. The total downward force acting on the wetwell shall be greater than the total upward buoyant force by a minimum safety factor of 1.3. The calculation shall assume the depth of groundwater to be at land surface. The calculation shall not consider any weight from the components within the wetwell, the weight of the wetwell lid, or frictional forces from the soil.
- b. Dual wetwells:
- i. When required, dual wetwells shall be designed with the same criteria as a single wetwell; except the wetwell shall be cast-in-place with dual inlets and valving to separate either wetwell. Valving shall be located at the bottom of the wetwell. The influent slope of the wetwell floor shall have a minimum slope 1 inch per foot to the hopper bottom.
3. Piping:
- a. Piping shall be installed above ground with a concrete slab for all pump stations. Valve vaults shall not be permitted.
4. Site Enclosures:
- a. All pump station sites shall be enclosed.
 - b. Duplex pump stations shall at a minimum have chain link fencing with a rolling slide gate.
 - c. All pump stations with more than two (2) pumps and all duplex pump stations installed with generators, shall require split-face block walls or precast concrete wall panels meeting the wind load within the current edition of the Florida Building Code, a minimum 140 mph wind speed exposure C, and include a 15 foot minimum black colored anodized aluminum rolling slide gate.
 - i. Any request to deviate from color or design to match existing may be reviewed and approved on a case-by-case basis.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2410: Wastewater Pump Station Design Standard

October 10, 2021

- d. Duplex stations without generators may utilize wall systems; subject to review and approval by UTILITIES.
5. Flow Meters:
 - a. Indicating, totalizing and recording flow measurement devices shall be provided at pumping stations where required in Table 2410-2 and at all pump stations requiring a generator per FDEP. Bypass piping around the meter shall be provided for all stations with flow meters to facilitate meter maintenance.
 6. Packaged Odor Control System:
 - a. Provide a complete modular odor control system if required (refer to Table 2410-2: Biotrickling Filter). The odor control system shall include a modular biotrickling filtration system followed by a polishing stage utilizing virgin activated carbon media. The system shall be capable of removing hydrogen sulfide and other typical odor causing compounds from air stream; including but not limited to: methyl mercaptan and dimethyl sulfide.
 - b. For new stations, the design inlet hydrogen sulfide concentration shall be 50 parts per million (ppm), with a peak loading of 150 ppm. Odor control design for existing stations shall be based on measured values. The odor control system, including carbon polishing, shall be capable of reducing hydrogen sulfide to a concentration of 0.05 ppm.
 - c. Biotrickling Unit:
 - i. The first-stage biotrickling filter hydrogen sulfide removal efficiency shall be 99% or greater and maintained under the variable loading conditions; for inlet hydrogen sulfide concentrations below 10 ppm a maximum outlet hydrogen sulfide concentration of 0.5 ppm shall be acceptable to account for potential reduced performance resulting from lower hydrogen sulfide inlet concentrations.
 - ii. The ventilation rate shall be capable of a minimum of six (6) air changes per hour of the wetwell volume plus half of the volume of the upstream 500 linear feet of gravity main and/or force main system. The biotrickling filter fan (blower) motor shall be controlled by a VFD. At a minimum, the fan capacity for a triplex pump station shall be 300 cfm. The biotrickling filter shall have a minimum 12 second empty bed retention time (EBRT) when carbon polishing stage is present.
 - iii. The odor control design of four (4) or more pumps shall be based on site specific criteria, subject to detailed design review and approval of UTILITIES. Refer to Section 3410, "Wastewater Pump Stations" specification for additional information.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2410: Wastewater Pump Station Design Standard

October 10, 2021

7. SCADA:
 - a. Control Panel:
 - i. Panel shall be of type to match pump station configuration (number of pumps, control features, etc) as determined by UTILITIES. Refer to Section 3413, “SCADA RTU Panel” specification for additional information.
8. Emergency Generator:
 - a. Pump stations shall be provided with emergency power receptacles. Emergency generators shall also be required for duplex pump stations as required by FDEP Regulations.
 - b. All triplex pump stations and larger shall require an in-place emergency generator. Duplex pump stations that receive flow from one (1) or more FDEP permitted pump station(s) shall be provided for uninterrupted pumping capabilities, including an in-place emergency generator.
 - c. Existing Pump Stations:
 - i. Existing pump stations that will begin receiving flow by new pump stations (public or private) modifying the operational conditions of an existing pump station due to re-pumping shall be classified as a critical pump station.
 - ii. An in-place emergency generator, in accordance with Section 3412 2.10 “Standby Power Generator System”, shall be installed at no cost to the COUNTY. The design, construction, and materials shall be provided at no cost to the COUNTY. The installation shall be performed by UTILITIES, or by the CONTRACTOR, subject to BCC approval to perform the work on COUNTY property.
9. Air Conditioned Motor Control Center:
 - a. The building shall be split-face block on a concrete slab, prestressed concrete roof slab with built-up roofing, interior walls shall be R-4 insulated or greater, and the suspended ceiling shall be R-19 insulated.
 - b. A high temperature alarm with dry contact shall be provided for connection to SCADA control panel.
 - c. Each building shall be equipped with two (2) separate A/C units. Each unit shall have a “filter back” return air grill.
 - d. Each exterior door shall be equipped with a weather proof stainless steel push button combination lock. Interior doors shall be equipped with a panic bar. Interior lighting for the building shall be provided.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2410: Wastewater Pump Station Design Standard

October 10, 2021

10. Soft starts and Variable Frequency Drive Motors:

- a. Soft starts are required for all pumps.
- b. Where variable frequency drives (VFDs) are installed, motors shall be rated for inverter operation and shall indicate inverter rating on the nameplate. All Variable Frequency Drives shall have bypass contactors installed to allow operation of the pump motor should the variable frequency drive fail.

11. Wetwell Liner:

- a. Wetwell liner to be provided as specified in Appendix D, “List of Approved Products”.

12. Level Control:

- a. Pump operation shall be controlled automatically by means of a level transducer. Transducer signals shall be transmitted to the control panel through SCADA.
- b. There shall also be a backup float ball level control system which transmits signals to the control panel, monitored by SCADA. At stations with four (4) or more pumps, a backup float-based control panel shall be provided in case of failure of the SCADA PLC.
- c. Requirements in Section 3412, “Wastewater Pump Station Electrical Power and Control System” shall apply. Refer to the STANDARD DRAWINGS for level control positioning.

13. Automatic Gear Actuator:

- a. Automatic Gear Actuator shall be installed on all valves inside the pump station tract for pump stations with four (4) or more pumps.

14. Mixer:

- a. Mixer(s) shall be required for all pump stations with four (4) or more pumps.
- b. Each mixer shall be of the close-coupled, submersible type design. All components of the mixer, including the motor shall be capable of continuous underwater operation while the mixer propeller is completely submerged. In addition, all components of the mixer shall be capable of operation in air, completely unsubmerged for two (2) hours.
- c. All exposed hardware shall be 316 SST.

F. Electrical Equipment, Power Supply and Power Cords:

1. Requirements in Section 3411 “Submersible Wastewater Pumps” and Section 3412 “Wastewater Pump Station Electrical Power and Control System” shall apply.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2410: Wastewater Pump Station Design Standard

October 10, 2021

G. Controls:

1. Requirements in Section 3412, “Wastewater Pump Station Electrical Power and Control System” shall apply.

H. Site Grading:

1. Wastewater pump station grades shall prevent local ponding, provide positive drainage away from structures and generally be limited to no greater than 2% slopes. Land grading outside of the wastewater pump station perimeter fence shall not exceed 5 to 1 slopes. To the greatest extent possible, lesser slopes are preferred and shall be a minimum of 2% away from the site. Any slopes exceeding 5 to 1 must be approved by UTILITIES.
2. The use of retaining walls on or immediately adjacent to the wastewater pump station site or within the easement is not permitted. Access drive slopes, including driveway and apron, shall be no greater than 7% at any point along the centerline of the driveway.

I. Landscaping:

1. UTILITIES shall not design, accept or maintain landscaping. If landscaping is desired by HOA/property owner, a minimum 3 feet clear zone shall be maintained from the pump station tract, shall not obstruct access to the pump station, and shall be the responsibility of the HOA/property owner.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2510: Reclaimed Water Main Design Standard

October 10, 2021

PART 1 GENERAL

- A. Reclaimed water shall be utilized, when available, for irrigation and other approved uses that do not require potable water. Use of reclaimed water shall be in accordance with the most current edition of Chapter 37 of the Orange County Code and “Chapter 62-610, Reuse of Reclaimed Water and Land Application, Part III, FAC”. Reclaimed water facilities shall be independent of all potable water, raw water supply, wastewater, and storm water systems.
- B. Based on Chapter 37 of the Orange County Code and the criteria contained herein, UTILITIES will evaluate all new developments to determine if the use of reclaimed water is appropriate. UTILITIES will review the proposed reclaimed water use and demand of the proposed development to determine if connection to the reclaimed water system represents a benefit to the community.
- C. Upon completion of the evaluation, UTILITIES shall have the authority to require the development, including all individual lots and tracts therein, to be connected to the reclaimed water system for all landscaped and sodded areas of the development that are planned to be irrigated by the DEVELOPER. The DEVELOPER shall be responsible for all costs necessary to provide onsite distribution and offsite transmission required to serve the irrigation needs of the development.
- D. In cases of conflict, the Chapter 37 of the Orange County Code shall prevail. Reclaimed water use shall be a condition of all development approvals granted as of the effective date of the Chapter 37 of the Orange County Code, provided that service is available and adequate flow capacity (flow and pressure) exists, or will exist in the UTILITIES reclaimed water facilities to service the development, as determined by the DIRECTOR and as set forth by the following criteria.
 1. For new Planned Development (PD) Projects and/or new Development of Regional Impact (DRI) Projects, reclaimed water shall be considered available if the UTILITIES reclaimed water facilities are located at a distance of 1,350 feet or less from the development property line within two (2) years after the Preliminary Subdivision Plan (PSP) or Development Plan (DP) approval for any portion of the PD or DRI.
 2. For PSPs, reclaimed water service shall be considered available if UTILITIES reclaimed water facilities are located at a distance as specified in Table 2510-1, within one (1) year or after the COUNTY approval of the PSP.
 3. For all other proposed development projects that are not part of a PD or PSP, reclaimed water service shall be considered available if UTILITIES facilities exist within the distances noted in Table 2510-1 at the time of commercial site plan approval. The distance in Table 2510-1 shall be measured along a road ROW or an accessible utility easement accommodating public utilities.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2510: Reclaimed Water Main Design Standard

October 10, 2021

Table 2510-1: Reclaimed Water Offsite Service Extension

Irrigation Demand for the Development (gpd)	Maximum Distance from the Development Property Line to UTILITIES' Reclaimed Water Facilities (feet)
< 25,000	150
25,000 - 50,000	300
50,001 - 100,000	600
> 100,000	1,350

4. Notwithstanding the above availability requirements, officially designated "Affordable Housing Developments" as approved by the COUNTY shall be exempt.

PART 2 LOCATION

- A. Refer to Section 2210, Part 2 "Water Main Design Standard".

PART 3 DESIGN BASIS

- A. Design Basis:

1. Reclaimed water systems shall be designed to promote efficient reclaimed water usage. Reclaimed water mains shall be designed for the estimated ultimate irrigation demand, based on planned development build-out. The DEVELOPER is responsible for sizing of the mains, only for the development. Individual single-family homes are exempt from providing design calculations for irrigation systems with one (1) inch or smaller meters.
2. Reclaimed water mains shall be sized using the flow calculations and peak hourly factor as described below while maintaining the minimum pipe diameters specified in this Section.

- B. Weekly Flows and Peak Flows:

1. The weekly reclaimed water flow shall be based on a minimum of 1 inch per week over the irrigable area of the property.
2. Peaking factor for peak flow calculations:
 - a. For commercial developments, the peak reclaimed water flow shall be calculated by dividing the weekly flow by two (2) days of irrigation per week and multiplying the result by a peak hourly factor of 6. Irrigation zones shall be provided to uniformly distribute flows so that the maximum peak hourly factor is not exceeded. Alternate irrigation system designs will be evaluated on a case-by-case basis.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2510: Reclaimed Water Main Design Standard

October 10, 2021

- b. For single family residential developments, the peak reclaimed water flow shall be calculated by dividing the weekly flow by four (4) days of irrigation per week and multiplying the result by a peak hourly factor of six (6).

C. Design Calculations:

1. DEVELOPER's ENGINEER or Landscape ARCHITECT shall submit signed, sealed and dated design calculations with the MASTER PLAN and the PLANS for all reclaimed water distribution projects.
2. Calculations shall show that reclaimed water mains will have sufficient hydraulic capacity to transport peak flows. All head losses and minor losses shall be included in the calculations.

PART 4 DESIGN AND CONSTRUCTION

A. Pipe Cover:

1. Refer to Section 2210, Part 4, A "Water Main Design Standard"

B. Road Widening Plan:

1. Refer to Section 2210, Part 4, B "Water Main Design Standard"

C. Pressure:

1. All reclaimed water mains shall be designed to maintain a minimum pressure of 35 psi at the required meter connection. For excessive pressures, privately owned pressure-reducing provisions may be required.

D. Velocity and Diameter:

1. Only 4, 6, 8, 12, 16, 20, 24, 30, 36, 42, 48 and 54 inch diameter mains shall be permitted.
2. A maximum of 500 feet of 6 inch main followed by a maximum of 500 feet of 4 inch main shall be permitted for dead-end reclaimed water mains along cul-de-sacs. Looped system mains shall be a minimum of 6 inch diameter.
3. Trunk lines serving subdivisions exceeding fifty (50) single family residences shall be a minimum of 8 inch diameter. Using the design basis peak hourly factors, reclaimed water mains shall be sized to meet the minimum pressure and the maximum velocity requirements specified in this Section.
4. The maximum velocity in UTILITIES' owned portion of the system shall not exceed 10 feet per second for ductile iron pipe. In no case shall connections be made to cause velocities to exceed 8 feet per second in existing PVC mains.

E. Material:

1. Refer to Section 2210, Part 4, G "Water Main Design Standard"

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2510: Reclaimed Water Main Design Standard

October 10, 2021

F. Design Friction Losses:

1. Refer to Section 2210, Part 4, D “Water Main Design Standard”

G. Design Pressure and Restraint:

1. Refer to Section 2210, Part 4, E “Water Main Design Standard”

H. Pipe Deflection:

1. Refer to Section 2210, Part 4, H “Water Main Design Standard”

I. Dead Ends:

1. Dead Ends with the following exception; where dead end mains occur, blow-off valve for flushing purposes shall not be required for reclaimed water mains.

J. Valves:

1. Resilient seat gate valves shall be installed vertically in accordance with the specifications in Chapter 3 and Appendix D to isolate reclaimed water mains.
2. Valves shall be located on reclaimed water mains to provide ease of operation, maintenance and isolation.
3. In-line valves shall be located generally at 1,500 foot intervals. Adequate number of valves shall also be provided at all areas where reclaimed water mains intersect to ensure effective isolation of reclaimed water lines for repair, maintenance or future extension.
4. The pipe profile shall show valves with the minimum pipe cover at the valve as specified in Table 2210-1 - Minimum Pipe Cover Required for Pipe at Gate Valves.

K. Air Release Valves:

1. ARVs shall be located at high points in reclaimed water mains where service connections are limited and where elevation changes exceed 5 feet.

L. Control Valves:

1. Pressure reducing and/or pressure sustaining valves shall be provided on master metered reclaimed water main connections for maintaining adequate system pressures.
2. Single-family residential developments may be required to have a pressure-reducing valve at all main connections to UTILITIES RECLAIMED WATER SYSTEM; and
3. Other developments utilizing well backup with or without storage are required to have a pressure reducing/sustaining valve at the master meter.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2510: Reclaimed Water Main Design Standard

October 10, 2021

M. Booster Pumps:

1. In-line booster pumps are not permitted on RECLAIMED WATER SYSTEMS.

N. Pipe Restrained Joints:

1. Refer to Section 2210, Part 4, E “Water Main Design Standard”.

O. Separation Requirements for Water Mains, Reclaimed Water Mains and Sewers:

1. Refer to Section 2210, Part 4, L “Water Main Design Standard”.

P. Signage and Public Notice:

1. For all systems, there shall be readily identifiable “reclaimed water” or “Do Not Drink” notices, marking or coding on application/distribution facilities and appurtenances.
2. Notification shall be accomplished by the posting of advisory signs designating the nature of the reclaimed project area where reclaimed is practiced, notes on scorecards or by other methods per the STANDARD DRAWINGS. Notification methods used include posting of advisory signs at entrances to residential neighborhoods, medians, ROW, at the entrance to a golf course, and at the first and tenth tees.
3. Advisory signs shall be posted adjacent to lakes or ponds used to store reclaimed water with a minimum of four (4) signs or as determined by UTILITIES. Advisory signs shall be posted at decorative water features that use reclaimed water and shall include the following text: “Do Not Drink” and “Do Not Swim” together per the STANDARD DRAWINGS.
4. The DEVELOPER shall be responsible for all cost incurred and installation of reclaimed water signage in accordance with FDEP regulations and UTILITIES standards. The OWNER responsible for operation and maintenance of the private irrigation system shall also be responsible for maintenance of the signage.
5. UTILITIES will be responsible for maintenance of signage for UTILITIES RECLAIMED WATER SYSTEMS.

PART 5 SERVICES AND CONNECTIONS

A. Connections shall conform to the applicable provisions of the MANUAL.

B. Connections:

1. For proposed projects connecting to existing, inactive, “DRY LINE” infrastructure, the entire system shall be re-tested including but not limited to pressure testing, and wire check by the CONTRACTOR and shall comply with the specifications and standards approved at time of original installation. The DEVELOPER shall fix, repair, or replace all defects found by a method approved by UTILITIES at no cost to the COUNTY.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2510: Reclaimed Water Main Design Standard

October 10, 2021

2. For projects connecting to existing valves, the ENGINEER shall incorporate methods, materials or requirements in the design for pressure testing of the new systems without reliance on the condition of the existing valve. Existing valves due to age, condition, maintenance are not guaranteed by the COUNTY to meet the pressure test requirements set forth for new materials testing.

C. Services:

1. Services shall conform to the applicable provisions of this MANUAL. Only 1, 2, 4, 6 and 8 inch services will be permitted. All services greater than 8 inches will be evaluated on a case-by-case basis, as determined by UTILITIES.
 - a. One (1) and two (2) inch services shall be polyethylene tubing.
 - b. Services 4 inch and larger shall be restrained joint DIP from the point of connection to the main to the meter assembly, if the existing main is on the same side of the street as the property. If the main is on the opposite side of the street, as a minimum, the segment of pipe immediately upstream from the meter assembly shall be DIP.
2. Services and connections four (4) inches or larger to new or existing reclaimed water systems shall be installed by the DEVELOPER. The CONTRACTOR shall furnish service connections for new reclaimed water main extensions. The CONTRACTOR shall install all taps and services on existing mains, if new main extensions are installed as part of the project scope. The CONTRACTOR shall furnish all service connections for new reclaimed water main extensions.
3. For projects not consisting of new main extensions, UTILITIES may, on a case-by-case basis, install residential services up to 2 inches. OWNER shall be responsible for payment of applicable fees and charges prior to service installation.

PART 6 RECLAIMED WATER METERING

A. General:

1. Refer to 2210, Part 6, A “Water Main Design Standard”.
2. All reclaimed water service connections shall be metered. In general, the method of metering will follow the guidelines listed below. A master metering system is required when reclaimed water flow dictates installation of a 4 inch or larger meter. However, the DEVELOPER’s ENGINEER must obtain approval before finalizing the metering system design. Meter boxes shall not be installed in sidewalks, driveways or areas subject to vehicular traffic.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2510: Reclaimed Water Main Design Standard

October 10, 2021

- B. Single Family and Duplex, Homes with public ROW:
1. Each unit shall be individually metered. All meter(s) shall be located within a utility easement immediately adjacent to the public ROW at the property line located in between lots as indicated in the STANDARD DRAWINGS.
 2. On-site reclaimed water systems downstream of the meter shall be maintained by the Homeowner or Homeowner's Association.
- C. Single Family and Duplex Homes with Private Streets:
1. If easements are dedicated over the entire private street common areas, individual meters may be permitted in accordance with PART 6, "Reclaimed Water Metering", paragraph B. Additionally, private streets shall meet COUNTY standards and sufficient area must be available outside of paved areas to locate water mains, services, and meters. If these criteria cannot be met, the subdivision shall be metered pursuant to PART 6, "Reclaimed Water Metering", paragraph E.
 2. On-site reclaimed water systems downstream of the meter shall be maintained by the Homeowner or Homeowner's Association.
- D. TOWNHOMES with public ROW or Private Streets:
1. TOWNHOMES shall install a master meter for individual buildings or groups of buildings. Meters shall be installed within the ROW or within a minimum 10 x 15 foot utility easement immediately adjacent to the public ROW in as indicated in the STANDARD DRAWINGS.
 2. Private streets shall meet COUNTY standards and sufficient area must be available outside of paved areas to locate mains, services, and meters. If these criteria cannot be met, the subdivision shall be metered pursuant to PART 6, "Reclaimed Water Metering", paragraph E.
- E. Single Family, Duplex and TOWNHOMES with Private Streets not meeting COUNTY standards:
1. DEVELOPER shall provide a master meter located within a minimum 10 x 15 foot utility easement immediately adjacent to the public ROW as indicated in the STANDARD DRAWINGS.
 2. On-site reclaimed water systems downstream of the master meter shall be maintained by the Homeowner or Homeowner's Association.
- F. Commercial, Industrial, Institutional, Shopping Centers, Apartments, and Condominium Projects:
1. In general, all such projects shall require installation of one meter to service the entire development. If the average daily demand is 100,000 gpd or greater, a reclaimed water agreement shall be required. In general, shopping centers and associated out parcels shall require installation of a single meter to service the

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2510: Reclaimed Water Main Design Standard

October 10, 2021

entire development unless out parcels are adjacent to public ROW or otherwise approved by UTILITIES.

G. Meter Installation:

1. Meters larger than 2 inch shall be installed by the DEVELOPER. Installation of meters 2 inches and smaller will be performed by UTILITIES. Meters 1 inch or smaller in size will be installed underground in an approved meter box. Meters that are 1-1/2 inch and larger shall be installed above ground, within a utility easement adjacent to the public ROW.

H. Meter Sizing:

1. UTILITIES shall determine the size and quantity of all meters. The DEVELOPER's ENGINEER or Landscape ARCHITECT shall provide sufficient information on estimated average daily and peak flows to determine meter size.
2. Reclaimed water meters shall be sized using Table 2510-2, where the Peak Flow is defined as the highest flow resulting from a combination of zones designed to flow simultaneously.

Table 2510-2: Flow and Selection of Reclaimed Water Meter Size

Meter Size (inches)	Reclaimed Water Meter Peak Flow Up to (gpm)
3/4	15
1	25
1.5	50
2	80
3**	125*

Note: * For peak reclaimed water flows above 125 gpm, contact Development Engineering for guidance.

** Service piping and connection to 3 inch meter to be reviewed by UTILITIES.

PART 7 IRRIGATION WELLS

A. General:

1. Existing or proposed wells may be utilized as a back-up supply of irrigation water in the case of an interruption of service from UTILITIES RECLAIMED WATER SYSTEM.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2510: Reclaimed Water Main Design Standard

October 10, 2021

B. Well Back-Up:

1. Users that install back-up wells that are sized and have capacity to meet the anticipated peak flow demands of the system may be eligible for a wholesale reclaimed water rate.

C. Ground Water Protection:

1. Existing or proposed wells must be protected from reclaimed water entering the well by either an air-gap or must be outfitted with an approved double check valve assembly or reduce pressure backflow preventer.

PART 8 ON-SITE STORAGE

- A. If the annual average daily demand is greater than 172,000 gallons, on-site storage may be required. The installation of on-site storage with a backup irrigation well will qualify the user for the most favorable rate. The volume of the on-site storage ponds or tanks shall be equal to or greater than the annual average daily demand during a 24 hour period.
- B. On-site storage ponds shall be lined and owned, operated and maintained by the pond OWNER. An engineering submittal for the proposed design shall be transmitted to UTILITIES for review and approval.
 1. At a minimum, the submittal shall include construction plans and an engineering report supporting the pond design.
 2. The pond shall include a level control device to avoid overflow and shall be owned, operated and maintained by the pond OWNER.
 3. The pond reclaimed water meter assembly shall include a pressure sustaining valve to protect the County system pressure.
 4. No monitoring wells shall be approved.
 5. The submittal must meet the requirements of UTILITIES, as well as 62-610, FAC. Two (2) copies of any submittal are required, one (1) of which will be transmitted to FDEP for review.
- C. Single-family residential developments, where UTILITIES will own, operate and maintain the on-site distribution system are exempt from on-site storage requirements.

PART 9 APPROVED USES OF RECLAIMED WATER

- A. In addition to citrus groves, landscaping, and golf courses, other uses of reclaimed water may be acceptable if the following requirements are met:
 1. Specific approval by UTILITIES.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2510: Reclaimed Water Main Design Standard

October 10, 2021

2. All requirements of “Chapter 62-610, Reuse of Reclaimed Water and Land Application, Part III, FAC” are met.
- B. Other Approved Uses of Reclaimed Water:
1. Construction dust control;
 2. Flushing of sanitary sewers and reclaimed water mains;
 3. Cleaning roads, sidewalks and other outdoor work areas;
 4. Industrial process water; and
 5. Cooling towers.

PART 10 PROHIBITED USES OF RECLAIMED WATER

- A. The following uses of reclaimed water are prohibited:
1. Fire protection - the use of reclaimed water as a supply for fire hydrants and fire sprinkler systems;
 2. Toilet flushing - reclaimed water shall not be connected to any internal building plumbing fixture or piping utilized for toilet flushing or other potable water systems;
 3. Laundry water supply;
 4. Swimming pools or spas;
 5. Single family residential air conditioning systems;
 6. Vehicle washing;
 7. Manufacture of ice for ice rinks; and
 8. Hose bibbs.

PART 11 CROSS CONNECTION CONTROL

- A. Refer to Section 2210, Part 9 “Water Main Design Standard”.

PART 12 PROTECTION OF RECLAIMED WATER SYSTEM

- A. General:
1. To protect UTILITIES RECLAIMED WATER SYSTEM from contamination due to cross-connection with a private system utilizing a chemical injection and/or storm water augmentation systems, a UTILITIES approved backflow prevention device shall be required.

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS

Section 2510: Reclaimed Water Main Design Standard

October 10, 2021

2. Developments that use reclaimed water with chemical injection and/or storm water augmentation systems that add potential contaminants such as fertilizer, pesticides, algaecides, etc., shall as a minimum, require installation of an approved double check valve assembly. Projects with a higher degree of hazard, such as saline solutions, etc., may be required to install an approved reduced pressure backflow preventer assembly or other device.

B. Location and Installation:

1. All backflow prevention devices are to be located directly following the reclaimed water meter serving the OWNER's property. Backflow prevention devices shall be installed per the "Orange County Utilities Cross Connection Manual". It shall be the OWNER's responsibility to pay for and install all backflow prevention devices. It shall be the OWNER's responsibility to maintain all backflow prevention devices.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3110: General Construction Requirements

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This section covers general conditions the CONTRACTOR shall comply with regarding the construction sites.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GRADES, SURVEY LINES, AND PROTECTION OF MONUMENTS

A. Grade:

1. All approved WORK shall be constructed in accordance with the lines and grades shown on the PLANS. The full responsibility for keeping alignment and grade shall rest upon the CONTRACTOR.
2. Benchmarks and base line controlling points shall be established prior to beginning work. Reference marks for lines and grades as the work progresses will be located to cause as little inconvenience to the prosecution of the WORK as possible. The CONTRACTOR shall also place excavation and other materials as to cause no inconvenience in the use of the reference marks provided. CONTRACTOR shall remove any obstructions placed contrary to this provision.

B. Surveys:

1. The CONTRACTOR shall furnish and maintain, at their own expense, stakes and other such materials, and give such assistance, including qualified helpers, for setting reference marks to the satisfaction of UTILITIES and the ENGINEER.
2. The CONTRACTOR shall check such reference marks by such means as he may deem necessary and, before using this, shall call UTILITIES' attention to any inaccuracies.
3. The CONTRACTOR shall, at their own expense, establish all working or construction lines and grades as required from the reference marks, and shall be solely responsible for the accuracy thereof. However, the CONTRACTOR shall be subject to the check and review by UTILITIES.
4. The CONTRACTOR shall, at their own expense, provide a SURVEYOR to survey and monument all tracts and easements, including but not limited to: pump station tracts or proposed easements on private property prior to the start of UTILITIES WORK. Monuments shall be preserved throughout the WORK.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3110: General Construction Requirements

October 10, 2021

5. The CONTRACTOR shall, at their own expense, provide a SURVEYOR to survey stake or monument the proposed ROW of property to be turned over to the Public prior to the start of UTILITIES WORK. Monuments shall be preserved throughout the WORK.

C. Monument Preservation:

1. Property corners and survey monuments shall be preserved using care not to disturb or destroy them. If a property corner or survey monument is disturbed or destroyed during construction, whether by accident, careless work, or required to be disturbed or destroyed by the construction WORK, said property corner or survey monument shall be restored by a SURVEYOR. All costs for this work shall be paid for by the CONTRACTOR.

3.02 UTILITY COORDINATION

A. Location of Utilities:

1. Prior to proceeding with trench excavation the CONTRACTOR shall contact all utility companies and all other users of the ROW in the area to aid in locating their underground services. It shall be the CONTRACTOR's responsibility to contact utility companies at least three (3) NORMAL WORKING DAYs before starting construction. The CONTRACTOR shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground utilities may be determined. The CONTRACTOR shall comply with Chapter 556, F.S., "Underground Facility Damage Prevention and Safety Act", Chapter 553, F.S., "Florida Trench Safety Act, Part IV", Chapter 368, F.S., "Florida Gas Safety Law, Part 1" and OSHA Standard 1926.651.
2. The CONTRACTOR shall take all reasonable precautions against damage to existing utilities. However, in the event of a break in an existing water main, gas main, sewer or underground cable, the CONTRACTOR shall immediately notify the responsible official of the organization operating the interrupted utility. The CONTRACTOR shall lend all possible assistance in restoring services and shall assume all cost, charges, or claims connected with the interruption and repair of such services, as determined by UTILITIES.
3. UTILITIES may elect to facilitate the repair with UTILITIES forces.
4. The CONTRACTOR shall not operate UTILITIES valves without authorization from UTILITIES.

B. Deviations Occasioned by Structures or Utilities:

1. Wherever obstructions are encountered during the progress of the WORK and interfere to such an extent that an alteration in the PLANS is required, UTILITIES shall have the authority to order a deviation from the line and grade or arrange with the OWNERS of the structures for the removal, relocation or reconstruction of the obstructions. Where gas, water, telephone, electrical,

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3110: General Construction Requirements

October 10, 2021

hot water, steam or other existing utilities are an impediment to the vertical or horizontal alignment of the proposed pipe line, UTILITIES shall have the authority to order a change in grade or alignment or shall have the authority to direct the CONTRACTOR to arrange with the OWNERS of the utilities and all other users of the ROW for their location and removal as required at no cost to the COUNTY. If a change in line or grade of a gravity sewer is necessary, UTILITIES will require the addition of any manholes needed to maintain the integrity of the sewer system at no cost to the COUNTY.

C. Subsurface Exploration:

1. The CONTRACTOR shall make such subsurface explorations as necessary to perform the WORK.

D. Test Pits:

1. Test pits for the purpose of locating underground pipeline, utilities, or structures in advance of the construction shall be excavated and backfilled by the CONTRACTOR. Test pits shall be backfilled immediately after their purpose has been satisfied and maintained in a manner satisfactory to UTILITIES. The costs for such test pits shall be borne by the CONTRACTOR.

3.03 MAINTENANCE OF TRAFFIC, PEDESTRIAN WALKWAYS, AND CLOSING OF STREETS

- A. The requirements by PUBLIC WORKS for traffic control of non-emergency road closures and closures of pedestrian walkways shall be adhered to in addition to the requirements as outlined below.
- B. The CONTRACTOR shall carry on the WORK in a manner that will cause a minimum of interruption to traffic. Where traffic must cross open trenches, the CONTRACTOR shall provide suitable bridges and crossings at street intersections and driveways. The CONTRACTOR shall post suitable signs indicating that a street is closed with necessary detour signs for the proper maintenance of traffic. Prior to closing of any streets, the CONTRACTOR shall notify and obtain the approval of responsible authorities (COUNTY, City, FDOT, etc.) and UTILITIES.
- C. Unless permission to temporarily close a street is received in writing from the proper authority (COUNTY, City, FDOT, etc.), all excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times. If the CONTRACTOR's operations cause traffic hazards, they shall repair the road surface, provide temporary ways, erect wheel guards or fences, or take other measures for safety satisfactory to UTILITIES.
- D. Detours around construction will be subject to the approval of the authority having jurisdiction and UTILITIES. Where detours are permitted, the CONTRACTOR shall provide all necessary barricades and signs as required to divert the flow of traffic. The CONTRACTOR shall expedite construction operations while traffic is detoured. Time

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3110: General Construction Requirements

October 10, 2021

periods when traffic is being detoured will be established by COUNTY, FDOT or prevailing authority.

- E. It shall be the sole responsibility of the CONTRACTOR to take precautions to prevent injury to the public due to open trenches. Night watchmen may be required where special hazards exist or police protection provided for traffic while work is in progress. The CONTRACTOR shall be fully responsible for damage or injuries whether or not police protection has been provided.

3.04 PROTECTION OF PUBLIC AND PROPERTY

A. Barricades, Guards and Safety Provisions:

1. The CONTRACTOR shall be solely responsible for adhering to the rules and regulations of OSHA and appropriate authorities regarding safety provisions. To protect persons from injury and to avoid property damage, adequate barricades, construction signs, lights and guards as required shall be placed and maintained by the CONTRACTOR at their expense during the progress of the WORK and until it is safe for traffic to use the roads and streets. Material piles, equipment and pipe which may serve as obstructions to traffic shall be enclosed by fences or barricades and shall be protected by proper lights when the visibility is poor.
2. Signage and barricades shall be in accordance with applicable FDOT manuals.
3. During construction, pedestrian corridors shall be maintained in a safe, passable, and stabilized manner. Measures utilized shall include, but not be limited to, boardwalks or stabilized pathways. The CONTRACTOR shall be solely responsible for coordination with School Board Transportation Safety Manager for potential construction impacts to schoolyards and crossings. Closure of any sidewalks and/or school crossings near schools shall require coordination with the School Board Transportation Safety Manager and written authorization from the COUNTY if construction is conducted when school is in session.

B. Protection of Utility Structures:

1. Temporary support, adequate protection and maintenance of all underground and surface utility structures including drains, sewers, manholes, hydrants, valves, valve covers, power poles and miscellaneous other utility structures encountered in the progress of the WORK shall be furnished by the CONTRACTOR at their expense. The CONTRACTOR shall be required to provide adequate sheeting or other method approved by the COUNTY to protect existing and proposed assets or, in the opinion of the COUNTY, to prevent any potential damage, cave-ins, or subsidence.
2. Any such structures that may have been disturbed shall be restored to equal or better condition upon completion of the WORK. UTILITIES' valves, hydrants, manholes and other appurtenances shall be made accessible to UTILITIES' personnel during all phases of construction.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3110: General Construction Requirements

October 10, 2021

C. Sanitary Sewer Overflows:

1. The CONTRACTOR shall be liable for any and all sanitary sewer overflows (SSO) associated with the WORK, regardless of fault. The CONTRACTOR shall be liable for all UTILITIES personnel labor and equipment costs, penalties and fines resulting from an SSO. Such occurrences may be considered violations of Florida Statutes (FS) or Administrative rules and may result in additional liability beyond that outlined below for damages and restoration, and the judicial imposition of civil penalties, pursuant to Sections 403.121 and 403.161 FS. The CONTRACTOR will be assessed the following penalties for any and each SSO:
 - a. For a domestic or industrial wastewater violation not involving surface water or groundwater quality violation, UTILITIES shall assess a penalty of two thousand dollars (\$2,000.00) for an unpermitted or unauthorized discharge.
 - b. For an unpermitted or unauthorized discharge that resulted in a surface water or groundwater quality violation, UTILITIES shall assess a penalty of five thousand dollars (\$5,000.00) per occurrence.
 - c. In addition, for any and all unpermitted or unauthorized discharge, UTILITIES shall assess a penalty in the amount of one dollar (\$1.00) per gallon of SSO, up to a maximum amount of one hundred thousand dollars (\$100,000.00) per each SSO.

D. Handling and Care of Stored Materials:

1. All materials delivered, stored, and installed shall be new and of the highest quality, and an approved material from a manufacturer listed in the Appendix D, "List of Approved Products". Materials that are damaged, used, defective, refurbished or in any way found to be not of the highest quality shall be rejected and replaced at no cost to the COUNTY.
2. The CONTRACTOR shall ensure delivery; handling and stored products are in accordance with manufacturer's recommendations and by methods and means that will prevent damage, deterioration, and loss including theft and protection against damage from climatic conditions. The CONTRACTOR shall control delivery schedules to minimize long-term storage of products at the site and overcrowding of construction spaces. In particular, the CONTRACTOR shall provide delivery/installation coordination to ensure minimum holding or storage times for products recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other sources of loss. Damaged or defective items, in the opinion of the COUNTY, shall be replaced at no cost to the COUNTY.
3. All materials and equipment to be incorporated in the WORK shall be handled and stored by the CONTRACTOR before, during and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3110: General Construction Requirements

October 10, 2021

any injury, theft or damage of any kind whatsoever to the material or equipment.

4. In the event any such material, equipment and supplies are lost, stolen, damaged or destroyed prior to construction warranty acceptance, the CONTRACTOR shall replace same at no cost to the COUNTY.
5. The CONTRACTOR shall remove all rejected materials from the project site within five (5) NORMAL WORKING DAYS.

E. Open Excavation:

1. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons and damage to property. The CONTRACTOR shall, at their own expense, provide suitable and safe bridges with handrails and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required.
2. The length of open trench will be controlled by the particular surrounding conditions, but shall be limited to 300 feet unless otherwise approved by UTILITIES. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, UTILITIES may require special construction procedures such as limiting the length of open trench, fencing, prohibiting excavated material in the street and requiring that the trench shall not remain open overnight.
3. The CONTRACTOR shall take precautions to prevent injury to the public due to open trenches. All trenches excavated material, equipment or other obstacles that could be dangerous to the public shall be barricaded and well lighted at night. OSHA Regulations shall apply to all open excavation.

F. Protection of Trees and Shrubs:

1. The CONTRACTOR at their expense, shall protect all trees and shrubs not shown to be removed on the PLANS, in accordance with “Article VIII, ‘Tree Protection and Removal’, Chapter 15, Orange County Code”. No excavated materials shall be placed so as to injure or damage such trees or shrubs. Trees or shrubs destroyed by negligence of the CONTRACTOR or their employees shall be replaced in accordance with “Article VIII, ‘Tree Protection and Removal’, Chapter 15, Orange County Code” at the sole expense of the CONTRACTOR.

G. Protection of Lawn Areas:

1. Lawn areas shall be left in as good or better condition as before starting of the WORK. Where sod is to be removed it shall be carefully restored with new sod of the same type.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3110: General Construction Requirements

October 10, 2021

H. Restoration of Fences:

1. Any fence, or part thereof, that is damaged or removed during the course of the WORK shall be replaced or repaired by the CONTRACTOR and shall be left in as good a condition or better as before the starting of the WORK. The manner in which the fence is repaired or replaced and the materials used shall be subject to the approval of UTILITIES.

I. Protection Against Siltation and Bank Erosion:

1. The CONTRACTOR shall follow federal, state and local permit requirements.

3.05 ACCESS TO THE PUBLIC SERVICES

- A. Neither the materials excavated nor the materials or equipment used in the construction of the WORK shall be so placed as to prevent free access to public services. All excavated material shall be piled in a safe manner that will not endanger the WORK and that will avoid obstructing streets, sidewalks and driveways. Excavated material suitable for backfilling shall be stockpiled separately on the site. No material shall be placed closer than two feet from the edge of an excavation. Fire hydrants, valve pit covers, valve boxes, curb stop boxes or other utility controls shall be left unobstructed and accessible. Gutters shall be kept clear or other satisfactory provisions made for street drainage. Natural watercourses shall not be obstructed or polluted. Surplus material and excavated material unsuitable for backfilling shall be transported and disposed of off the site in disposal areas obtained by the CONTRACTOR.

3.06 PUBLIC NUISANCE

- A. The CONTRACTOR shall not create a public nuisance including, but not limited to, encroachment on adjacent lands, flooding of adjacent lands or excessive noise or dust. The CONTRACTOR shall eliminate noise to as great an extent as practicable at all times. Dewatering Pumps and bypass pumps shall have a maximum rating of 55 decibels for sound attenuation.

3.07 CONSTRUCTION HOURS

- A. WORK shall be performed during NORMAL WORKING HOURS and NORMAL WORKING DAYS unless written authorization has been granted by UTILITIES and overtime pay for inspection shall apply per the current Fee Directory prepared by Orange County Office of Management and Budget, (OMB) as posted on the COUNTY website. WORK shall not be performed outside the hours of 7:00 a.m. to 7:00 p.m., during NORMAL WORKING DAYS, unless the CONTRACTOR received written approval from the Inspector and paid "Other than NORMAL WORKING HOURS" fees.
- B. Prior to any WORK, written notification shall be provided to UTILITIES as stated in Section 4110 "UTILITIES' Schedule of Notification of Inspections" of this MANUAL.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3110: General Construction Requirements

October 10, 2021

3.08 CONSTRUCTION IN EASEMENTS AND RIGHTS OF WAY

A. Construction Easements:

1. In easements across private property, the CONTRACTOR shall confine all operations within the easement area and shall be responsible and liable for all damage outside of the easement area. Trees, fences, shrubbery or other type of surface improvements located in easements shall require protection during construction. Precautions shall be taken by adequate sheeting or other approved method to prevent any cave in or subsidence beyond the easement limits or damage to improvements within the easement. The CONTRACTOR'S SURVEYOR shall stake all easements prior to construction to ensure proper utility placement.
2. In general, the easement area is intended to provide reasonable access and working area for efficient operation by the CONTRACTOR. Where easement space for efficient operation is not provided, the CONTRACTOR shall be responsible for organizing the operations to perform within the restrictions shown on the PLANS.

B. Construction in FDOT Right-of-Way:

1. The CONTRACTOR shall strictly adhere to the requirements of the FDOT permit conditions where construction work is in a ROW under the jurisdiction of the State of Florida and shall take care to avoid any unreasonable traffic conflicts due to the WORK in road ROW.

C. Construction in COUNTY Right-of-Way:

1. WORK shall be governed by the RIGHT OF WAY UTILIZATION REGULATIONS, as amended. UTILITIES' capital improvement projects shall be exempt from the ROW permitting provisions of the code as it applies to permit issuance. All other provisions of the RIGHT OF WAY UTILIZATION REGULATIONS shall apply.

D. Construction in Proposed County Right-of-Way:

1. The CONTRACTOR'S SURVEYOR shall stake all proposed ROW prior to construction to ensure proper utility placement.

3.09 SUSPENSION OF WORK DUE TO WEATHER

- A. During inclement weather, all WORK which might be damaged or rendered inferior by such weather conditions shall be suspended. The WORK shall be suitably covered, protected and/or backfilled to protect the WORK and public from damage or injury.

3.10 USE OF CHEMICALS

- A. Chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must indicate approval of either United States Environmental Protection Agency, National

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3110: General Construction Requirements

October 10, 2021

Safety Foundation, or United States Department of Agriculture. Use of such chemicals and disposal of residues shall be in strict conformance with label instructions. Safety Data Sheets (SDS) for chemicals used during project construction shall be submitted to UTILITIES for approval.

3.11 COOPERATION WITH OTHER CONTRACTORS AND FORCES

- A. During construction progress, it may be necessary for other contractors and persons employed by UTILITIES to work in or about the site. The CONTRACTOR shall not impede or interfere with the work of such other contractors and shall cooperate with the other contractor(s) for proper prosecution of the work.

3.12 CLEANING

- A. During Construction:

1. During construction the CONTRACTOR shall, at all times, keep the construction site and adjacent premises as free from material, sediment, debris, and rubbish, as is practicable, and shall remove the same from any portion of the site if, in the opinion of UTILITIES, such material, sediment, debris, or rubbish constitutes a nuisance, or is objectionable, or has the potential to violate conditions of any permits held for the site.
2. The CONTRACTOR shall implement appropriate best management practices (BMPs) to prevent off-site tracking of material, and, if tracking occurs, shall use all means necessary to remove the material, prevent further material from entering the roadway storm-water system, and will adjust the associated BMPs to prevent future tracking.

- B. Final Cleaning:

1. At the conclusion of the WORK, all tools, temporary structures and materials belonging to the CONTRACTOR shall be promptly taken away. The CONTRACTOR shall remove and promptly dispose of all water, dirt, rubbish or any other foreign substances.

3.13 SALVAGE

- A. Any existing UTILITIES owned equipment or material including but not limited to valves, pipes, fittings, couplings, etc., which is removed or replaced as a result of construction, may be designated as salvage by UTILITIES, and if so, shall be carefully excavated if necessary and delivered to UTILITIES at a location designated by UTILITIES.

3.14 EROSION AND SEDIMENT CONTROL

- A. Erosion, sediment, and pollution control practices implemented as part of construction activities are performance based. If best management practices (BMPs) selected or installed by the CONTRACTOR to control erosion, sediment, or pollution during construction activities are not sufficient to prevent off-site impact or discharge, the

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3110: General Construction Requirements

October 10, 2021

- CONTRACTOR shall adjust or replace BMPs in order to achieve compliance as soon as practicable, but no later than seven (7) CALENDAR DAYS days after identifying the non-compliant BMP.
- B. BMPs selected and utilized by the CONTRACTOR shall meet the minimum standards in the most current version of State of Florida Erosion and Sediment Control Designer and Reviewer Manual.
 - C. Construction activities that disturb one acre or more of land are required to obtain coverage under the NPDES “Generic Permit for Stormwater Discharge from Large and Small Construction Activities (CGP)”, per 62-621.300(4)(a) F.A.C, by submitting a Notice of Intent (NOI) to the Florida Department of Environmental Protection (FDEP). CONTRACTOR and their SUBCONTRACTOR must adhere to all conditions of the CGP during the course of construction activities. A Notice of Termination (NOT) must be filed with FDEP when the construction activities have ceased and the site has been permanently stabilized.
 - D. A Storm-water Pollution Prevention Plan (SWPPP) must be prepared and implemented by the CONTRACTOR for all sites operating under a CGP.
 - E. If BMPs originally included in the SWPPP are changed, the SWPPP document shall be adjusted to reflect the change.
 - F. The COUNTY reserves the right to require BMPs to be replaced, modified, or added, at the expense of the CONTRACTOR, to ensure construction activities do not cause violations of County or State regulations.
 - G. Discharge of groundwater from dewatering operations requires approval from FDEP and the applicable Water Management District. The CONTRACTOR shall obtain the FDEP “Generic Permit for the Discharge of Ground Water from Dewatering Operations” pursuant to the requirements of 62-621.300(2)(a) and 62-620 F.A.C. and Florida Statutes Chapter 403 prior to discharging groundwater off-site. Groundwater discharge to COUNTY ROW requires a Right-of-Way Utilization Permit. If required, the CONTRACTOR shall also obtain a ROW permit for discharges to the COUNTY ROW.
 - H. The CONTRACTOR shall notify Orange County Environmental Protection Division (EPD) within twenty-four (24) hours of any illicit discharge to the Municipal Separate Storm Sewer System (MS4) or waters of the COUNTY, per Sec. 15-116 of Orange County Code.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3111: Project Record Documents and Submittals

October 10, 2021

PART 1 GENERAL

1.01 OVERVIEW

- A. This Section outlines the project record documents that are required to be submitted for review and acceptance of utility improvements to be connected to UTILITIES infrastructure. RECORD DOCUMENTS shall be required prior to the activities and inspections listed in Section 4110, “General Inspection Requirements”.

1.02 CONSTRUCTION

- A. Inspection of improvements shall be in accordance with criteria established in the SUBDIVISION REGULATIONS. UTILITIES will inspect the water, wastewater and reclaimed water improvements to ensure their compliance with requirements in this MANUAL. After all required improvements have been installed the DEVELOPER’s ENGINEER shall submit certification to UTILITIES that the improvements have been constructed substantially according to the approved PLANS and specifications.

1.03 SURVEY CONTROL AND DATUM

- A. Refer to Section 2111, Part 1, 1.03 “Project Documents and Submittals” for Survey Control and Datum.

1.04 SCANNED DOCUMENTS

- A. The scanned drawing sets shall be complete and include the title sheet, plan/profile sheets, cross-sections and details. Each individual sheet contained in the printed set of the drawings shall be included in the electronic submittal, with each sheet being converted into an individual TIFF (tagged image file format). The plan sheets shall be scanned in tif format Group 4 at minimum 400 dpi resolution to maintain legibility of each drawing. Then, the TIFF images shall be embedded into a single pdf (Adobe Acrobat) file representing the complete plan set. The date printed / plotted should be present on each page on the AS-BUILT SURVEY and RECORD DRAWINGS.

1.05 ACCEPTANCE

- A. The documents defined in PART 2 PRODUCTS, of this section, are required to be submitted to UTILITIES for approval prior to the following respective scheduled milestones including but not limited to: wastewater pump station startup, certification of the FDEP applications for clearance of water and wastewater systems, temporary certification of occupancy and certification of occupancy.
- B. Water and Wastewater FDEP clearance requests must encompass the entire project.
- C. Partial clearances on water FDEP permits will be allowed on a case-by-case basis. Proposed sequencing shall be required on the APPROVED CONSTRUCTION PLANS. Partial RECORD DOCUMENTS and the related FDEP partial clearance request must correspond to sequencing shown in APPROVED CONSTRUCTION PLANS. The design must include valves situated to accommodate partial clearance.
- D. RECORD DOCUMENTS shall be submitted for all FDEP clearance requests. RECORD DOCUMENT submittals shall be limited to final water clearance and final RECORD

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3111: Project Record Documents and Submittals

October 10, 2021

- DOCUMENTS for the entire project incorporating all previous FDEP clearances.
- E. RECORD DOCUMENTS for the water system must be submitted prior to UTILITIES water clearance approval if the project includes both water and wastewater systems. These RECORD DRAWINGS are titled as “Water Only Record Drawings”, “Final Water Record Drawings”, or similar to denote that these drawings are water only and not the complete project final RECORD DRAWINGS. The submittal for the FDEP sewer clearance shall include the previous FDEP water clearance and all other assets shown in the APPROVED CONSTRUCTION PLANS in the Final RECORD DOCUMENTS.
 - F. Final RECORD DOCUMENTS for the entire project must be approved prior to UTILITIES approval of the final FDEP clearance.

PART 2 PRODUCTS

2.01 SUBMITTAL REQUIREMENTS

A. General

1. RECORD DOCUMENTS package shall be submitted certified, signed and sealed as a full package and as specified in this Section 3111, “Project Record Documents and Submittals”. The certified documents may be hard copy or electronically submitted in a manner acceptable to the COUNTY.
2. Hardcopy or digital signature and seals shall follow the requirements of Chapter 61G15-23, F.A.C.

2.02 RECORD DOCUMENTS

A. The RECORD DOCUMENTS consist of the following:

1. RECORD DRAWINGS: The APPROVED PLANS for construction shall be revised from the CONTRACTOR AS-BUILT SURVEY to create the RECORD DRAWINGS. RECORD DRAWINGS sets not utilizing the original APPROVED PLANS in format, content, style, scale, page layout, disciplines, appearance, etc. shall be rejected. The detail pages and sheets not related to UTILITIES WORK may be omitted from the RECORD DRAWINGS. The RECORD DRAWING shall consist of the following:
 - a. One (1) certified, full size, RECORD DRAWINGs signed and sealed by the ENGINEER shall be complete and incorporate all UTILITIES constructed improvements including any partial drawings sets utilized for separate FDEP clearances or preapproved project sequencing. The coordinate asset tables shall be populated in the RECORD DRAWINGS in addition to the below requirements.
2. Survey Documents: One (1) set of the following:
 - a. BOUNDARY SURVEY submittals shall be reviewed by UTILITIES prior to approval to verify that the area defined by the BOUNDARY SURVEY

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3111: Project Record Documents and Submittals

October 10, 2021

corresponds to the area described in the legal documents granting the easement or dedicating the tract to the COUNTY.

- b. One (1) certified full size Easement BOUNDARY SURVEY for UTILITIES' Pipes.
 - i. If piping is constructed within an easement, a BOUNDARY SURVEY shall be required.
 - ii. BOUNDARY SURVEY shall include, but not limited to: tract, property corners, monuments, adjacent tracts, adjacent easements, and all improvements within tract, property or easement including but not limited to: drainage structures, power poles, transformers, landscaping, fence, curbs, walls, etc.
 - iii. The survey map report shall indicate if pipe centerline was constructed within 3 feet of the easement boundary.
 - iv. Easements shall be shown with dimensions and offsets tied to the baseline of the design survey.
 - c. One (1) certified, full size BOUNDARY SURVEY for all Pump Stations, and Master Meters, including but not limited to: tract, property corners, monuments, adjacent tracts, adjacent easements, and all improvements within tract, property or easement including but not limited to: drainage structures, power poles, transformers, landscaping, fence, curb, walls, etc.
 - d. Survey Map Report - Provide measurements and computations that were made, accuracies obtained for the replacement of survey traverse, ROW, easements, and pump station site boundary corners that may have been lost or destroyed.
 - e. One (1) certified, full size AS-BUILT SURVEY signed and sealed by the SURVEYOR shall be complete and incorporate all UTILITIES constructed improvements including any partial drawings sets utilized for partial FDEP clearances or sequencing. As-Built Asset Attribute Data Table (see Table 3111-2 Asset Attribute Data Table) -. SURVEYOR shall obtain field measurements of vertical and horizontal dimensions of constructed improvements for the table. The ASBUILTS shall include the SURVEYOR'S statement regarding the constructed improvements being within the specified accuracies as described in Table 3111-1 Minimum Survey Accuracies per Asset (Water, Wastewater, Reclaimed Water and Existing) or if not, indicating the variances. UTILITIES will provide an electronic version of a blank table that shall be used to input data.
3. Digital Data Submission – provided on standard media; on a hard drive (media physically provided to Orange County Utilities) or on a COUNTY approved delivery method. Partial submittals are not acceptable for RECORD

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3111: Project Record Documents and Submittals

October 10, 2021

DOCUMENTS and digital data submissions. The digital data submission shall include the following data:

- a. RECORD DRAWING: A scanned digital version of the certified RECORD DRAWING in unlocked PDF and comprised of the TIFF.
- b. SURVEY ASBUILTS: A scanned digital version of the certified SURVEY ASBUILTS, in unlocked PDF and comprised of the TIFF.
- c. BOUNDARY SURVEY: A scanned digital version of the certified BOUNDARY SURVEY, including but not limited to: Easement Boundary Survey and Pump Station tract improvements Boundary Survey in unlocked PDF and comprised of the TIFF.
- d. Geotechnical: A scanned digital version of the Utilities required geotechnical information organized and sorted for each type of Utilities asset by either location, station or PLAN sheet number in unlocked PDF and comprised of the TIFF.
- e. Building Permits: A scanned digital version of any and all Building Permits and sub-trade permit sign-offs related to the construction of pump stations or any other Utilities facilities requiring Building Permits.
- f. Asset Table: As-Built Asset Attribute Data Table (see Table 3111-2 Asset Attribute Data Table) in Orange County provided format.
 - i. The current version and format of the Asset Attribute table at the time of the submittals shall be utilized regardless of previous submittal versions.
- g. Deflection Table: Deflection Table in Orange County provided format.
 - i. The current version of the Deflection table located on the OC website at the time of the submittals shall be utilized regardless of previous submittal versions available when construction began.
- h. AutoCAD: A revised digital RECORD DRAWING shall be submitted in AutoCAD (dxf or dwg) format.
- i. Full and complete RECORD DRAWINGS shall be submitted and accepted by the COUNTY prior to submitting for the final FDEP permit clearance.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3111: Project Record Documents and Submittals

October 10, 2021

**Table 3111-1: Minimum RECORD DRAWING Accuracies per Asset
(Water, Wastewater, Reclaimed Water and Existing)**

Asset	Horizontal Accuracy (feet)	Elevation Accuracy (feet)	Location: Horizontal Center and Vertical Top, unless otherwise specified
Bench Marks	0.01	0.01	Point
Baseline Control Locational Accuracy	0.01	N/A	Point
Tract, property corners and Easement Corners	(Note 1)	N/A	Survey Monuments
Pump Station Limits of improvements.	0.1	N/A	Corners of Curb, footers, fence posts, or other physical improvements associated with the improvements of the Pump Station.
Mains at 100' max. intervals	0.01	0.01	Pipe, Pipe at Valves, Pipe at Bore & Jack Casing (Horizontal center, vertical top and on flow line).
PVC Force mains (16" & greater) at 20' max. intervals	0.01	0.01	Pipe, Pipe at Valves, Pipe at Bore & Jack Casing (Horizontal center, vertical top and on flow line).
Fittings, Sleeve, and end of the pipe if Plugged or Capped.	0.01	0.01	Fitting (Horizontal center, vertical top and on flow line).
Restrained Pipe	0.1	0.1	Each Joint
Connections (Direct taps, Service Saddles, and Corporation Stops for appurtenances)	0.01	0.01	Fitting or pipe immediately adjacent to connection for corporation stops
Abandoned Connections (Sampling Points, Pressure Testing Saddles, Jumpers)	0.1	0.1	Pipe adjacent to abandoned connection point, service saddles for pressure testing, or cap.
Bore & Jack Casing	0.1	0.1	Top of Casing at the Casing Limits
Directional Drill	0.1	0.1	Interval equal to the length of individual drilling rod
Hydrants (Public & Private)	0.1	N/A	Operating Nut of Hydrant
Valves (Inline valve, tapping valve, hydrant valve, control valve)	0.1	0.1	Operating Nut
Air Release, Blow-off, and Backflow Valves	0.1	N/A	Valve Enclosure
Master Meters, Meters, detector meters, specialty meters, & Wastewater Meters	0.1	N/A	Register of Meter

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3111: Project Record Documents and Submittals

October 10, 2021

Table 3111-1: Minimum RECORD DRAWING Accuracies per Asset (Water, Wastewater, Reclaimed Water and Existing) (Continued)			
Asset	Horizontal Accuracy (feet)	Elevation Accuracy (feet)	Location: Horizontal Center and Vertical Top, unless otherwise specified
Meter Box (Water & Reclaimed)	0.1	N/A	Meter Box or curb stop for new installation
Sewer Clean-out	0.1	N/A	Clean-out or wye for new construction
Sewer Lateral Service Line	0.1	0.1	Wye connection at gravity main and tee at property line
Manhole Rim (Public & Private)	0.1	(Note 2)	Manhole Rim (within .2' of finished grade)
Manhole Inverts (Public & Private)	N/A	0.01	Pipe Inverts
Pump Station (Public & Private)	0.1	0.01	Center of Wetwell
Pump Station Inverts (Public & Private)	N/A	0.01	Pipe Inverts
Production Well or Monitoring Well	0.1	0.1	Well
Grease Interceptor	0.1	0.1	Center of all access ports or lids
Oil / Water Separators / Lint Traps	0.1	0.1	Center of all access ports or lids
Demolished Pipe (abandoned in place or removed)	0.1	0.1	Limits of Abandoned or Removed Pipe
Existing Utilities water, wastewater, reclaimed water, gas main, storm water pipes, and appurtenant structures (Note 3)	0.1	0.1	Pipe or Structure. (All new and existing)
Dry Line Infrastructure (Note 4)	0.1	0.1	Mains, fittings, valves, and manholes
Utilities Crossings and Separation	0.1	0.1	Top of Pipe of utilities mains and other facilities for vertical separation requirements
<p>Note 1: Shall conform to the requirements of the “Chapter 5J-17, ‘Minimum Technical Standards’, FAC”, certified by a SURVEYOR. 5J-17.050 (Definitions)</p> <p>Note 2: Manhole Rim elevation may be estimated prior to installation of asphalt to +/- 0.2 ft.</p> <p>Note 3: Within the limits of construction and shall also include all pipelines or other municipal pipelines that cross the UTILITIES pipe.</p> <p>Note 4: If shots do not exist, the CONTRACTOR shall be required to pothole and provide survey shots.</p>			

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3111: Project Record Documents and Submittals

October 10, 2021

Table 3111-2: As-Built Asset Attribute Data Table, Examples

Hydrants Worksheet

1	A	C	D	E	F	G	H	I	J	K	L	M	N
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Manufacturer	Model #	Owner	Comments				
2	14916	C301	448981.21	1492734.53	132.88	Brand A	XYZ	OCU	HYDRANT				
3	15022	C303	449034.91	1492737.69	127.74	Brand B	XYZ	OCU	HYDRANT				
4	15053	C303	449035.68	1493035.18	130.71	Brand C	XYZ	OCU	HYDRANT				
5	15281	C405	449044.75	1493035.29	133.21	Brand D	XYZ	OCU	HYDRANT				
6	15668	C406	449349.85	1493474.96	126.74	Brand B	XYZ	OCU	HYDRANT				

Valves Worksheet

1	A	C	D	E	F	G	H	I	J	K	L
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Valve Type	Main Type	Valve Size	Valve Manufacturer	Valve Model #	# of Turns to Close
2	14997	C303	449080.55	1492742.38	128.22	Gate	Water Main	6" WM GV	Brand A	RWGV1	20
3	15021	C302	449034.70	1492741.35	122.63	Gate	Water Main	6" WM GV	Brand B	RWGV1	20
4	15025	C305	449079.97	1492743.01	121.91	Gate	Water Main	12" WM GV	Brand C	RWGV1	38
5	15026	C305	449090.35	1492747.91	122.96	Gate	Water Main	12" WM GV	Brand D	RWGV1	38

1	H	I	J	K	L	M	N	O	P	Q	R
1	Main Type	Valve Size	Valve Manufacturer	Valve Model #	# of Turns to Close	Gear Actuator	Gear Ratio	Side Actuator	Actuator Manufacturer	Owner	Comments
2	Water Main	6" WM GV	Brand A	RWGV1	20	No	3 to 1	No	Brand A	OCU	
3	Water Main	6" WM GV	Brand B	RWGV1	20	No	3 to 1	No	Brand B	OCU	
4	Water Main	12" WM GV	Brand C	RWGV1	38	No	3 to 1	No	Brand C	Private	
5	Water Main	12" WM GV	Brand D	RWGV1	38	No	3 to 1	No	Brand D	Private	

Manhole Worksheet

1	A	C	D	E	F	G	H	I	J	K	L
1	ID Number	Plan Sheet #	Easting	Northing	Rim Elevation	Invert Elev N	Invert Elev NE	Invert Elev E	Invert Elev SE	Invert Elev S	Invert Elev SW
2	SS-1	C-5	449666.79	1493293.42	122.58						
3	SS-2	C-6	449444.28	1493493.722	124.96			116.44		116.22	
4	SS-3	C-6	449445.19	1493102.6	123.39	114.91				114.31	
5	SS-4	C-6	449444.67	1492715.4	124.85	113.63		113.63		113.38	
6	SS-8	C-7	449667.93	1492715.1	121.68						

1	J	K	L	M	N	O	P	Q	R	S	T
1	Invert Elev SE	Invert Elev S	Invert Elev SW	Invert Elev W	Invert Elev NW	Manufacturer	Owner	Lined	Liner Manufacturer	Coated	Comments
2				117.51		Brand A	OCU	No	N/A	No	
3		116.22		117.63		Brand B	OCU	No	N/A	No	
4		114.31				Brand C	OCU	Yes	Brand A	No	
5		113.48		119.04		Brand D	OCU	Yes	Brand B	No	DROP: 113.61
6				114.3		Brand A	Private	No	N/A	No	

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3111: Project Record Documents and Submittals

October 10, 2021

Meter Worksheet

ID Number	Plan Sheet #	Easting	Northing	Elevation	Main Type	Comments
MW-1	C-7	576533.64	1535523.68	58.01	Water Main	
RWMN-1	C-8	576537.42	1535598.78	64.84	Reclaimed Water Main	

Fitting Worksheet

ID Number	Plan Sheet #	Easting	Northing	Elevation	Main Type	Fitting Type	Pipe Size	Fitting Manufacturer	Comments
15096	C-3	448980.51	1492743.69	127.32	Water Main	Tapping Saddle	8"	Brand A	
15020	C-3	449354.92	1492742.72	121.74	Water Main	Tapping Sleeve	8"	Brand B	
15028	C-3	449380.19	1492743.22	120.51	Water Main	Bend 45°	8"	Brand C	
15045	C-3	449388.42	1493040.56	117.29	Water Main	Tea	8"x8"	Brand D	
15048	C-3	449367.36	1493040.40	118.55	Water Main	Bend 45°	8"	Brand E	
15049	C-3	449382.63	1493040.55	124.52	Water Main	Bend 45°	8"	Brand A	
15051	C-4	449351.95	1493040.06	124.81	Force Main	Reducer	12"x6"	Brand B	
15226	C-4	448772.28	1492742.60	123.85	Force Main	Bend 11 1/4°	6"	Brand C	
15242	C-4	448771.18	1493039.81	127.42	Force Main	Plug	6"	Brand D	
15258	C-4	449044.51	1493040.02	127.75	Force Main	Tea	12"x6"	Brand E	
15263	C-4	449069.15	1493040.57	127.52	Force Main	Bend 11 1/4°	12"	Brand A	
15302	C-5	449387.93	1492993.09	119.84	Gravity Main	Wye	8"	Brand B	
15306	C-5	449388.16	1493011.27	117.40	Reclaimed Water Main	Bend 22-1/2°	12"	Brand C	
15307	C-5	449387.99	1493013.80	118.25	Reclaimed Water Main	Bend 22-1/2°	12"	Brand D	
15563	C-5	449389.47	1492723.05	120.56	Reclaimed Water Main	Bend 45°	12"	Brand E	
15764	C-6	449389.00	1492718.08	116.45	Reclaimed Water Main	Bend 45°	12"	Brand A	

Cleanout Worksheet

ID Number	Plan Sheet #	Easting	Northing	Elevation	Comments
918	C-6	448058.42	1492501.85	125.74	
919	C-6	448042.54	1492583.01	125.58	
922	C-6	447941.90	1492798.73	125.15	
923	C-6	447891.90	1492765.23	125.12	

Pipes Worksheet

ID Number	Plan Sheet #	Easting	Northing	Elevation	Main Type	Type of Shot	Construction Method	Material
15003	C-3	449456.15	1492743.28	124.47	Water main	Construction Sampling Point	Open Cut	DP
15008	C-3	449135.23	1492743.61	122.35	Water main	Shot on Pipe	Directional Drill	HDPE
15015	C-4	449214.45	1492743.14	121.90	Water main	Shot on Pipe	Directional Drill	HDPE
15019	C-4	449294.01	1492742.52	121.75	Water main	Shot on Pipe	Open Cut	DP
15032	C-4	449389.63	1492815.51	121.32	Water main	Shot on Pipe	Open Cut	DP
15036	C-5	449385.45	1492894.73	120.85	Reclaimed Water Main	Shot on Pipe	Open Cut	DP
15086	C-5	449669.07	1493410.02	121.70	Reclaimed Water Main	Shot on Pipe	Open Cut	DP
15218	C-5	448920.08	1492743.23	127.87	Reclaimed Water Main	Bore & Jack (Casing)		DP
15222	C-5	448840.37	1492743.25	125.51	Reclaimed Water Main	Bore & Jack (Casing)		DP
15230	C-6	448772.82	1492811.38	124.78	Force Main	Restraint Joint Limit	Open Cut	PVC
15234	C-6	448772.65	1492890.53	125.84	Force Main	Restraint Joint Limit	Open Cut	PVC
15238	C-6	448772.35	1492969.73	125.98	Force Main	Shot on Pipe	Open Cut	PVC
15246	C-6	448804.35	1493839.75	125.98	Force Main	Shot on Pipe	Open Cut	PVC

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3111: Project Record Documents and Submittals

October 10, 2021

Pipes Worksheet (Continued)

	I	J	K	L	M	N	O	T
	Construction Method	Material	Pressure Class	Manufacturer	Pipe Size	Operating Status	Comments	
2	Open Cut	DIP	Class 250	Brand A	16"	Active (flow)		
3	Directional Drill	HDPE	DR-11	Brand D	16"	Active (flow)		
4	Directional Drill	HDPE	DR-11	Brand C	16"	Active (flow)		
5	Open Cut	DIP	Class 250	Brand D	16"	Active (Existing)		
6	Open Cut	DIP	Class 250	Brand A	16"	Active (Existing)		
7	Open Cut	DIP	Class 250	Brand B	16"	Active (flow)		
8	Open Cut	DIP	Class 250	Brand C	16"	Active (flow)		
9		DIP	Class 250	Brand D	16"	Active (flow)		
10		DIP	Class 250	Brand A	16"	Abandoned Pipe		
11	Open Cut	PVC	DR-18	Brand B	12"	Active (flow)		
12	Open Cut	PVC	DR-18	Brand C	12"	Active (flow)		
13	Open Cut	PVC	DR-18	Brand D	12"	Active (flow)		
14	Open Cut	PVC	DR-18	Brand A	12"	Active (flow)		

Pump Station Worksheet

	A	C	D	E	F	G	H
	ID Number	Plan Sheet #	Easting	Northing	Elevation		Comments
2	PS-1	C-40	450043.57	1492570.75	117.78		8 Diameter Wetwell
3							
4							
5							

Well Worksheet

	A	C	D	E	F	G	H	I
	ID Number	Plan Sheet #	Easting	Northing	Elevation	Well Type		Comments
2	Well-1	C-40	450043.57	1492570.75	117.78	Monitoring Well		
3								
4								
5								

Easements Worksheet

	A	C	D	E	F	G	H
	ID Number	Plan Sheet #	Easting	Northing	Elevation	Boundary Corner Type	Comments
2	Corner-1	C-8	463484.03	1511029.75		Pump Station Tract	N W Corner
3	Corner-2	C-8	463523.24	1511040.01		Pump Station Tract	N E Corner
4	Corner-3	C-8	463480.45	1511015.23		Pump Station Tract	S W Corner
5	Corner-4	C-8	463526.97	1511025.49		Property	S W Corner
6	Easement-1					Easement	

Existing OC Utility Crossing Worksheet

	A	C	D	E	F	H	I
	ID Number	Plan Sheet #	Easting	Northing	Existing Pipe Elevation	Existing Main Type	Comments
2	Conflict-1	C-750	463484.59	1511029.75	103.54	Force Main	
3	Conflict-2	C-750	463523.24	1511040.01	98.12	Storm Main	
4	Conflict-3	C-750	463489.45	1511015.23	101.87	Water main	
5							
6							

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3111: Project Record Documents and Submittals

October 10, 2021

Grease Interceptor Worksheet

	A	C	D	E	F	G	H
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Volume (Gallons)	Comments
2	GI-1	C-400	450843.57	1452570.75	117.78	1000.00	
3							
4							
5							

Notes: Table 3111-2 and 3111-3; Recommended for ease of coordination between the Engineer and the Contractor’s As-built Surveyor for calculating deflections from surveyed coordinates and elevations: Provide a unique asset ID (top of pipe shots and fittings) for each utility and type, numbered sequentially along the pipe run (including changes in direction) from start to finish of the pipe. Then branches and services of the same utility type can be numbered. It is recommended that each utility (water, wastewater or reclaimed water) numbering format be distinguishable from the other. This will allow organization and convenient sorting after the individual asset table worksheet tabs are combined in the spreadsheet program prior to copying and pasting to the deflection table spreadsheet.

Table 3111-3: Pipe Deflection Table Example

***Uses law of cosines to determine angle ABC and Ø.**

$$\text{Angle ABC} = \arccos((AB^2 + BC^2 - AC^2)/(2*AB*BC))$$

$$180-\text{Ø}/2 = \text{angle ABC}$$

Calculates the total deflection Ø to the outer point (A or C) is equal in angle to the approach from the next point along the line.

****Uses law of sines, using the chord length AC and radius R.**

$$\text{Since } \sin((\text{Ø}/2)*(PI/180)) = (\text{Chord}/2)R \text{ and length AC} = \text{Chord}$$

$$R = AC/(2*\sin(\text{Ø}*PI/360))$$

This calculation assumes an average radius over the bend between three (3) points.

*****Adds the lengths of AB+BC / 20ft to get an approximate number of bends over the span.**

This value is divided by the total deflection angle to calculate the average bend angle of the span.

This assumes that the bend angle is consistent across the entire length.

******Uses average offset angle and laying length of pipe.**

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3111: Project Record Documents and Submittals

October 10, 2021

Table 3111-4: Gravity Main Table

Downstream		Upstream		Length (ft)	Design Slope	Constructed Slope	Constructed Allowable Slope
Manhole Number	Invert Elev.	Manhole Number	Invert Elev.				

2.03 COMPLETION/ACCEPTANCE

- A. One (1) copy of recorded Easement/Tract/Plat after certification of completion.
- B. Specific cost breakdown for the improvements, Signed and sealed by EOR.
- C. Specific cost breakdown for the pump station components, including wetwell, pump, piping, electrical and site work, Signed and sealed by EOR.
- D. Copies of all soils testing reports on all utilities.
- E. One (1) set of bacteriological test reports (Appendix B, “Water Main Disinfection Certification”).
- F. Pump Station Startup Report, (Appendix B, “Pump Station Start-Up”).
- G. One (1) electronic copy in Adobe Acrobat portable document format (pdf) format of the Operation and Maintenance Manual for the pump stations with generators or other equipment.
- H. ENGINEER of Record Certification of Completion (FDEP Form).
- I. Certification of Completion (FDEP Form) and required materials to obtain clearance of the system for service.
- J. Bill of Sale with original signatures.
- K. Recorded utility easements.
- L. Maintenance, Materials and Workmanship Irrevocable Letter of Credit, Bond, or Cash Escrow.
- M. Municipal Certification of Completion for utility systems located within municipalities. One (1) of the following additional documents shall be required: letter of credit; maintenance, materials and workmanship warranty bond; or copies of agreements between UTILITIES and any other entity for operation and maintenance, as applicable.

Note: All forms are located on the Orange County Utilities Department website at <http://www.ocfl.net/PlanningDevelopment/UtilitiesPlanningandConstruction>

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3111: Project Record Documents and Submittals

October 10, 2021

PART 3 EXECUTION

3.01 RECORD DRAWINGS

- A. The ENGINEER shall develop the RECORD DRAWINGS by modifying the APPROVED CONSTRUCTION PLANS utilizing information from the Construction AS-BUILT Documents supplied by the CONTRACTOR and shall delineate substantive deviations from the original design documents.
- B. The ENGINEER shall state whether the deviations are such that the original engineering design intent has or has not been “materially” accomplished by the finished construction. The Engineer shall fully and completely delineate the scope of the Engineer’s work on all RECORD DRAWINGS and what services were performed by the Engineer or the firm upon which the opinion in the certificate is based.
- C. The certification statement shall include: “The RECORD DRAWING is a compiled representation of the constructed project; a listing of the sources and the basis of information used in the preparation of the RECORD DRAWINGS; the information is believed to be correct to the best of the Engineer’s knowledge; and the drawings meet the design intent including, but not limited to: location of installed assets and pipe deflections.”
- D. Appropriate notes on the RECORD DRAWINGS or disclosures accompanying the certification can clarify an Engineer’s determination that such modifications do or do not “materially” affect the permitted design.
 1. The CONTRACTOR shall be responsible for recording information on the approved PLANS concurrently with construction progress.
 2. The CONTRACTOR’S SURVEYOR shall be responsible for surveying utility assets concurrently (at minimum monthly) with construction progress and providing AS-BUILT data to the CONTRACTOR.
 3. Monthly Survey data and CONTRACTOR AS-BUILTS and Deflection tables shall be retained on the project site and submitted to the UTILITIES inspector monthly by email.
 4. RECORD DRAWINGS shall be legibly marked to record actual construction.
 5. RECORD DRAWINGS shall show location of all underground and above ground water, wastewater and reclaimed water piping and related appurtenances, based upon record survey information.
 - a. All piping location including horizontal and vertical locations of utilities and appurtenances shall be clearly shown and referenced to permanent surface improvements and road ROW.
 - b. Drawings shall also identify actual installed pipe, removed assets, demolished or abandoned assets, valves, fittings, hydrants and other assets. These assets shall be attributed with materials, class, pressure rating, specifications, etc.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3111: Project Record Documents and Submittals

October 10, 2021

- c. Assets removed from service shall be denoted and shown as hatched.
 - d. Proposed design drawings assets that were not installed shall be removed from the APPROVED PLANS. Hatching or shading of proposed assets that were not installed shall not be accepted on RECORD DRAWINGS and must be shown as not installed on AS-BUILTS.
 - e. RECORD DRAWINGS and RECORD DOCUMENTS shall be rejected if any portion of the package is not in compliance with the MANUAL requirements, necessitating a complete resubmittal of the entire RECORD DOCUMENT package.
6. Asset callouts at minimum shall include size, description, and unique asset number.
 - a. Example: 8” PVC WM-233, 12” Tee FM-165, 24” DIP RM-87. Providing only the asset number on RECORD DRAWING plan /profile shall be rejected.
 7. Infrastructure that is to be publically and / or privately owned and maintained shall be clearly defined on the RECORD DRAWINGS plan and profile sheets and defined in the asset table. The unique asset ID for all privately owned and maintained assets requiring a survey coordinate shot (hydrants, manholes, pump stations, grease traps) and inputted on the coordinate asset table shall be prefixed with “PRIV” to denote private.
 - a. Example: PRIV-MH-1, and PRIV-HY-1
 8. RECORD DRAWINGS and AS-BUILTS shall clearly show all field changes of dimension and detail including changes made by field order or by change order.
 9. RECORD DRAWINGS and AS-BUILTS shall clearly show all details not on original contract drawings but constructed in the field. All equipment and piping relocation shall be clearly shown.
 10. RECORD DRAWINGS shall clearly show the actual horizontal locations, distances, and vertical elevations of the utility assets. State plane coordinates shall be utilized for horizontal locations. Plan and profile sheets of assets in the ROW or easements shall be corrected and updated to show as-built horizontal and vertical locations of the assets including separations to existing infrastructure.
 11. RECORD DRAWINGS shall clearly show dimensions between all manholes, slope of gravity mains, invert and top elevations. Manhole names and numbers shall be updated on the RECORD DRAWINGS to include the COUNTY GIS manhole numbers on the plan and profile sheets. The COUNTY GIS manhole numbers are required and provided during CCTV.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3111: Project Record Documents and Submittals

October 10, 2021

12. RECORD DOCUMENTS shall also include the As-built Coordinate Asset Table (see Table 3111-2), Pipe Deflection Table (see Table 3111-3), and Gravity Main Table (see Table 3111-4).
13. RECORD DRAWINGS and AS-BUILTS shall include any fueling equipment placed underground (piping, tanks, etc.) for submittal to the FDEP. In accordance with Rule 62-761.710, F.A.C, the RECORD DRAWINGS and AS-BUILTS, shall include all construction and equipment design specifications including exact dimensions, geometry and locations of the storage tanks or integral piping installed.

3.02 COMPLETION/ACCEPTANCE

A. Final Acceptance:

1. Final acceptance of a water distribution / transmission system, wastewater collection / transmission system, and/or reclaimed water distribution / transmission system and the release of the performance bond will be made only after all inspections have been made and the improvements found to be in accordance with the applicable regulations of the SUBDIVISION REGULATIONS, the SITE DEVELOPMENT ORDINANCES, FDEP, and the requirements of the MANUAL contained herein.
2. Proposed UTILITIES owned and maintained pipes are deemed as capital assets and will be accepted by UTILITIES.

B. Maintenance, Materials, and Workmanship Bond, Irrevocable Letter of Credit or Cash Escrow:

1. A bond, letter of credit, or cash escrow shall be obtained by the DEVELOPER benefiting UTILITIES in the amount of 10% of the estimated construction cost of all required water, wastewater and reclaimed water improvements to be owned and maintained by UTILITIES.
2. The bond, letter of credit, or cash escrow surety shall comply with all Administrative Regulations and shall guarantee maintenance of all improvements intended to be owned and maintained by UTILITIES for a minimum of a one (1) year period, commencing after a certificate of completion (COC) has been issued by UTILITIES.
3. Improvements shall include materials, workmanship and structural integrity of the water, wastewater, and reclaimed water systems, and miscellaneous related facilities, excluding mechanical equipment.
4. The manufacturer's warranty will be acceptable for mechanical equipment.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3111: Project Record Documents and Submittals

October 10, 2021

C. Certificate of Completion/Approval for Maintenance:

1. After the successful completion of all water, wastewater and reclaimed water improvements, the RECORD DRAWINGS must be submitted to UTILITIES. The RECORD DRAWINGS must be approved before the system is placed into operation. Upon receipt of the required documents outlined above and applicable executed forms on the Orange County Utilities Department website, <http://www.ocfl.net/PlanningDevelopment/UtilitiesPlanningandConstruction> verifying the satisfactory construction of all improvements intended to be owned and maintained by UTILITIES. After the surety warranty period and verification by UTILITIES of satisfactory performance of all water, wastewater and reclaimed water improvements, UTILITIES will issue the Approval for Maintenance, thereby releasing the DEVELOPER from further responsibilities.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3112: Site Preparations, Surface Removal, and Restoration

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section covers clearing, grubbing, and stripping of the construction sites. The CONTRACTOR shall clear and grub all of the area within the limits of construction as shown on the PLANS and approved by UTILITIES prior to the beginning any WORK. All site WORK shall conform to the applicable COUNTY site clearing ordinance and landscaping and tree ordinances.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 CLEARING AND GRUBBING

A. Clearing:

1. The surface of the ground for the area to be cleared and grubbed shall be completely cleared of all timber, brush, stumps, roots, grass, weeds, rubbish and all other objectionable obstructions resting on or protruding through the surface of the ground. However, trees and shrubs shall be preserved as specified in Section 3110, "General Construction Requirements".
2. Clearing operations shall be conducted so as to prevent any damage to existing structures and installations and to those under construction, and so as to provide for the safety of employees and others.

B. Grubbing:

1. Grubbing shall consist of the complete removal of all stumps, roots larger than 1-1/2 inches in diameter, matted roots, brush, timber, logs and any other organic or metallic debris not suitable for foundation purposes, resting on, under or protruding through the surface of the ground to a depth of 18 inches below the subgrade or to a depth as designated by UTILITIES.
2. All depressions excavated below the original ground surface for or by the removal of such objects shall be refilled with suitable materials and compacted to a density conforming to the surrounding ground surface.

C. Disposal of Cleared and Grubbed Material:

1. The CONTRACTOR shall, at their expense, dispose of all material and debris from the clearing and grubbing operation in accordance with all applicable ordinances.

D. Perimeter Controls:

1. Perimeter controls as shown in the Erosion Control Plan or SWPPP shall be installed prior to initiating clearing and grubbing.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3112: Site Preparations, Surface Removal, and Restoration

October 10, 2021

3.02 STRIPPING WITHIN COUNTY EASEMENT OR RIGHT-OF-WAY

- A. In areas so designated, topsoil shall be stripped and stockpiled. Stockpiled topsoil shall be protected until it is placed as specified. The CONTRACTOR, at the discretion of UTILITIES, shall dispose of any remaining topsoil after all WORK is in place.

3.03 DUST CONTROL

- A. CONTRACTOR shall control dust resulting from clearing and grubbing operations to prevent nuisance to adjacent property owners and the general public. CONTRACTOR shall use dust control methods and materials approved by UTILITIES.

3.04 SURFACE REMOVAL

- A. The CONTRACTOR shall remove the surface materials along the proposed pipe lines, as indicated on the PLANS, only to such widths as will permit a trench to be excavated which will afford sufficient room for proper efficiency and proper construction.
- B. Pavement removal shall be saw cut with straight lines prior to excavation. All applicable COUNTY and FDOT regulations shall be followed.
- C. Where sidewalks, driveways, pavements and curb and gutter are encountered, care shall be taken to protect against fracture or disturbance beyond reasonable working limits. All fractured, broken or disturbed surfaces shall be restored to their original or better condition prior to completion of the WORK.

3.05 RESTORATION

- A. Restoration of all surfaces including road subbase, soil cement, limerock base, asphaltic concrete surface, portland cement concrete pavement and driveways, sidewalks, concrete curbs, existing walls, fences and irrigation systems shall be in strict accordance with applicable ROAD CONSTRUCTION SPECIFICATIONS and STANDARD FDOT SPECIFICATIONS.
- B. All grassing and mulching shall be done as specified in the ROAD CONSTRUCTION SPECIFICATIONS. Solid sodding shall be placed on all slopes steeper than 4 to 1, within 10 feet of all proposed structures and where existing sod is removed or disturbed by the WORK.
- C. In addition, the CONTRACTOR shall restore all existing structures and assets including but not limited to: storm drains, culverts, inlets, pipes, valves, manholes, etc. to equal or better condition in accordance with applicable road construction specifications and this MANUAL.

3.06 STABILIZATION

- A. Stabilization measures shall be initiated as soon as practicable, but in no case more than seven days after disturbance, in portions of the site where construction activities have temporarily or permanently ceased.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3113: Excavations, Backfill, Compaction and Grading

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section covers excavation, backfill, fill, compaction, and grading associated with utility trench and structural construction. The CONTRACTOR shall furnish all labor, materials, equipment and incidentals necessary to perform all excavation, backfill, fill, compaction, grading and slope protection required to complete the WORK.
- B. The entire surface of the WORK shall be maintained free from ruts and in such condition that construction equipment can readily travel over any section.

1.02 EXISTING UTILITIES

- A. The CONTRACTOR shall locate existing utilities in the areas of WORK in accordance with Sunshine 811 regulations, Chapter 556, "Underground Facility Damage Prevention and Safety Act", FS. The CONTRACTOR is responsible for subsurface verification of all existing utilities prior to construction.
- B. If utilities are to remain in place, the CONTRACTOR shall provide adequate means of protection.
- C. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, the CONTRACTOR shall be responsible for resolving the utility conflicts to UTILITIES' satisfaction.
- D. Damage and repair costs to such piping or utilities are the CONTRACTOR's responsibility.
- E. UTILITIES shall not be responsible for uncharted or incorrectly charted water, wastewater, and reclaimed water mains or other utilities.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General:
 - 1. Materials for use as bedding and backfill, whether in-situ or borrow, shall be as described under this Section. The CONTRACTOR shall test materials and provide test results to UTILITIES to document compliance with this section.
- B. Structural Fill:
 - 1. Materials for structural fill shall be select common fill as specified herein.
- C. Common Fill:
 - 1. Common fill shall consist of mineral soil, substantially free of clay, organic material, muck, loam, wood, trash and other objectionable material which may be compressible or which cannot be compacted properly. Common fill shall not contain stones larger 3-1/2 inches in any dimension in the top 12 inches or 6 inches in any dimension in the balance of fill area. Common fill shall not

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3113: Excavations, Backfill, Compaction and Grading

October 10, 2021

contain asphalt, broken concrete, masonry, rubble or other similar materials. It shall have physical properties such that it can be readily spread and compacted during filling. Additional common fill shall be no more than 12% by weight finer than the No. 200 mesh sieve, unless finer material is approved for use in a specific location by UTILITIES.

2. Material falling within the above specifications that is encountered during the excavation may be stored in segregated stockpiles for reuse. Material that is not suitable for backfill shall be disposed as unsuitable materials.

D. Select Common Fill:

1. Select common fill shall be as specified above from common fill, except that the material shall contain no stones larger than 1/2 inches in largest dimension, and shall be no more than 5% by weight finer than the No. 200 mesh sieve.

E. Bedding Rock:

1. Bedding rock shall be FDOT certified No. 57 limestone aggregate.

PART 3 EXECUTION

3.01 DEWATERING, DRAINAGE AND FLOTATION

A. General:

1. The CONTRACTOR shall excavate, construct and place all pipelines, concrete work, fill and bedding rock “in the dry”. In addition, the CONTRACTOR shall not make the final 24 inches of excavation until the water level is a minimum of 2 feet below proposed bottom of excavation. For purposes of these specifications, “in the dry” is defined to be within 2% of the optimum moisture content of the soil. UTILITIES reserves the right to ask the CONTRACTOR to demonstrate that the water level is a minimum of 2 feet below proposed bottom of excavation before allowing the construction to proceed.
 - a. Where the project will require dewatering; water samples at each dewatering location shall be collected and analytical tests from a certified laboratory for the parameters required in the FDEP GENERIC PERMIT FOR THE DISCHARGE OF PRODUCED GROUND WATER FROM ANY NON-CONTAMINATED SITE ACTIVITY 62-621.300 (2). The DEVELOPER shall apply and obtain FDEP permit 62-621.300 (2). Parameters in violation of 62-621.300(2) shall require the DEVELOPER to apply and obtain FDEP permit GENERIC PERMIT FOR DISCHARGES FROM PETROLEUM CONTAMINATED SITES 62-621.300(1).
 - b. Discharge water shall be clear, with no visible soil particles. Discharge from dewatering shall be disposed of in such a manner that it will not interfere with the normal drainage of the area in which the WORK is being performed, create a public nuisance or form ponding. The operation shall

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3113: Excavations, Backfill, Compaction and Grading

October 10, 2021

not cause damage to any portion of the WORK completed, in progress, to the surface of streets or to private property. The dewatering operation shall comply with the requirements of National Pollutant Discharge Elimination System (NPDES) and other state and COUNTY regulatory agencies. Additionally, the CONTRACTOR shall obtain proper right of entry where private property will be involved.

- c. Dewatering shall be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.
- d. The CONTRACTOR shall furnish all materials and equipment and perform all WORK required to install and maintain the drainage systems for handling groundwater and surface water encountered during construction of structures, pipelines and compacted fills.
- e. During backfilling and construction, water levels shall be measured in observation wells. Observation wells shall be located as directed by UTILITIES.
- f. Continuous pumping will be required as long as water levels are required to be below natural levels.

3.02 EXCAVATION

A. General:

1. Excavation consists of removal, storage and disposal of material encountered when establishing required grade elevations.
 - a. Authorized earth excavation includes removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, and other materials encountered that are not classified as rock excavation or unauthorized excavation. Unauthorized excavation consists of removal of material beyond the limits needed to establish required grade and subgrade elevations without specific direction of UTILITIES. Unauthorized excavation, as well as remedial work directed by UTILITIES shall be at the CONTRACTOR's expense. Such remedial work shall be performed as directed by UTILITIES.
 - b. The CONTRACTOR shall utilize an excavator bucket tooth with flat, flare or paddle style for excavation within 12 inches of the trench depth.
 - c. If the sub-grade is unsuitable, the CONTRACTOR shall remove and replace all unsuitable material below pipe with selected common fill, compacted to 95% of the maximum density as per AASHTO T-180 modified proctor.
 - d. If the CONTRACTOR excavates below grade, then the CONTRACTOR shall refill the excavation using select common fill.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3113: Excavations, Backfill, Compaction and Grading

October 10, 2021

- e. Slope sides of excavations shall comply with local codes, ordinances, and with OSHA requirements. The CONTRACTOR shall shore and brace where sloping is not possible due to space restrictions or stability of the material excavated. Sides and slopes shall be maintained in a safe condition until completion of backfilling.
 - f. The CONTRACTOR shall stockpile satisfactory excavated materials at a location approved by UTILITIES until required for backfill or fill.
 - g. Soil materials shall be located away from the edge of excavations.
 - h. Excavated spoil (material removed from the excavation) shall be piled on the side of the trench between the trench and traffic, and far enough away (a minimum of 2 to 5 feet) so the crew can walk between the trench and the excavated material.
 - i. For trenches less than 5 feet deep, the spoil shall be placed a minimum of 2 feet from the back of trench and only on one (1) side of the trench. For trenches deeper than 5 feet, the spoil shall be placed a minimum of 4 feet from the edge of the trench and only on one (1) side of the trench. Keeping the spoil away from the edge of trench reduces the load on the trench side walls.
 - j. The CONTRACTOR shall keep all areas clear to prevent material, tools and debris from being knocked into the trench and damaging the pipe or causing injury to workers.
- B. Excavations for Structures:
1. All such excavations shall conform to the elevations and dimensions shown on drawing within a tolerance of plus or minus 0.10 feet.
 2. When connecting to existing structures (ex. existing manholes), the entire structure shall be excavated and all soil removed from around the structure from existing grade to the elevation of the point of connection. No soil burden is acceptable on any portion of the structure. Failure to remove all the soil shall result in the removal and replacement of the existing structure as required by UTILITIES.
- C. Trench Excavation:
1. Excavation for trenches required for the installation of utility pipes shall be made to the depths indicated on the approved PLANS to provide suitable room for laying the size and type of pipe specified.
 - a. Excavations shall not exceed normal trench width as specified in the STANDARD DRAWINGS. Any excavation that exceeds the normal trench width shall require special backfill requirements as determined by UTILITIES.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3113: Excavations, Backfill, Compaction and Grading

October 10, 2021

- b. Where the pipes are to be laid directly on the trench bottom, the lower part of the trenches shall not be excavated to grade by machinery. The last of the material being excavated shall be done manually in such a manner that will give a shaped bottom, true to grade, so that pipe can be evenly supported on undisturbed material, as specified in the STANDARD DRAWINGS. Bell holes shall be made as required.

3.03 SHORING, SHEETING AND BRACING

A. General:

1. Requirements of the Trench Safety Act shall be adhered to at all times.
2. Shoring, sheeting and bracing is a method of construction to be utilized to prevent soil movement that could in any way diminish the width of the excavation. It is necessary for proper construction to protect workers from hazardous conditions, adjacent structures, existing piping and/or foundation material from disturbance, undermining or other damage. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, immediately fill voids with select common fill and compact.

B. Removal:

1. Unless otherwise approved or indicated on the approved PLANS, all sheeting and bracing shall be removed after completion of the substructure. All voids left or caused by withdrawal of sheeting shall be immediately filled with select common fill and compacted with tools specially adapted to that purpose or otherwise as may be approved by UTILITIES.

3.04 BEDDING AND BACKFILL

A. General:

1. Material placed in fill areas under and around structures and pipelines shall be deposited within the lines and to the grades shown on the approved PLANS making due allowance for settlement of the material. Fill shall be placed only on properly prepared surfaces that have been inspected and approved by UTILITIES.
 - a. Fill shall be brought up in uniform 12 inch maximum level lifts starting the deepest portion of the fill.
 - b. Fill shall be placed and spread in layers by an approved method. Prior to the process of placing and spreading, all materials not meeting those specified under this Section shall be removed from the fill areas.
 - c. Fill materials shall be placed and compacted "in the dry". The CONTRACTOR shall dewater excavated areas as required to perform the WORK and in such manner as to preserve the undisturbed state of the natural inorganic soils. Prior to filling, the ground surface shall be prepared by removing vegetation, debris, unsatisfactory soil materials, obstructions

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3113: Excavations, Backfill, Compaction and Grading

October 10, 2021

and deleterious materials. When existing ground surface has a density less than that specified under this Section for the particular area classification, the CONTRACTOR shall break up the ground surface, pulverize, moisture condition to the optimum moisture content and compact to required depth and percentage of maximum density.

- d. The CONTRACTOR shall evaluate the moisture condition of soils for proper compaction. Material that is too wet shall be replaced.

B. Bedding and Backfill for Structures:

1. Bedding rock shall be used for bedding under all structures, as indicated on the STANDARD DRAWINGS. The CONTRACTOR shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of this bed.
2. Select common fill shall be used as backfill against the exterior walls of the structures. Fill shall be compacted sufficiently in accordance with this Section.
 - a. Backfilling shall be carried up evenly on all walls of an individual structure. No backfill shall be allowed against walls until the walls and their supporting slabs, if applicable, have attained sufficient strength.
 - b. In locations where pipes pass through structure walls, the CONTRACTOR shall take precautions to consolidate the fill up to the spring line of the pipe. Select common fill in such areas shall be placed for a distance of not less than 3 feet either side of the centerline of the pipe in level layers not exceeding 8 inches in depth.
 - c. The surface of filled areas shall be graded to smooth true lines, strictly conforming to grades indicated on the approved PLANS. No soft spots or un-compacted areas will be allowed in the WORK.
 - d. Temporary bracing shall be provided as required during construction of all structures to protect partially completed structures against all construction loads, hydraulic pressure and earth pressure. The bracing shall be capable of resisting all loads applied to the walls as a result of backfilling.

C. Bedding and Backfill for Pipes:

1. Bedding for pipe shall be as shown on the approved PLANS. The CONTRACTOR shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of this bed.
 - a. Backfilling over and around pipes shall begin as soon as practicable after the pipe has been laid, jointed and inspected. All backfilling shall be prosecuted expeditiously and as detailed on the STANDARD DRAWINGS.
 - b. Any space remaining between the pipe and sides of the trench shall be carefully backfilled, spread by hand or approved mechanical device and thoroughly compacted with a tamper as fast as placed, up to a level of 1

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3113: Excavations, Backfill, Compaction and Grading

October 10, 2021

foot above the top of the pipe. The filling shall be carried up evenly on both sides.

- c. The remainder of the trench above the compacted backfill, as just described above, shall be filled and thoroughly compacted in uniform 12 inch maximum lifts layers.
- d. Compaction shall be in accordance with the STANDARD DRAWINGS and this Section.
- e. For gravity sanitary sewer construction, the first lift of backfill shall be placed to the spring line of the pipe and compacted by hand tamp.

3.05 COMPACTION

A. General:

1. The CONTRACTOR shall control soil compaction during construction to provide the percentage of maximum density specified. When utility WORK is conducted within FDOT ROW or other governing municipality, the more stringent minimum density standards shall apply.

B. Percentage of Maximum Density Requirements:

1. Fill or undisturbed soil from the bottom of the pipe trench to 1 foot above the pipe to the finished grade elevation shall be compacted to a minimum density of 95% of the maximum dry density as determined by AASHTO T-180. Right of way or easements with vehicular traffic on top of the pipe shall be compacted to a minimum density of 98% of maximum dry density as determined by AASHTO T-180.

C. Compaction Tests:

1. One (1) compaction test location shall be required for each 300 linear feet of pipe and for every 100 square feet of backfill around structures as a minimum. UTILITIES may determine that more compaction tests are required to certify the installation depending on field conditions. The locations of compaction tests within the trench shall be in conformance with the following schedule.
 - a. One (1) test at the spring line of the pipe.
 - b. At least one (1) test for each 12 inch layer of backfill within the pipe bedding zone for pipes 24 inches and larger.
 - c. One (1) test at an elevation of 1 foot above the top of the pipe.
 - d. One (1) test for each 2 feet of backfill placed from 1 foot above the top of the pipe to finished grade elevation.
 - e. Density testing is required around sanitary manholes. Tests shall be staggered around the manhole within 3 feet of the structures outside diameter.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3113: Excavations, Backfill, Compaction and Grading

October 10, 2021

- i. First test shall be 1 foot above the structure base; and
- ii. Second test shall be 2 feet above first test and subsequent tests every 2 feet up to finished subgrade.
- f. The CONTRACTOR shall provide additional compaction and testing prior to commencing further construction if the ENGINEER's testing reports and inspection indicate that the fill that has been placed is below specified density.
- g. The CONTRACTOR shall provide density testing reports to UTILITIES in a timely manner and at minimum shall be provided monthly during backfilling activities.
 - i. Density testing scheduled subsequent to backfilling activities shall be coordinated with UTILITIES and witnessed by the UTILITIES representative.
 - ii. Failure by the CONTRACTOR to coordinate or have the UTILITIES representative present shall result in rejection of the submitted density testing reports and re-testing at the CONTRACTOR's expense.
 - iii. Density testing reports not submitted in a timely manner shall result in rejection of the pipe installed and rejection of the density testing reports until such time that density re-testing is coordinated and repeated at the CONTRACTOR's expense as deemed necessary by the UTILITIES representative.
- h. Dewatering systems shall not be removed until compaction / density testing has been completed.

3.06 GRADING

- A. All areas within the limits of construction, including transition areas, shall be uniformly graded to produce a smooth uniform surface. Areas adjacent to structures or paved surfaces shall be graded to drain away from structures and pavement. Ponding shall be prevented. After grading, the area shall be compacted to the specified depth and percentage of maximum density, and outlined in this Section.
- B. No grading shall be done in areas where there are existing pipelines that may be uncovered or damaged until such lines have been relocated.

3.07 MAINTENANCE

- A. The CONTRACTOR shall protect newly graded areas from traffic and erosion and keep them free of trash and debris. The CONTRACTOR shall repair and reestablish grades in settled, eroded and rutted areas.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3113: Excavations, Backfill, Compaction and Grading

October 10, 2021

3.08 INSPECTION AND QUALITY ASSURANCE

A. Inspection:

1. The CONTRACTOR shall examine the areas and conditions under which excavating, filling and grading are to be performed and not proceed with the WORK until unsatisfactory conditions have been corrected.
 - a. The CONTRACTOR shall examine existing grade prior to commencement of WORK and report to UTILITIES if elevations of existing grade vary from elevations shown on approved PLANS.

B. Quality Assurance:

1. All WORK shall be performed in compliance with applicable requirements of governing authorities having jurisdiction.
 - a. The CONTRACTOR shall engage soil and material testing and inspection services for quality control testing during earthwork operations at no cost to the COUNTY.
 - b. Quality control testing shall be performed during construction to ensure compliance with these specifications. The CONTRACTOR shall assist the testing service as necessary. The CONTRACTOR shall allow the testing service to inspect and approve fill materials and fill layers before further construction is performed. The CONTRACTOR shall give copies of all test results in a report form to UTILITIES to demonstrate compliance with compaction requirements stipulated in this Section.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3114: Installation of Pipe

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. These specifications cover the pipe installation for potable water mains, wastewater force mains, reclaimed water mains and wastewater gravity mains.
- B. The CONTRACTOR shall be responsible for all materials furnished and storage of same, until the date of certificate of completion (COC). The CONTRACTOR shall replace, at their expense, all materials found to be defective or damaged in handling or storage.
- C. The CONTRACTOR shall, if requested by UTILITIES, furnish certificates, affidavits of compliance, test reports, samples or check analysis for any of the materials specified herein.
- D. All pipe delivered to project site for installation is subject to random testing for compliance with the designated specifications.
- E. The CONTRACTOR shall exercise extreme caution when excavating in proximity of all existing COUNTY assets and appurtenances. Water main, reclaimed water main, force main and gravity sewer locations shown on PLANS are not exact or guaranteed. The CONTRACTOR is responsible for field verifying existing utility locations. UTILITIES dispatch operator shall be notified immediately in the event of a force main, water main, or reclaimed water main break or damage at 407-836-2777.
 1. The CONTRACTOR shall immediately repair all damage to UTILITIES' mains and infrastructure, at the CONTRACTOR's expense.
 2. If the repair is not made in a timely manner, as determined by UTILITIES, UTILITIES may perform repairs and the CONTRACTOR will be charged for the repair(s).

1.02 PIPE STORAGE AND HANDLING

- A. Pipe shall be covered with plastic for protection against contamination. PVC pipe shall be protected with an "opaque shield between the sun and the pipe to prevent UV degradation" or discoloration.
- B. Pipe shall be handled in such manner as will prevent damage to the pipe or coating. Accidental damage to pipe or coating shall be repaired to the satisfaction of UTILITIES or be removed from the job. When not being handled, the pipe shall be supported on timber cradles or on properly prepared ground, graded to eliminate all rock points and to provide uniform support along the full length. When being transported, the pipe shall be supported at all times in a manner which will not permit distortion or damage to the lining or coating.
 1. Any unit of pipe that, in the opinion of UTILITIES, is damaged beyond repair by the CONTRACTOR shall be removed from the site of the WORK and replaced with another unit.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3114: Installation of Pipe

October 10, 2021

- C. Joint gaskets shall be stored in clean, dark, dry location until immediately before use.
- D. During the manufacturing process PVC pipe walls are subject to differential cooling rates resulting in a frozen-in bending stress which increases with respect to the material thickness of the pipe. Relaxation of this stress is a function of time and temperature cycles (nighttime/ daytime). Pipe stored outside above ground between the manufacturing date and actual installation of the pipe will relieve most of these residual stresses. Not providing ample time relative to the size and thickness of the pipe has resulted in the pipe cracking radially during pipe cutting. Therefore PVC pipe diameters 30” and 36” shall be stored onsite for a minimum of 90 days prior to installation. PVC pipe greater than 36” shall be stored onsite for a minimum of 120 days prior to installation. Additional time may be required based on seasonal temperature ranges or manufacturing process techniques.
- E. Additional handling and care of stored materials requirements is covered in Section 3110 “General Construction Requirements” in this MANUAL.

PART 2 PRODUCTS

2.01 TECHNICAL AND ENGINEERING SUPPORT

A. Manufacturers of Pipe that are approved in Appendix D shall be members in good standing with the respective engineering support trade organizations for purposes of providing technical & engineering support, ongoing research, regulatory coordination and training to the community including but not limited to: Manufacturers, Suppliers, ENGINEERS, CONTRACTORS and the COUNTY.

- 1. PVC Pipe – Uni-Bell PVC Pipe Association (Uni-Bell)
- 2. DIP Pipe – Ductile Iron Pipe Research Association (DIPRA)
- 3. HDPE - Plastics Pipe Institute (PPI)

2.02 PIPE COLOR CODING

A. Pipe shall have color coding equal to the following table.

Table 3114-1: Pipe Color

Pipe Use	Color Coding
Potable Water	Safety Blue
Wastewater	Safety Green
Reclaimed Water	Pantone Purple (522-C)

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3114: Installation of Pipe

October 10, 2021

2.03 PIPE MATERIALS AND APPURTENANCES

A. Potable Water Mains:

1. Refer to Section 3210, “Water Pipes, Valves, and Appurtenances”.

B. Gravity Mains:

1. Refer to Section 3310, “Wastewater Pipes, Valves, and Appurtenances”.

C. Wastewater Force Mains:

1. Refer to Section 3310, “Wastewater Pipes, Valves, and Appurtenances”.

D. Reclaimed Water Mains:

1. Refer to Section 3510, “Reclaimed Water Pipes, Valves, and Appurtenances”.

2.04 FITTINGS AND RESTRAINTS

A. Fittings for Water Mains, Wastewater Force Mains and Reclaimed Water Mains:

1. Ductile iron fittings 4 inch through 24 inch shall be pressure rated at 350 psi minimum (except flange-joint shall be rated at 250 psi minimum). All 30-inch and larger fittings shall be pressure rated to 250 psi minimum. All fittings shall conform to either ANSI/AWWA C110/A21.10 and/or C153/A21.53, latest revision, and shall be ductile iron only. All fittings shall be cast and machine allowing the bolt holes to straddle the vertical centerline. All fittings shall be designed to be capable to withstand, without bursting, hydrostatic tests of three times the rated water working pressure. All fittings shall have a date code cast (not printed or labeled), with identification of date and factory and unit it was cast and machined. Fittings shall have distinctly cast on them the pressure rating, nominal diameter of openings, manufacturer’s name, the country where cast, and number of degrees or fraction of the circle. Ductile iron fittings shall have the letter “DI” or “Ductile” cast on them.
2. All potable water main fittings shall have NSF certification, and ISO 9001 certification for both the foundry and manufacturer. The NSF-61 certification shall be issued on all coatings and linings, from the said manufacturers that are used for potable water applications.
3. Interior and Exterior coatings shall be as specified by Sections 3119, 3210, 3310 and 3510.

B. Hardware for Fittings and Restraints.

1. All flanged: pipe, valves and appurtenances shall have 316 SST hardware. Shall meet ANSI/AWWA C111/A21.11 and the referenced ASTM Standards:
 - a. Once installed, damaged, and/or torqued down to or past the manufacturers’ specifications, the hardware and restraints shall not be reused.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3114: Installation of Pipe

October 10, 2021

- b. On all flanged connections, 316 stainless steel bolts, nuts and washers are to be used along with the proper sized full flanged gasket.

Table 3114-2: Hardware ASTM Standards

<i>Hardware</i>	<i>Carbon Steel</i>	<i>AISI 316 Stainless Steel</i>
Heavy Hex Bolts	ASTM A307 Grade B	ASTM A193 Grade B8M
Heavy Hex Nuts	ASTM A563	ASTM A194 Grade 8M
Tee-Bolts	ASTM A242	N/A
Rods (all-thread, tie, anchor)	ASTM A242	ASTM A193 Grade B8M

- ASTM A193 / A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications.
- ASTM A194, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
- ASTM A307, Standard Specification for Carbon Steel Bolts and Studs.
- ASTM A563, Standard Specification for Carbons and Alloy Steel Nuts.
- ASTM A242, Standard Specification for High-Strength Low-Alloy Structural Steel.
- ANSI/AWWA C111/A21.11, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

PART 3 EXECUTION

3.01 SURVEY LINE AND GRADE

A. Pressure Mains:

1. Pipe shall be laid to the lines and grades shown on the PLANS. The CONTRACTOR shall provide line and grade stakes at a 100 foot maximum spacing and at all line and/or grade change locations. The CONTRACTOR shall provide temporary bench marks at a maximum of 1,000 foot intervals. The CONTRACTOR shall provide and maintain stakes denoting private property, ROW or easements throughout construction. The minimum pipe cover, in accordance with Table 3114-3, shall be taken from the lower elevation of the finished grade surface or below the elevation of the edge of pavement of the road surface whichever is greater.

B. Gravity Mains:

1. The CONTRACTOR shall set temporary bench marks at a maximum of 500 foot intervals. The CONTRACTOR shall constantly check line and grade of the pipe by laser beam method. In the event line and grade do not meet specified limits

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3114: Installation of Pipe

October 10, 2021

described hereinafter, the WORK shall be immediately stopped, UTILITIES notified and the cause remedied before proceeding with the WORK.

3.02 PIPE PREPARATION AND HANDLING

- A. All pipe and fittings shall be inspected prior to lowering into trench to insure no cracked, broken or otherwise defective materials are being used. All homing marks shall be checked for the proper length so as to not allow a separation or over homing of connected pipe. Homing marks incorrectly marked on pipe shall result in rejection of pipe and removal from site. The CONTRACTOR shall clean ends of pipe thoroughly and remove foreign matter and dirt from inside of pipe and keep clean during and after installation.
- B. Proper implements, tools and facilities shall be used for the safe and proper protection of the WORK. Pipe shall be lowered into the trench in such a manner as to avoid any physical damage to the pipe. Pipe shall not be dropped or dumped into trenches under any circumstances.

3.03 PIPE INSTALLATION

- A. Trench Preparation and Pipe Bedding:
 - 1. Refer to Section 3113 “Excavation, Backfill, Compaction and Grading” and STANDARD DRAWINGS.
- B. Trench Dewatering and Drainage Control:
 - 1. Specifications from Section 3113 “Excavation, Backfill, Compaction and Grading” shall apply.
 - 2. CONTRACTOR shall prevent water from entering trench during excavation and pipe-laying operations to the extent required to properly grade the bottom of the trench and allow for proper compaction of the backfill. Pipe shall not be laid in water.
- C. Pipe Laying in Trench:
 - 1. Dirt or other foreign material shall be prevented from entering the pipe or pipe joint during handling or laying operations and any pipe or fitting that has been installed with dirt or foreign material in it shall be removed, cleaned and re-laid.
 - 2. Pigging of pipe may be used to remove foreign materials in lieu of flushing.
 - 3. At times when pipe laying is not in progress; the open ends of the pipe shall be closed by a watertight plug or by other means approved by UTILITIES to ensure absolute cleanliness inside the pipe.
 - 4. The color stripe and pipe text shall be located on the top of pipe when installed.
 - 5. When installing PVC pipe, no additional joints will be installed until the preceding pipe joint has been completed and the pipe carefully embedded and secured in place.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3114: Installation of Pipe

October 10, 2021

D. Locating Wire:

1. Locating wire, for electronically locating pipe after it is buried or installed by trenchless technology, shall be attached along the length of and installed with the pipe. This is applicable to all sizes and types of pressure mains.
2. At a minimum, the tracing wire shall be attached to the pipe with nylon wire -ties, as shown in the STANDARD DRAWINGS.
3. The wire itself shall be 10 gauge single strand solid core copper wire with non-metallic insulation. The insulation shall be color coded for the type of pipe being installed.
4. Continuity must be maintained in the wire along the entire length of the pipe run.
5. Permanent splices must be made in the length of the wire using wire connectors specifically designed for direct burial, dielectric silicone gel or moisture-resistant grease filled, designed to prevent uninsulated wire loss of continuity and approved for underground applications as listed in the uniform electric code handbook.
6. At all tracing wire splices, tees, and valve collars, a knot in the locate wire shall be made to prevent the wire from coming apart.
7. The coiled wire shall extend a minimum 12 inches above the surface at valve locations.
8. The CONTRACTOR shall conduct a preliminary wire check during construction, witnessed by the COUNTY, for continuous continuity prior to installing road base.

E. PVC Pressure Pipe Installation and Training:

1. PVC pipe shall be installed in accordance with standards set forth in the UNIBELL “Handbook of PVC Pipe”, AWWA C605, and AWWA Manual M-23 and the pipe manufacturer’s instructions.
 - a. The pipe shall be laid by inserting the spigot end into the bell flush with the insertion line or as recommended by the manufacturer.
 - b. At no time shall the spigot end be allowed to go past the “insertion line” or “homing mark” for pressure pipe applications and homing mark shall be visible. A gap between the end of the spigot and the adjoining pipe is necessary to allow for expansion and contraction.
2. Field Cutting: PVC pipe can be cut with a handsaw or power driven abrasive disc. Be sure to make a square cut. Bevel the end with a beveling tool, wood rasp or power sander to the same angle as provided on the factory-finished pipe. Remark the insertion line on the spigot using a factory marked spigot as a guide.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3114: Installation of Pipe

October 10, 2021

3. Every person handling, installing or backfilling PVC pipe shall not be permitted to install COUNTY owned and / or maintained pipe without training by the approved Appendix D manufacturer’s representatives for every project site. Onsite project training shall be for each manufacturer of pipe utilized onsite, per crew and per project. Specifically each crew member shall be trained on every project by every pipe manufactures representative regardless of previous onsite training.

F. Minimum Cover Over Pipe

1. Reference STANDARD DRAWINGS, “Roadway and Utilities Corridor Guides” A900 series, for location details regarding pipe off-sets, maximum allowable pipe diameter, distance from structures, and CLEAR ZONE requirements.

Table 3114-3: Minimum Pipe Cover

Pipe Diameter/ (inches)	LOCAL Roadway	Non-LOCAL Roadway
2” - 8”	30”	36”
12”	36”	48”
16”	48”	48”
20”	48”	48”
24”	48”	48”
30”	48”	48”
36”	48”	48”
42”	48”	48”

Note: Maximum pipe size permitted in LOCAL roadways is dependent on the clear zone available between vertical structures.

Note: Minimum Cover Over Plug and Butterfly Valves – See Table 3114-3 Minimum Pipe Cover

Note: Minimum Cover Over Gate Valves – See Table 2210-1 – Minimum Pipe Cover Required for Pipe at Gate Valves.

G. PVC Gravity Pipe Installation:

1. PVC pipe shall be installed in accordance with standards set forth in the UNI-BELL “Handbook of PVC Pipe”, and the pipe manufacturer’s instructions, and shall meet the requirements in section 4310 “Testing and Inspection for Acceptance of Wastewater System” within this MANUAL.
 - a. The pipe shall be laid by inserting the spigot end into the bell flush with the insertion line or as recommended by the manufacturer.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3114: Installation of Pipe

October 10, 2021

- b. At no time shall the spigot end be allowed to go past the “insertion line” or “homing mark” for gravity pipe applications and homing mark shall be visible.
- c. Pipe shall be laid such that the bell and spigot is in the direction of flow. A gap between the end of the spigot and the adjoining pipe is necessary to allow for expansion and contraction.

2. Field Cutting: PVC pipe can be cut with a handsaw or power driven abrasive disc. Be sure to make a square cut. Bevel the end with a beveling tool, wood rasp or power sander to the same angle as provided on the factory-finished pipe. Remark the insertion line on the spigot using a factory marked spigot as a guide.

H. Ductile Iron Pipe Installation:

1. Ductile iron pipes shall be installed in accordance with AWWA C600 and AWWA Manual M-42. When a restraining type gasket is used, the bell shall be painted red.

I. HDPE pipe installation:

1. HDPE pipe installation shall follow the methods described ASTM F1962 in the most current revisions of the “Plastics Pipe Institute Handbook”, PPI MAB-7, “Guidelines for Use of Mini-Horizontal Directional Drilling for Placement of HDPE (PE4710) Pipe in Municipal Applications” and AWWA “M55 PE Pipe - Design and Installations Manual”.

J. Installation of Pipes on Curves:

1. For Ductile Iron Pipe, long radius curves, either horizontal or vertical, may be installed with standard pipe by deflections at the joints. Maximum deflections at pipe joints, fittings and laying radius for the various pipe lengths shall not exceed 75% of the pipe manufacturer’s recommendation.
2. No joint deflection or pipe bending is allowed in PVC pipe. The maximum allowable tolerance in the joint due to variances in installation is 0.75 degrees (3-inches per joint per 20 foot stick of pipe). No bending tolerance in the pipe barrel shall be acceptable. Alignment change shall be made only with fittings. Sleeves shall not be used for deflection.

K. Installation of Pipe Adjacent to Structures:

1. Pressure pipes 4 inches through 12 inches shall be installed a minimum of 10 feet from all building foundations, including, but not limited to: porches, walls and structural foundations. Pressure pipes greater than 12 inches shall be installed a minimum of 15 feet from all building foundations, including, but not limited to: porches, walls, and structural foundations. Additional horizontal separation may be required based on easement requirements per Section 2210, 2310, 2311 of this MANUAL.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3114: Installation of Pipe

October 10, 2021

3.04 INSTALLATION OF APPURTENANCES:

A. Appurtenances:

1. Valves, fire hydrant assemblies, blow-off assemblies, line markers and combination or universal air release assemblies are to be installed at the locations shown on the PLANS and as shown in the STANDARD DRAWINGS.
2. Valves and fire hydrant assemblies shall be restrained to the pipeline they are connected to.
 - a. In addition the pipeline shall be restrained by the use of an approved material from a manufacturer listed in the Appendix D, "List of Approved Products".
 - b. The distance of pipeline restraint shall not be less than shown in the STANDARD DRAWINGS.

B. Service Lines:

1. Service lines shall be installed to service intended properties as shown on the PLANS and as shown in the STANDARD DRAWINGS. Etch the letter "W", "S", or "R" in the curb at each service location as applicable.

C. Valve Boxes:

1. Valve boxes in non-paved areas shall be installed with a valve collar as shown in the STANDARD DRAWINGS. Etch the letter "V" in the curb at each valve location.

D. Valves:

1. Valves shall be installed with the operating nut square and centered in the valve box with a centering ring or valve box stabilizer.
2. The valve key, when installed, is perpendicular to the ground and can be freely turned without impacting the valve box walls.

E. Fittings:

1. Fittings installed in a pressure pipeline shall require that both the pipe and fitting be restrained by the use of approved materials from manufacturers listed in the Appendix D, "List of Approved Products".
2. The distance of pipeline restraint shall be not less than as shown in the STANDARD DRAWINGS.

3.05 PRESSURE AND NON-PRESSURE CONNECTIONS

- A. The CONTRACTOR shall coordinate and schedule with UTILITIES to be onsite for all connections and excavations to existing infrastructure.
- B. If not compliant and CONTRACTOR performs WORK without UTILITIES onsite, replacement and re-inspection shall be warranted at no cost to the COUNTY.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3114: Installation of Pipe

October 10, 2021

C. Refer to Section 3117, “System Connections”, for further requirements.

3.06 SUBAQUEOUS CROSSINGS

- A. The method of crossing bodies of waters shall be by subaqueous means. UTILITIES may approve other construction means or methods addressing special conditions.
- B. A minimum cover of 5 feet shall be maintained over the pipe. Restrained joint pipe shall be used. See STANDARD DRAWING A103 for details.
- C. Valves shall be provided at both ends of the water crossings so that the section can be isolated for testing or repair. The valves shall be easily accessible and installed, as shown in the STANDARD DRAWINGS, at locations not subject to flooding.
- D. An air or combination air/vacuum release valve shall be installed at the upstream high point prior to the subaqueous crossing. The air release valve shall be capable of expelling large quantities of air from the main during filling, allow air into the main during shutdown and expelling air during operation.
- E. It shall be the responsibility of the CONTRACTOR/DEVELOPER to obtain all applicable regulatory permits, including but not limited to: dredge and fill permits and approval for crossing Submerged Land of the State of Florida, if applicable, to perform the WORK.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3115: Directional Drilling

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The WORK specified in this section consists of furnishing and installing underground utilities using the horizontal directional drilling (HDD) method of installation, also commonly referred to as directional boring or guided horizontal boring for pressure pipe. This WORK shall include all piping, equipment, materials and labor for the complete and proper installation, testing, restoration of underground utilities and surface features, and environmental protection and restoration.

1.02 QUALITY ASSURANCE

A. Qualifications:

1. Directional drilling CONTRACTOR (or SUBCONTRACTOR) shall be a licensed General Contractor or Underground Utilities Contractor; shall have a minimum of four (4) years of experience constructing water, wastewater, or reclaimed water pipelines of the same or larger diameter and the same or greater lengths. All pipe and appurtenances of similar type and material shall be furnished by a single manufacturer.
2. The CONTRACTOR's operations shall be in conformance with the Directional Crossing Contractors Association (DCCA) published guidelines (latest edition) and pipe manufacturer's guidelines and recommendations.

PART 2 PRODUCTS

2.01 GENERAL

A. The directional drilling equipment shall consist of the following:

1. A directional drilling rig of sufficient capacity to perform the bore and pull-back the pipe;
2. A drilling fluid mixing, delivery and recovery system of sufficient capacity to complete the crossing;
3. A drilling fluid recycling system to remove solids from the drilling fluid so that the fluid can be reused;
4. A magnetic guidance system to accurately guide boring operations;
5. A vacuum truck of sufficient capacity to handle the drilling fluid volume;
6. Trained and competent personnel to operate the system; and
7. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in proper working order.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3115: Directional Drilling

October 10, 2021

2.02 DRILLING SYSTEM

A. The directional drilling machine shall consist of a hydraulically powered system to rotate, push and pull hollow drill pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head. The machine shall be anchored to the ground to withstand the pulling, pushing and rotating pressure required to complete the crossing. The hydraulic power system shall be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system shall be free of leaks. Rig shall have a system to monitor and record maximum pullback pressure during pullback operations. The rig shall be grounded during drilling and pullback operations. There shall be a system to detect electrical current from the drilling string and an audible alarm that automatically sounds when an electrical current is detected.

2.03 PIPE

A. Pipe shall be PVC or HDPE pipe with ductile iron pipe outside diameters in accordance with AWWA C900 or C906 respectively. The dimension ratio shall be verified by the CONTRACTOR based on the pipe, joint and material pull strength required for the directional drilling.

B. PVC Pipe

1. PVC restrained joint pipe shall have minimum dimension ratios equal to the following table.

Table 3115-1: Minimum Dimension Ratios for PVC Pipe

Type of Pipe System	Minimum Dimension Ratio
Wastewater	18
Reclaimed Water	18
Water	18

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3115: Directional Drilling

October 10, 2021

2. PVC pipe shall meet the requirements of AWWA C900. The pipe shall be joined using separate couplings that have beveled edges, built-in sealing gaskets and restraining grooves or steel ring-and-pin gasketed joints. The restraining splines shall be square and made from Nylon 101. Pipe and couplings shall be Underwriters Laboratory and Factory Mutual approved.
3. Installation Curvature: The pipeline curvature shall not have a radius less than as shown in Table 3115-2.

Table 3115-2: PVC Pipe Deflection Information

Pipe Diameter (inches)	Minimum Radius of Curvature (feet)	Offset per 20-ft Length (inches)	Deflection per 20-ft Length (degrees)
4	133	17.25	8.6
6	200	12.00	5.7
8	266	9.00	4.3
10	333	6.75	3.5
12	400	6.00	2.9
16	532	4.50	1.5

C. HDPE Pipe

1. HDPE pipe and related fittings shall be made with prime virgin resins exhibiting a minimum cell classification as defined in ASTM D3350 and meeting the PE 4710 code designation with minimum dimension ratios equal to the following.

Table 3115-3: Minimum Dimension Ratios for HDPE Pipe

Type of Pipe System	Minimum Dimension Ratio
Wastewater	11
Reclaimed Water	11
Water	11

2. HDPE pipe 4 inch and larger nominal diameter shall be joined by means of zero leak-rate thermal heat fusion of the pipe butt ends (butt fusion). Joints shall provide axial pullout resistance. Pipe shall meet the requirements of ANSI/AWWA C906, and have an outside diameter dimension of ductile iron pipe. Flanged joints shall not be used below finished grade for horizontal directional drilling applications.
3. HDPE pipe shall have been continuously marked by the manufacturer with permanent printing indicating at a minimum the following.
 - a. Nominal size (inches);
 - b. Dimension ratio (DR);
 - c. Pressure rating (psi);

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3115: Directional Drilling

October 10, 2021

- d. Trade name;
 - e. Material classification (per Appendix D);
 - f. Plant, extruder and operator codes;
 - g. Resin supplier code;
 - h. Date produced; and
 - i. HDPE pipe used for portable water mains shall bear the NSF Seal of Approval.
4. HDPE pipe shall be black in color with permanent colored stripes extruded into the pipe length or shall be one solid color, per the applicable service as specified in Table 3114-1, Pipe Color.
5. Installation Curvature:
- a. The pipeline curvature shall not have a radius less than as shown in Table 3115-4.

Table 3115-4: HDPE Pipe Deflection Information (DIP Sizes)

Pipe Diameter (inches)	Minimum Radius of Curvature (feet)
4	23
6	34
8	44
12	67
16	88
20	104
24	125
30	156
36	188
42	219

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3115: Directional Drilling

October 10, 2021

Table 3115-5: Directional Drilling Rod Average Deflection Information

Rod Diameter (inches)	Minimum Bending Radius (feet)
1	100
2	200
3	300
4	400
5	500
5.5	550
6	600

Minimum Bending Radius of 1 inch Rods

$$Rr = 1200 \times Dr$$

Rr = Minimum bending radius of drill rod (inches)

Dr = Diameter of drill rod (inches)

2.04 DRILLING FLUIDS

- A. Drilling fluids shall consist of a mixture of potable water and gel-forming colloidal material, such as bentonite or a polymer surfactant mixture producing slurry of custard-like consistency.

PART 3 EXECUTION

3.01 PERSONNEL REQUIREMENTS

- A. Responsible representatives of the CONTRACTOR and SUBCONTRACTOR(s) shall be present at all times during directional drilling operations. A responsible representative as specified herein is defined as a person experienced in the type of WORK being performed and who has the authority to represent the CONTRACTOR in a routine decision making capacity concerning the manner and method of carrying out the WORK.
- B. The CONTRACTOR and SUBCONTRACTOR(s) shall have sufficient number of competent workers on the project at all times to ensure the utility placement is made in a timely, satisfactory manner. Adequate personnel for carrying out all phases of the directional drilling operation (where applicable: tunneling system operators, operator for removing spoil material, and laborers as necessary for various related tasks) must be on the job site at the beginning of WORK. A competent and experienced supervisor representing the CONTRACTOR or SUBCONTRACTOR that is thoroughly familiar with the equipment and type of WORK to be performed, must be in direct charge and

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3115: Directional Drilling

October 10, 2021

control of the operation at all times. In all cases, the supervisor must be continually present at the project site during the directional drilling operation.

3.02 REQUIREMENTS

- A. Directional drilling CONTRACTOR shall coordinate with PUBLIC WORKS, or ROW owner, and UTILITIES for all directional drills.
- B. No directional drills shall be started after 12:00 PM to allow proper completion of drill start to finish.
- C. Welding or butt fusing of HDPE in temperatures below 55 degrees shall only be allowed if these conditions are met:
 - 1. The CONTRACTOR shall set up a temporary wind barrier around the operator and fusion equipment.
 - 2. Close the pipe ends off with end caps or other means to prevent the flow of cold air.
 - 3. Pre-heat pipe ends using a heating blanket or warm air device.
 - 4. With pipe mounted in the fusion machine, position the pipe ends within 1/4 to 1/2 inch of the heater plate face to allow the pipe ends to warm for 30 seconds to 2 minutes, depending on the pipe size and wall thickness. Before starting pipe fusion, the operator needs to ensure that the ID of the pipe is clear of moisture due to frost that is being melted. The use of direct application open flame devices, such as torches, for heating PE pipe is unacceptable due to the lack of adequate heating control and the possibility of oxidative damage to the pipe ends and even ignition of the pipe.
- D. The warming temperature shall not exceed 120°F.
- E. Wind striking the fusion heater plate and pipe can cause unacceptable temperature variations and possible joint contamination during butt fusion. In windy conditions, use a suitable shelter to protect the pipe and the fusion heater plate. High winds can also cause flow through the pipe bore. Plug or cover pipe ends to prevent this.

3.03 WORK PLAN

- A. Prior to beginning WORK, the CONTRACTOR must submit a WORK plan to UTILITIES detailing the procedure and schedule to be used to execute the project. The WORK plan should include the following.
 - 1. A description of all equipment to be used;
 - 2. Down-hole tools;
 - 3. A list of personnel and their qualifications and experience;
 - 4. List of SUBCONTRACTORS;
 - 5. A schedule WORK activity;
 - 6. A safety plan, traffic control plan (if applicable);

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3115: Directional Drilling

October 10, 2021

7. An environmental protection plan;
 8. Contingency PLANS for possible problems; and
 9. CONTRACTOR and SUBCONTRACTOR full business names and CONTRACTOR license numbers.
- B. WORK plan should be comprehensive, realistic and based on actual working conditions for this particular project. Plan should document the requirements to complete the project
- C. Equipment:
1. The CONTRACTOR will submit specifications on directional drilling equipment to be used to ensure that the equipment will be adequate to complete the project. Equipment shall include but not be limited to the following:
 - a. Drilling rig;
 - b. Mud system;
 - c. Mud motors (if applicable);
 - d. Down-hole tools;
 - e. Guidance system; and
 - f. Rig safety systems.
- D. Calibration records for guidance equipment shall be included. Specifications for any drilling fluid additives that the CONTRACTOR intends to use or might use shall be submitted.

3.04 COORDINATION OF THE WORK

- A. The CONTRACTOR shall notify UTILITIES at least nine (9) CALENDAR DAYS in advance of starting WORK. In addition, the actual crossing operation shall not begin until UTILITIES is present at the project site and agrees that proper preparations for the crossing have been made. UTILITIES' approval for beginning the crossing shall in no way relieve the CONTRACTOR from the ultimate responsibility for the completion of the WORK.
- B. The CONTRACTOR and UTILITIES shall select a mutually convenient time for the crossing operation to begin in order to avoid schedule conflicts.

3.05 PROCEDURE

- A. The installation of appropriate safety and warning devices in accordance with the "FDOT Manual on Traffic Control and Safe Practices" shall be completed prior to beginning WORK.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3115: Directional Drilling

October 10, 2021

3.06 INSTALLATION

- A. Erosion and sedimentation control measures and on-site containers shall be installed to prevent drilling mud from spilling out of entry and/or exit pits. Drilling mud will be disposed of off-site in accordance with local, state and federal requirements and/or permit conditions.
1. No other chemicals or polymer surfactant shall be used in the drilling fluid without written consent of UTILITIES and after a determination is made that the chemicals to be added are not harmful or corrosive to the facility and are environmentally safe.
- B. Pilot Hole:
1. Pilot hole shall be drilled on bore path with no deviations greater than 2% of depth over a length of 100 feet. In the event that pilot does deviate from bore path more than 2% of depth in 100 feet, the CONTRACTOR shall notify ENGINEER. The ENGINEER may require the CONTRACTOR to pull-back and re-drill from the location along bore path before the deviation.
- C. Boring Path Report:
1. Submit a Bore Path Report to UTILITIES within seven (7) CALENDAR DAYS of the completion of each bore path and shall comply with FDOT 555-3.2 "Product Locating and Tracking". Include the following in the report:
 - a. Location of project, name and project number;
 - b. Name of person collecting data, including title, position and company name;
 - c. Contract/project plans sheet number including station numbers;
 - d. Identification of the detection method used;
 - e. Data #;
 - f. Distance;
 - g. Rod Length;
 - h. Elevation (Per Section 2111);
 - i. Depth;
 - j. Pitch;
 - k. Azimuth;
 - l. Radius;
 - m. X & Y coordinates (Per Section 2111); and
 - n. Topography report containing; Data #, Distance, and Elevation.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3115: Directional Drilling

October 10, 2021

D. Over Deflection:

1. If the bore report shows the pipe installation to exceed design and/or manufacturers deflection, the directional drill and HDD pipe shall be rejected. All pipe shall be removed and new pipe shall be installed per design at no cost to the COUNTY.

E. Reaming:

1. Upon successful completion of pilot hole, and verification and COUNTY approval of the boring path report, the CONTRACTOR will ream the borehole using the appropriate tools per table 3115-6, "Maximum Pilot or Back-Reamer Diameter". CONTRACTOR will not attempt to ream at one time more than the drilling equipment and mud system are designed to safely handle.
2. The CONTRACTOR shall ream during pullback of the pipe material. Reaming and pullback shall commence prior to 2:00 PM.

Table 3115-6: Maximum Pilot or Back-Reamer Diameter

Outside Pipe Diameter * (Inches)	Maximum Bit Diameter (Inches)
< 8	Diameter + 4
8 to 24	1.5 x Diameter
>24	Diameter + 12

Note: *Use manufacturers' recommendation for pipe with restrained joints

F. Pullback:

1. In front of the pipe will be a swivel and barrel reamer to compact borehole walls.
2. Once pullback operations have commenced, operations must continue without interruption until pipe is completely pulled into borehole.
3. During pullback operations, the CONTRACTOR shall not apply more than the maximum safe pipe pull pressure at any time. A break away head rated at the maximum safe pull pressure shall be utilized. Maximum allowable tensile force imposed on the pull section shall not exceed 80% of the pipe manufacturer's safety pull (or tensile) strength.
4. The CONTRACTOR shall provide a pullback report to the UTILITIES representative prior to all testing.

- G. As-built variance from the designed bore path shall not exceed plus or minus 1 foot in the vertical plane and plus or minus 2 feet in the horizontal plane. The CONTRACTOR and ENGINEER shall submit any proposed deviations from the design bore path as a field revision to the PLANS. Failure of approved variance and adherence to design, at the discretion of the UTILITIES representative, shall result in abandonment and reinstallation of the directional drill.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3115: Directional Drilling

October 10, 2021

- H. The pipe entry area shall be graded to provide support for the pipe to allow free movement into the borehole. The pipe shall be guided in the borehole to avoid deformation of, or damage to, the pipe.
- I. If unexpected subsurface conditions are encountered during the bore, the procedure shall be stopped. The installation shall not continue until the OWNER and ENGINEER have been consulted.
- J. The pipe shall be installed in a manner that does not cause upheaval, settlement, cracking, movement, distortion of surface features or escaping drilling fluid (frac-out).
- K. A boring log shall be kept with horizontal and vertical location at a minimum of every rod length. In addition, horizontal location of the bore shall be marked in the field during the bore. A Survey shot is required for each length of the bore rod. The SURVEYOR shall locate these marks and include this information with the bore elevations in the RECORD DRAWINGS. The SURVEYOR may make a note on the drawing page containing the directional drill and provide an exception for the directional drill only, as the directional drill route cannot be uncovered and physically located.
- L. Locating wire:
 - 1. Locating wire in accordance with Section 3114 shall be attached to the pipe.
 - 2. A minimum of three (3) locating wires shall be attached at different radial locations around the pipe to ensure continuity in at least one (1) wire subsequent to installation.
 - 3. Failure of continuous continuity in the locating wire, at the discretion of the UTILITIES representative, shall result in abandonment and reinstallation of the directional drill.
 - 4. Three (3) copper coated clad wires may be utilized in lieu of 10 gauge copper wire for directional drills only.
- M. The pipe shall be installed at a depth of no more than 15 feet below finished grade, measured from the top of pipe unless approved by UTILITIES.
- N. Boring Failure:
 - 1. If an obstruction is encountered during boring which prevents completion of the installation of pipe or if pipe fails the hydrostatic testing, the directional drill and HDD pipe shall be rejected.
- O. Rejected HDD pipe:
 - 1. The CONTRACTOR shall be required to remove and properly dispose of pipe and properly abandon the bore at no cost to the COUNTY. All rejected HDD pipe may be properly abandoned in place at the discretion of the COUNTY. Reuse of the installed and failed pipe shall not be accepted. The ENGINEER and CONTRACTOR shall submit a new installation procedure and revised plans to the COUNTY for approval before resuming HDD WORK at another location.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3115: Directional Drilling

October 10, 2021

- P. If, during construction, damage is observed to COUNTY assets or assets of the ROW owner, all HDD WORK shall be ceased until resolution to minimize further damage and a plan of action for restoration is obtained and approved by the COUNTY and ROW owner.

3.07 FIELD TESTING

A. PVC Pipe:

- 1. Perform hydrostatic testing for leakage following installation in accordance with the applicable test sections.

B. HDPE Pipe:

- 1. After installation the pipe shall be tested in accordance with ASTM F2164 and AWWA M55 with the following modifications:
 - a. Test Duration: The total test time including initial pressurization, initial expansion and time at test pressure, must not exceed eight (8) hours. If the test is not completed due to leakage, equipment failure, etc., the test section shall be depressurized and allowed to “relax” for a minimum of eight (8) hours before it is brought back up to test pressure. The test procedure consists of initial expansion phase and leakage test phase.
 - b. Initial Expansion Phase: During the initial expansion phase, the test section is pressured to the test pressure and enough make-up water is added as necessary to maintain test pressure for four (4) hours.
 - c. Leakage Test Phase: The leakage test phase follows immediately and shall be either two (2) or three (3) hours in duration. At the end of the time test, the test section shall be returned to test pressure by adding a measured amount of liquid. The amount of make-up liquid added shall not exceed the values provided in Table 3115-7 plus allowable leakage.

Table 3115-7: Allowance for Make-up Water Under Test Pressure*

Test Duration (hours)	Pipe Diameter (inches)									
	2	4	6	8	12	16	20	24	30	36
	Allowance/100 feet of Pipeline (gallons)									
2	0.11	0.25	0.60	1.00	2.30	3.30	5.50	8.90	12.60	18.00
3	0.19	0.40	0.90	1.50	3.40	5.50	8.00	13.30	19.10	27.00

Note: * Applies to test period and not to initial expansion phase

C. Pressure Testing:

- 1. The test pressure for the pipe shall be 150 psi for water, reclaimed water, and wastewater.

CHAPTER 3 **CONSTRUCTION SPECIFICATIONS**

Section 3115: Directional Drilling

October 10, 2021

D. Mandrel Testing:

1. Perform mandrel testing shall be performed through the entire length of the installed pipe, for all pipe 16 inches in diameter and larger. The mandrel size shall be 90% of the inside diameter of the pipe. Mandrel testing on smaller pipe may be required by UTILITIES.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3116: Jack and Bore

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The installation of a casing pipe by the method of boring and jacking shall be covered by these specifications. The overall scope of WORK shall include, but not be limited to, boring and jacking pits and equipment, sheeting, steel casing pipe, casing spacers, coatings, location signs as required, miscellaneous appurtenances to complete the entire WORK as shown on the STANDARD DRAWINGS and restoration. Applicable provisions of PARTS 1 and 2 shall apply concurrently with this MANUAL. Boring and jacking operations shall be performed within the ROW and/or easements shown on the PLANS.

1.02 QUALITY ASSURANCE

- A. Jurisdiction:
 1. For casing pipe crossing under roadways or other installations not within the jurisdiction of the OWNER, the CONTRACTOR shall comply with regulations of said authority. State highway casing installations shall conform to the FDOT, "Utility Accommodation Guide" and shall meet all standard FDOT Specifications.
- B. The CONTRACTOR shall verify existing utility location prior to constructing drilling and receiving pits.
- C. Subaqueous crossings shall also adhere to the requirements in Section 3114, "Installation of Pipe".

PART 2 PRODUCTS

2.01 PIPE MATERIAL

- A. Steel Casing:
 1. Steel casings shall conform to the requirements of ASTM Designation A139 (straight seam pipe only) Grade "B" with minimum yield strength of 35,000 psi.
 2. The casing pipes shall have the minimum nominal diameter and wall thickness as shown in Table 3116-1.
 3. Field and shop welds of the casing pipes shall conform to the American Welding Society (AWS) standard specifications. Field welds shall be complete penetration, single bevel groove type joints. Welds shall be airtight and continuous over the entire circumference of the pipe and shall not increase the outside pipe diameter by more than 3/4 inch.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3116: Jack and Bore

October 10, 2021

B. Carrier Pipe:

1. The carrier pipe shall be as specified by Section 3210, “Water Pipe, Valves, and Appurtenances”, Section 3310, “Wastewater Pipe, Valves, and Appurtenances” and Section 3510, “Reclaimed Water Pipe, Valves, and Appurtenances” with restrained joints, with the following exceptions: water and reclaimed water carrier pipe shall be ductile iron pipe and wastewater force mains shall be DR-18 PVC.

Table 3116-1: Casing Pipe Minimal Nominal Diameter and Wall Thickness

Carrier Pipe Nominal Diameter (in.)	Casing Outside Diameter (in.)	Casing Wall Thickness (in.)
4	16	.250”
6	16	.250”
8	18	.250”
10	20	.250”
12	24	.250”
16	30	.312”
20	36	.375”
24	42	.500”
30	48	.500”
36	54	.500”
42	60	.500”

C. Carrier Pipe Spacers:

1. Stainless Steel Casing Spacers:
 - a. Carrier pipes, inside of steel casing pipe, shall be supported by casing spacers at no more than 6-1/2 feet between spacers with double spacers on each end of the casing and spacers at a maximum of 2 feet behind the bell.
 - b. Each spacer shall be a minimum 8 inches wide for pipe 12 inch diameter or less or minimum 12 inches wide for pipe 16 inch or greater and manufactured of minimum 14 gauge Type 304 SST.
 - c. All nuts, bolts and washers shall be 304 SST and compatible with the respective 304 SST shell / band.
 - d. Each spacer shall have a minimum of four (4) runner supports manufactured of an ultra-high molecular weight polyethylene or glass reinforced polymer. The runner supports shall be of adequate height to position the carrier pipe in the center of casing with a minimum top clearance of 1-1/2 inch.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3116: Jack and Bore

October 10, 2021

- e. All casing spacers larger than 36 inch diameter (carrier pipe) shall be factory designed, taking in consideration the weight of the carrier pipe filled with water.
 - f. All calculations and drawings shall be submitted to UTILITIES for review.
- D. Casing End Seals:
1. Casing ends shall be sealed with brick and cement in the annular space and casing end seals shall be used to completely close both openings on either side of the casing.
 2. These end seals shall be pull on (seamless) or wrap around with stainless steel straps for securing to the carrier pipe and the casing.
 3. End seals shall be constructed of specially compounded synthetic rubber a minimum thickness of 1/8 inch.

PART 3 EXECUTION

3.01 INSPECTION

- A. Casing pipe to be installed may be inspected for compliance with this MANUAL by an independent laboratory selected and paid for by UTILITIES. The manufacturer's cooperation shall be required in these inspections.
- B. All casing pipe shall be subjected to a careful inspection prior to being installed. If the pipe fails to meet the specifications it shall be removed and replaced with a satisfactory replacement at no cost to UTILITIES.

3.02 PIPE HANDLING

- A. Care shall be taken in loading, transporting, and unloading to prevent damage to the pipe or coatings. Pipe shall not be dropped.
- B. All pipes shall be examined before lying and no piece shall be installed which is found to be defective.
- C. Any damage to the pipe or coatings shall be repaired or replaced to the satisfaction of UTILITIES.

3.03 CONSTRUCTION REQUIREMENTS

- A. WORK Coordination:
 1. It shall be the CONTRACTOR's responsibility to perform the jacking and boring work in strict conformance with the requirements of the agency in whose ROW or easement the WORK is being performed. Any special requirements of the agency such as insurance, flagmen, etc., shall be strictly adhered to during the performance of WORK. The special requirements shall be performed by the CONTRACTOR at no cost to UTILITIES.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3116: Jack and Bore

October 10, 2021

B. Dewatering:

1. Dewatering through the casing during construction shall not be permitted.

C. Carrier Pipe Support:

1. The carrier pipes shall be supported within the casing pipes so that the pipe bells do not rest directly on the casing. The load of the carrier pipes shall be distributed along the casing spacers.
2. Casing spacers shall be bolt on style split shells made of Type 304 SST. All nuts and bolts shall be high strength, low alloy meeting AWWA C111.
3. Runners shall be made of a high molecular weight polymer with inherent high abrasion resistance and a low coefficient of friction.

D. Jacking Pits:

1. Excavation adjacent to the roads shall be performed in a manner to adequately support the roads. Bracing, shoring, sheeting or other supports shall be installed as needed. The CONTRACTOR shall install suitable reaction blocks for the jacks as required.
2. Jacking operations shall be continuous and precautions shall be taken to avoid interruptions that might cause the casing to “freeze” in place.
3. Upon completion of jacking operations, the reaction blocks, braces and all other associated construction materials shall be completely removed from the site.
4. The CONTRACTOR shall install appropriate barricades if pits are open overnight. Excavation shall be completely enclosed with barricades.

E. Miscellaneous Requirements:

1. Provide an indication of where the leading edge of the casing is located with respect to line and grade and the intervals for checking line and grade. Indication may be provided by using a water gauge (Dutch level) or electronic transmitting and receiving devices. Other methods must have prior approval. Maintain a record of the progress at the job site.
2. Equipment of adequate size and capability to install the product and include the equipment manufacturer’s information for all power equipment used in the installation.
3. Provide a means for centering the cutting head inside the borehole.
4. Correct line and grade shall be carefully maintained. Earth within the casing shall not be removed too close to the cutting edge in order to prevent the formation of voids outside the casing. If voids are formed, they shall be satisfactorily filled with grout by pumping.
 - a. The rear of the cutting head from advancing in front of the leading edge of the casing and in stable cohesive conditions shall not exceed 8 inches.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3116: Jack and Bore

October 10, 2021

- b. In unstable conditions, such as granular soil, loose or flowable materials, the cutting head is retracted into the casing a distance that permits a balance between pushing pressure, pipe advancement and soil conditions.
 - c. Develop and maintain a log of the volume of spoil material removal relative to the advancement of the casing.
5. Provide adequate casing lubrication with bentonite slurry or other approved technique.
6. Provide an adequate band around the leading edge of the casing to provide extra strength in loose unstable materials when the cutting head has been retracted into the casing to reduce skin friction as well as provide a method for the slurry lubricant to coat the outside of the casing.
7. The sections of steel casing shall be field welded in accordance with the applicable portions of AWWA C206 and AWS D7.0 for field welded pipe joints. The CONTRACTOR shall wire brush the welded joints and paint with an approved material. Only a certified welder shall perform welding operations on the casing pipe. The welder's certification shall be submitted to UTILITIES prior to the work.
8. After completion of jacking, the CONTRACTOR shall clean the interior of the casing of all excess material.
9. The annular space between the carrier pipe and casing shall be filled with clean sand, if required in the jack and bore permit. Masonry plugs and end seals are to be installed at each open end of the casing. Plugs shall be suitable for restraining the earth load.
10. The pipe shall be installed at a depth of no more than 15 feet below pavement measured from the top of pipe.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3117: System Connections

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Connections shall be made in accordance with this Section. Mains shall be tapped in such a manner as to avoid disturbance or disruption to the operation of the main in service and to protect the potable water supply from contamination.
- B. UTILITIES shall operate all valves on existing mains.
- C. The CONTRACTOR is not permitted to excavate or expose any COUNTY assets unless UTILITIES is onsite.
- D. All valves installed during construction are to remain closed until approved by UTILITIES to open.

PART 2 PRODUCTS

2.01 TAPPING SLEEVES, LINE STOPS, AND VALVES

A. General:

- 1. Tapping sleeves shall be mechanical joint sleeves. Refer to Appendix D, “List of Approved Products”, for all sleeves, valves and appurtenances.

B. Mechanical Joint Sleeves:

- 1. Water and reclaimed mechanical joint sleeves
 - a. Sleeves shall be cast of gray iron or ductile iron and have an outlet flange with the dimensions of the Class 125 flanges shown in ANSI B16.1 and properly recessed for tapping valve. Glands shall be gray iron or ductile iron. Gaskets shall be vulcanized natural or synthetic rubber. Bolts and nuts shall comply with ANSI/AWWA C111/ANSI A21.11.
 - b. Sleeves shall be capable of withstanding a 200 psi working pressure.

C. Fabricated Mechanical Joint Tapping Sleeves:

- 1. Water and reclaimed fabricated mechanical joint tapping sleeves
 - a. Sleeves shall be of split mechanical joint design with separate end and side gaskets.
 - b. Sleeves shall be fabricated of high strength steel, meeting ASTM A283 Grade C or ASTM A-36. Outlet flange shall meet AWWA C 207, Class “D” ANSI 150 pound drilling and be properly recessed for the tapping valve. Bolts and nuts shall be high strength low alloy steel to AWWA C111 (ANSI A21.11). Gasket shall be vulcanized natural or synthetic rubber.
 - c. Tapping sleeve shall meet MSS-SP124 and AWWA C223. Sleeve shall have manufacturer applied fusion bonded epoxy coating, minimum 12 mil thickness.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3117: System Connections

October 10, 2021

- d. The minimum working pressure shall be 150 psi and surge pressure shall be 200 psi.
2. Wastewater fabricated mechanical joint tapping sleeves
 - a. Sleeves shall be of split mechanical joint design with separate end and side gaskets.
 - b. Sleeves shall be fabricated of 316 SST, including flanges meeting ASTM A240, ASTM A312, ASTM/ASME B16.5. Outlet flange shall meet AWWA C 207, Class “D” and be properly recessed for the tapping valve.
 - c. Tapping sleeve shall meet MSS-SP124 and AWWA C223.
 - d. The minimum working pressure shall be 150 psi and surge pressure shall be 200 psi.
- D. Fabricated Line Stops:
 1. Water and reclaimed water line stops
 - a. Line Stops shall be fabricated of high strength steel, meeting ASTM A283 Grade C or ASTM A-36. Bolts and nuts shall be 304 SST. Gasket shall be vulcanized natural or synthetic rubber. Sleeve body, completion flange, completion plug and blind flange shall be shop, electro, or fusion epoxy coated, minimum 12 mil thickness.
 - b. The minimum working pressure shall be 150 psi and surge pressure shall be 200 psi.
 - c. Line stops shall be hydrostatically tested against the completion plug prior to tapping the pipe. Pressure tests shall be a minimum of 30 minutes at 150 psi with no allowable water loss or any drop in pressure.
 - d. An insertion type valve may be utilized in lieu of a line stop as approved by UTILITIES.
 2. Wastewater line stops
 - a. Line Stops shall be fabricated of 316 SST, meeting ASTM A240, ASTM A312, ASTM/ASME B16.5. Gasket shall be vulcanized natural or synthetic rubber meeting ASTM D2000. Sleeve body, completion flange and hardware shall be 316 SST. Completion plug and blind flange shall be shop, electro or fusion epoxy coated ductile iron or carbon steel, minimum 12 mil thickness.
 - b. The minimum working pressure shall be 150 psi and surge pressure shall be 200 psi.
 - c. Line stops shall be hydrostatically tested against the completion plug prior to tapping the pipe. Pressure tests shall be a minimum of 30 minutes at 150 psi with no allowable water loss or any drop in pressure.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3117: System Connections

October 10, 2021

E. Tapping Valves:

1. Tapping valves shall meet the requirements of Section 3210, “Water Pipes, Valves and Appurtenances”, Section 3310, “Wastewater Pipes, Valves and Appurtenances”, and Section 3510, “Reclaimed Water Pipes, Valves and Appurtenances”, except that units shall be flange by mechanical joint ends.
2. Valves shall be compatible with tapping sleeves as specified above and specifically designed for pressure connection operations.
3. Tapping valves shall be furnished with an alignment lip.
4. Tapping valves shall be installed in the vertical position for water and reclaimed water.
5. Wastewater shall be installed horizontally and abandoned in the open position followed by a plug valve.

F. Service Pipe, Line Stops, Fittings and Service Saddles:

1. Services shall meet the requirements of Section 3210, “Water Pipes, Valves and Appurtenances”, Section 3510 “Reclaimed Water Pipes, Valves and Appurtenances” and installed per the STANDARD DRAWINGS.

PART 3 EXECUTION

3.01 NOTIFICATION AND CONNECTION TO EXISTING MAINS

- A. The CONTRACTOR shall submit a completed “System Connection” form, Appendix B, to UTILITIES to schedule the connection. The request shall be made a minimum of seven (7) NORMAL WORKING DAYS/nine (9) CALENDAR DAYS prior to the proposed tie-in to the existing main.
- B. In this request, the CONTRACTOR shall provide the following information.
 1. Points of connection, fittings to be used and method of flushing and disinfection if applicable.
 2. Estimated construction time for said connections.
 3. Identify pressure and non-pressure connections
- C. Connections shall only be made on the agreed upon date and time. If the CONTRACTOR does not perform the work in the agreed upon manner or schedule, the CONTRACTOR shall be required to reschedule the said connection by following the procedure outlined above.
- D. All service connections for water or reclaimed water services shall be scheduled with UTILITIES for installation by CONTRACTOR.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3117: System Connections

October 10, 2021

3.02 INSTALLATION

A. General:

1. The CONTRACTOR shall furnish and install the line stop, tapping sleeves, and valves to existing mains. Taps are not permitted for single connections on distribution systems smaller than 4 inches or on transmission mains 30 inches or larger unless approved by UTILITIES.

B. Taps:

1. No taps (all sizes) on PVC shall be made within 5 feet of a fitting, joint, or tap.
2. No taps less than 2 inches on DI shall be made within 12 inches of a fitting, joint, or tap.
3. No 2 inch taps on DI shall be made within 18 inches of a fitting, joint or tap.
4. No taps larger than 2 inch on DI shall be made within 5 feet of a fitting, joint, or tap.

C. Excavation, Backfill, Compaction and Grading:

1. The applicable provisions of Section 3113, "Excavation, Backfill, Compaction and Grading", shall apply.

D. Pressure Connections:

1. Sufficient length of main shall be exposed to allow for installation of the tapping sleeve and valve and the operation of the tapping machinery. The main shall be supported on concrete pedestals or bedding rock at sufficient intervals to properly carry its own weight, plus the weight of the tapping sleeve, valve and machinery. Any damage to the main due to improper or insufficient supports will be repaired at the CONTRACTOR's expense.
2. Prior to the tap, the CONTRACTOR shall assemble all materials, tools, equipment, labor and supervision necessary to make the connection.
 - a. The COUNTY may require the CONTRACTOR to schedule the tapping operations during a period of low demand, low flow, or when pressure can be reduced including after NORMAL WORKING HOURS at no cost to the COUNTY.
 - b. The CONTRACTOR shall excavate to a minimum of 18 inches under the main for access and clean conditions for installation of the saddle, in addition to creating a dry and safe working area pit of sufficient size to enable the necessary WORK.
 - c. The inside of the tapping sleeve and valve, the outside of the main and the tapping machine shall be cleaned and swabbed or sprayed with 1% liquid chlorine solution prior to beginning installation for water system pressure

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3117: System Connections

October 10, 2021

connections and must comply with AWWA C-651-99 or most current version approved by the FDEP permit.

3. After the tapping sleeve has been mounted on the main, the tapping valve shall be bolted to the outlet flange, making a pressure tight connection.
 - a. Prior to beginning the tapping operation, the sleeve and valve shall be pressure tested for a minimum of 30 minutes under the observation of UTILITIES personnel to 150 psi to ensure that no leakage will occur.
 - b. The pressure test on the tapping saddle shall be rescheduled if the test fails. The tapping operations shall not proceed until the next business day after a successful test.
4. It is recommended that the CONTRACTOR utilize a tapping blanket for safety in accordance with safety considerations from Uni-Bell / PVC Pipe Association.
5. For pressure connections 4 inch through 20 inch installations, the minimum diameter cut shall be 1/2 inch less than the nominal diameter of the pipe to be attached. For larger taps, the allowable minimum diameter shall be 2 to 3 inches less than the nominal diameter of the pipe being attached.
 - a. After the tapping procedure is complete, the CONTRACTOR shall submit the coupon to UTILITIES.
6. The tapping valve shall be placed horizontally for pressure connections to wastewater force mains. A plug valve shall be attached to the tapping valve after the tapping procedure is complete. The tapping valve shall be left in the open position prior to backfilling.
7. Adequate restrained joint fittings shall be provided to prevent movement of the installation when test pressure is applied. Provisions in Appendix A, "STANDARD DRAWINGS" shall apply.
8. The CONTRACTOR shall be responsible for properly backfilling the work area pit after the WORK is completed.

E. Non- Pressure Dry Connections:

1. When service must be interrupted to existing potable water customers during an addition of appurtenances the following shall apply.
 - a. The CONTRACTOR shall provide ten (10) NORMAL WORKING DAYS notice to UTILITIES on the required form.
 - b. No customer shall be without service for more than six (6) hours. This accommodation to customers may include scheduling after NORMAL WORKING HOURS.
 - c. The CONTRACTOR shall be ready to proceed by pre-assembling as much material as possible at the site to minimize the length of service interruption.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3117: System Connections

October 10, 2021

- d. Needed pipe restraints must be installed prior to the initiation of the shut-down of water.
- e. The excavation shall be opened and needed site preparations must be completed before the initiation of the connection WORK.
- f. UTILITIES shall postpone a service cut-off if the CONTRACTOR is not ready to proceed at the scheduled time.
- g. Only UTILITIES personnel shall operate the valves needed to perform the shut-down on the existing system.

F. Service Connections:

1. All services, service saddles and fittings shall be in accordance with AWWA C800-05, or current version. Damage to the main due to improper installation shall be repaired at the CONTRACTOR's expense.
2. Prior to the tap, the CONTRACTOR shall assemble all materials, tools, equipment, labor and supervision necessary to make the connection.
 - a. The CONTRACTOR shall excavate a dry and safe working area pit of sufficient size to enable the necessary WORK.
 - b. The inside of the service saddle, the outside of the main and all tools shall be cleaned and swabbed or sprayed with 1% liquid chlorine solution prior to beginning installation for water system pressure connections and must comply with AWWA C-651-99 or most current version approved by FDEP permit.
3. The saddles shall be properly installed and tightened progressively and evenly with a torque wrench to the torque limit as recommended by the saddle manufacturer.
 - a. All direct taps, saddles, gate valves, and corporation stops shall be installed per the STANDARD DRAWINGS.
 - b. All corporation stops and 2 inch gate valves shall be left in the open position prior to backfilling.
4. For existing PVC, the pipe cutting tool shall be of a shell type design, have a minimum of two (2) slots, of throat design to accommodate the wall thickness of DR18 and C900 PVC pipe.
 - a. Operation shall use a standard ratchet handle on the boring bar to rotate the boring bar by hand and be capable of manually advancing the boring bar independently from the rotation.
 - b. A hand-held drill shall never be used to tap PVC pipe.
5. The coupon shall be retained and provided to UTILITIES.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3117: System Connections

October 10, 2021

6. Service lines shall be 1 inch or 2 inch polyethylene tubing and color coded blue for water and pantone purple for reclaimed water and connected via compression coupling to the corporation stop and curb stop.
7. Approximately 12 inch of polyethylene tubing shall be attached to the curb stop and shall remain above grade for accessibility during the walk-thru inspection.
8. UTILITIES shall inspect each service saddle installation and service line connection for proper installation, materials, manufacturer and color coding to distinguish water versus reclaimed water.
 - a. Under no circumstances shall the CONTRACTOR backfill the service connection prior to inspection and verification by UTILITIES.
9. The CONTRACTOR shall be responsible for properly backfilling the work area after the WORK is completed.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. These specifications pertain to the coating and lining including but not limited to manholes and lift stations as well as the coating of above ground assets including but not limited to: steel, ductile iron pipe, ductile iron fittings, valves, hydrants, hardware and all appurtenances. Brass, bronze and 316 SST shall not be coated.
- B. Precast concrete rehabilitation and new structures. The work shall include the furnishing and installation of an interior protective lining / coating corrosion protection system including all necessary materials, equipment and tools as required for a complete installation in accordance with the manufacturers recommendations. The completed system shall provide a waterproof, corrosion protection system to prevent any deterioration of concrete surfaces from hydrogen sulfide and other corrosive gases/acids produced by wastewater and to prevent infiltration. To ensure total unit responsibility, all materials and installation thereof shall be furnished by, and coordinated with, one (1) supplier/manufacturer.

1.02 QUALITY ASSURANCE

- A. All work shall be proved to be in first class condition and constructed in accordance with the drawings and specifications. All defects disclosed by tests and inspections shall be remedied immediately by the CONTRACTOR at no expense to the COUNTY.
- B. Fiberglass liner manufacturers shall certify that the liner has been manufactured, sampled, tested, and inspected in accordance with ASTM D 3753.
- C. Polyethylene liner manufacturers shall certify that the liner has been designed and manufactured in accordance with these specifications.
- D. Holiday Testing: Each coat shall be holiday tested at the recommended 100-125 volts DC per mil in accordance with the latest edition of the following standards: NACE SP0188-2006, NACE Standard RP0490, ASTM G62.

1.03 COVERAGE

- A. The protective lining / coating corrosion protection shall cover all concrete surfaces within the wetwell or manhole including the adjustment ring area.
- B. Coatings and lining surfaces shall be holiday free and all defects shall be repaired in accordance with the manufacturer's recommendations prior to the next coat being applied.

1.04 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM C1244: Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill
 - 2. ASTM D3299: Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

3. ASTM D3350: Standard Specification for Polyethylene Plastics Pipe and Fittings
 4. ASTM D3753: Glass-Fiber-Reinforced Polyester Manholes and Wetwells
 5. ASTM D6365: Nondestructive Testing of Geomembrane Seams using the Spark Test.
 6. ASTM F1759: Design of High-Density Polyethylene (HDPE) Manholes for Subsurface Applications
 7. ASTM F1869: Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
 8. ASTM G62: Standard Test Methods for Holiday Detection in Pipeline Coatings.
- B. NACE INTERNATIONAL (Formerly The National Association of Corrosion Engineers)
1. NACE SP0188-2006: (formerly RP0188), Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.
 2. NACE Standard SP0490-2007: (formerly RP0490), Holiday Detection of Fusion-Bonded Epoxy External Pipeline Coating of 250 to 760 μm (10 to 30 mil).
 3. NACE Standard SP0178-2007: (formerly RP0178), Design, Fabrication, and Surface Finish Practices for Tanks and Vessels to Be Lined for Immersion Service.

PART 2 PRODUCTS

2.01 HDPE LINERS

- A. The work shall include the furnishing and installation of an interior protective liner system including all necessary labor, materials, equipment and tools as required for a complete installation. Liner shall be high density polyethylene (HDPE). This liner shall provide a waterproof, corrosion resistant liner to prevent any deterioration of concrete surfaces from hydrogen sulfide and other corrosive gases/acids produced by wastewater and to prevent infiltration. To ensure total unit responsibility, all materials and installation thereof shall be furnished by, and coordinated with, one supplier/manufacturer.
- B. Manhole HDPE Liner shall have a minimum thickness of 2 mm (78 mil) and Wetwell HDPE shall have a minimum thickness of 5 mm (195 mil). All HDPE liner sheets shall be extruded with a large number of anchoring studs, a minimum of (420/m², 39 ft²), manufactured during the extrusion process in one (1) piece with the sheet so there is no welding and no mechanical finishing work to attach the studs to the sheet. The liner shall have a pull out of 112.5 lbs/anchoring stud. A manufacturer certified fabricator

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

- shall custom fit the liner to the form work in order to protect the concrete surfaces from sewer gases.
- C. All welding shall be performed in accordance with the published directives and procedures of the manufacturer and by welders certified by the manufacturer and documentation shall be provided to the COUNTY prior to the work. Completion of welding will provide a one (1) piece monolithic concrete protective liner system that will provide excellent resistance to hydrogen sulfide attack and will not pull off the wall in the event that infiltration occurs. Flat liner sheet, not anchored, used for overlapping joints, shall have a minimum thickness of 3 mm and shall contain a co-extruded bottom surface layer of conductive polyethylene. Conductive cap strip material shall have a free path from the back side of the sheet to a portion of the concrete surface.
 - D. Field welding of the liner at the riser joints shall be completed only after vacuum testing (ASTM C1244) of the new structure has been completed and any concrete joint deficiencies have been rectified.
 - E. Testing and supervision of the installation and welding shall be performed by qualified staff only and must be checked when completed by visually checking and by Spark Testing all welded joints per ASTM D6365. Holiday testing 20,000 to 35,000 volts. All high voltage discontinuity (spark) testing shall be performed using a Tinker & Razor model AP/W Holiday Detector or equal.
 - F. Penetrations (Gravity, conduit, etc) shall have an internal boot comprising of minimum of 3/8 inch 316 SST band clamp compressing a 2 inch wide neoprene with full circumferential welded boot around each penetration in accordance with the manufacturer's details.
 - G. Penetrations (Gravity, conduit, etc) shall be gasketed preformed polypropylene (PP) pipe bell connectors or PP sleeves for boot type connectors and shall be attached to the PP liner by hot air extrusion welding with PP welding bead in accordance with the manufacturer's details.
 - H. Chimney protection for the brick adjustment area may be a gasketed HDPE adjustable chimney liner creating a seal with the HDPE lined manhole in lieu of utilizing the approved specialty coatings per appendix D.

2.02 FIBERGLASS LINERS

- A. Fiberglass liners shall be used for new or existing precast manholes and wetwells. Fiberglass liners shall meet or exceed ASTM D 3753 and shall with stand ASHTO H-20 Loading.
- B. Fiber reinforced plastic (FRP) liner shall be one (1) piece with no vertical or horizontal seams allowed. The FRP shall be fabricated in accordance with NBS PS 15-69, and shall consist of commercial grade polyester resin, UV inhibitor, chopped strand, woven roving, and continuous reinforcement. Minimum liner thickness shall be 1/2 inch for all diameter wells, and shall not have external ribs. Liner size shall be field verified by

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

liner manufacturer’s representative. Tolerance of the inside diameter shall be +/- 1% of the required liner diameter.

C. Exterior Surface:

1. The exterior surface shall be relatively smooth with no sharp projections and shall be free of blisters larger than 1/2 inch in diameter, delamination and fiber show. Hand work finish is acceptable if enough resin is present to eliminate fiber show.

D. Interior Surface:

1. The interior surface shall be resin rich with no exposed fibers. The surface shall be free of crazing, delamination, and blisters larger than 1/2 inch in diameter, and wrinkles of 1/8 inch or greater in depth. Surface pits shall be permitted up to 6 square feet if they are less than 3/4 inch in diameter and less than 1/16 inch deep. Voids that cannot be broken with finger pressure and that are entirely below the resin surface shall be permitted if they are less than 1/2 inch in diameter and less than 1/16 inch thick.

E. Physical Properties:

Property	Hoop Direction	Axial Direction
Tensile Strength (psi)	18,000	5,000
Tensile Modules (psi)	0.6 x 10e	0.7 x 10e
Flexural Strength (psi)	26,000	4,500
Flexural Modules (psi)	1.4 x 10e	0.7 x 10e
Compressive Strength (psi)	18,000	12,000

F. Stiffness

Liner Length in FT	PSI
03 – 06.5	0.75
07 – 12.5	1.26
13 – 20.5	2.01
21 – 25.5	3.02
26 – 35.0	5.24

G. TESTING:

1. All tests shall be performed as specified in ASTM D3753 latest edition, Section 8. Test method D-790 (note 5) and test method D695.
2. Each completed liner shall be examined for dimensional requirements, hardness and workmanship. All required ASTM D3753 testing shall be completed and records of all testing provided to the COUNTY.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

3. As a basis of acceptance, the manufacturer shall provide an independent certification which shall consist of a copy of the manufacturer's test report, and be accompanied by a copy of the test results that the liner has been sampled, tested and inspected in accordance with the provisions of this specification and meets all its requirements. The independent certification and manufacturer's test report shall be provided to the COUNTY prior to delivery of the liner.

H. Connections:

1. Openings for pipe connections will be core drilled in the field. Pipes shall be placed through concrete wetwell and fiberglass liner in the locations indicated on the drawings.
2. Pipes shall then be grouted in place with the grout filling the entire void and being as thick as the concrete wetwell.
3. The pipe on the interior of the wetwell shall be fiberglassed to the fiberglass liner. To fiberglass the PVC or Ductile Iron pipe to the fiberglass liner, the surface to be fiberglassed must first be sanded. In the case of Ductile Iron pipe, the protective coating on the exterior of the pipe must be removed and then the pipe sanded. After sanding and cleaning the area to be fiberglassed, apply a coat of primer resin. When the resin becomes tacky, begin normal installation of the fiberglass, taking care to roll out all of the air pockets.
4. All field fiberglassing must be accomplished by a manufacturer certified installer. Submit certification to the COUNTY.

I. Fiberglass Reinforced Top:

1. The fiberglass manhole liner top shall be fabricated using fiberglass material as above. Material and installation to meet all physical requirements as above.
2. Top to be attached to wetwell liner pipe with fiberglass layup to comply with ASTM D3299. When reinforcement is necessary for strength, the reinforcement shall be fiberglass channel laminated to the inside of the liner top and shall comply with ASTM D3299.
3. 4000 psi concrete shall be poured around the entire manhole fiberglass cone section. Lift station top slabs shall be re-poured with HDPE interior liner.
4. CONTRACTOR shall ensure an air tight connect between the Pump Station HDPE lined top slab and interior wetwell liner.

- J. PVC stub-outs shall be factory installed for new installations to accept approved boots for gravity lines or compression seals for force mains.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

2.03 FERROUS METAL SURFACES (Inclusive of Steel and DIP, Hydrants, Fittings and Appurtenances)

A. General:

- a. Cleaning, surface preparation, coating application, and thickness shall be as specified herein and shall meet or exceed the coating manufacturer's recommendations.
- b. When the manufacturer's minimum recommendations exceed the specified requirements, CONTRACTOR shall comply with the manufacturer's minimum recommendations. All cleaning, surface preparation, coating application, thickness, testing, and coating materials (where available) shall be in accordance with the referenced standards of the following AWWA, ANSI, NACE, SSPC, NSF, and ASTM.
- c. Color coding shall be per Table 3119-1.
- d. Surfaces shall be holiday free and detected in accordance with ASTM G 62. Areas found to have holidays shall be marked and repaired in accordance with the paint manufacturer's instructions.
- e. The COUNTY shall be notified of time of testing to witness testing.
- f. The CONTRACTOR coating ferrous metal surfaces shall at minimum be certified NACE Level 1, verifiable through NACE.org, and be in good standing with NACE International prior to the WORK.

B. Procedures for Coating Exterior of DIP, Hydrants, Fittings and Appurtenances

1. Surface Preparation: Do not abrasive blast or prepare more surface area than can be coated in the same day; prepare surfaces and apply prime coatings within a six (6) hour period. Before application of the prime coat and each succeeding coat, all surfaces to be coated shall be subject to inspection and approval by the COUNTY. The CONTRACTOR shall correct any defects or deficiencies before application of any subsequent coating. Coatings applied without COUNTY approval shall be removed and reapplied at no cost to the COUNTY.
 - a. Brass, Bronze and Stainless Steel:
 - i. CONTRACTOR shall protect brass, bronze and stainless steel appurtenances from blasting, media and coatings. These materials shall not be coated. Labels, signs or nameplates including but not limited to: UL, ferrous metals, equipment identification, performance rating, name and nomenclature plates shall not be coated. Coating of brass, bronze and stainless steel (with the exception of 316 SST nuts and bolts) shall result in removal and replacement with new appurtenances at no cost to the COUNTY.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

- b. Steel:
 - i. Shall require NACE-1 / SSPC-SP5 White Metal Blast Cleaning minimum angular anchor profile of 1.5 mils. White metal blast cleaning removes all of the coating, mill scale, rust, oxides, staining, corrosion products, and other foreign matter from the surface.
 - c. DIP, DIP with asphaltic seal coat, Hydrants, FBE (Valves and appurtenances):
 - i. Shall require NACE-3 / SSPC-SP6 Commercial Blast Cleaning minimum angular anchor profile of 1.5 mils. Commercial blast cleaning removes all visible oil, grease, dust, dirt, mill scale, rust, coating, oxides, corrosion products, and other foreign matter from all surfaces and allows stains to remain on no more than 33% of each unit area of surface. SSPC-SP 11 Power Tool Cleaning to Bare Metal or SSPC-SP 15 Commercial Grade Power Tool Cleaning may be permitted to surface preparation but shall be considered a substitute to abrasive blasting including but not limited to SSPC-SP6/NACE 3 or SSPC-SP7/ NACE 4.
 - ii. Note: Primer Option - Hydrants, FBE (Valves and appurtenances), existing factory coatings: Where specifically called out in the Coating System Table below, NACE-4 / SSPC-SP7 may be substituted for the commercial blast for hydrants and factory applied FBE (Valves and appurtenances) where the coating manufacturer has specifically provided compatible coatings with existing coatings including urethane, epoxy, alkyd and water-based coatings. Under no circumstances shall DIP with asphaltic seal coat be over-coated. NACE-4 / SSPC-SP7 Brush-Off Blast Cleaning shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose coating. Tightly adherent mill scale, rust, and coating may remain on the surface. Mill scale, rust, and coating are considered tightly adherent if they cannot be removed by lifting with a dull putty knife after abrasive blast cleaning has been performed.
 - d. NACE-5 / SSPC-SP12; Water-jetting including high pressure water jetting or high pressure water cleaning with substrate shall not be permitted or considered a substitute for abrasive blasting surface preparation.
2. Contaminants:
- a. Remove all grease, dirt, dust, oil, salt, alkali, foreign matter and all other contaminants that could interfere with adhesion of the coating in accordance with SSPC-SP1 for the substrate prior to surface preparation and between each coating layer utilizing steam cleaning, alkaline cleaning or volatile solvent cleaning.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

- b. Rags and solvents must be replenished frequently to avoid spreading the contaminant rather than removing it.
 - c. Low-pressure (1500-4000 psi) high volume (3-5 gal/min) water washing with appropriate cleaning chemicals is a recognized “solvent cleaning” method.
 3. Temperature:
 - a. Surface temperature of substrate shall be a minimum of 5 degrees above the dew point and rising and generally between 40°F to 100°F.
 - b. Temperatures shall not exceed manufacturer’s recommendations.
 4. Stripping:
 - a. Edges, corners, crevices, welds, and bolts shall be given a brush coat / stripe coat for each material / layer.
 - b. The stripe coat shall be applied by a brush and worked in both directions.
 5. Coatings Systems:
 - a. Each coat shall be a distinctive color or shade to verify each coating in the system.
 6. Prime coat:
 - a. DIP, DIP with asphaltic seal coat, Hydrants, FBE (Valves and appurtenances) prime coat shall be zinc-rich. Zinc-rich shall only be used on bare metal.
 - b. Factory applied FBE / Asphaltic / Mastic coatings on valves and appurtenances shall be completely removed per NACE 3 / SSPC-SP6.
 - c. Note: Where specifically called out in the Coating System Table 3119-2 for factory applied FBE (Valves, pipe and appurtenances) surface preparation may be NACE-4 / SSPC-SP7 and the prime coat shall be an Inorganic water based epoxy.
 - i. Asphaltic seal coats and mastics shall not be over-coated with inorganic water based epoxy or any coating system.
 7. Intermediate coat:
 - a. Varies per coating system.
 8. Final Coat:
 - a. Varies per coating system.
 9. Coating thickness:
 - a. Dry Film Magnetic Pull-Off Gauge (Type I) shall be utilized to determine dry film thickness (DFT) in accordance with SSPC-PA 2 “Measurement of Dry Coating Thickness with Magnetic Gages”.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

- b. The average of the readings shall meet the County-specified minimum dry film thickness (MDFT) for each coating application.
- c. Electromagnetic Gauge (Type II) shall not be considered acceptable for use on ductile iron pipe.
- d. Destructive testing using a Tooke gauge shall only be utilized in cases of dispute regarding DFT and the CONTRACTOR shall be responsible for repairing the areas examined at no cost to the COUNTY.

10. Holiday Testing:

- a. Each coating layer shall be holiday tested at the recommended 100 - 125 volts DC per mil in accordance with the latest edition of the following standards:
 - i. NACE SP0188-2006, NACE Standard RP0490, ASTM G62 and per the manufacturers recommendations.
- b. All low voltage holiday testing shall be performed using a Tinker & Razor model M-1 Holiday Detector or equal.

11. Coating Systems:

- a. Ferrous Metals System 1 shall be used for above ground, non-immersion ferrous metal surfaces (Inclusive of Steel, DIP, Fittings and Appurtenances)
- b. Ferrous Metals System 1 or System 2 shall be used for Hydrants.

Table 3119-1: Color Codes

Application	Tnemec	Carboline	PPG
Water Master Meters/Piping	True Blue / Safety 11SF	*	*
Pump Station Piping/Master Meter	Hunter Green 08SF	*	*
Reclaimed Master Meters/Piping	Purple Rain / Safety 14 SF	*	*
DVCAs	Candy Apple Red / Safety 04 SF	*	*
Hydrant Bonnet & Caps	Hunter Green 08SF	*	*
Hydrant Bonnet & Caps	Tangerine Orange / Safety 04 SF	*	*
Hydrant Bonnet & Caps	Candy Apple Red / Safety 06SF	*	*
Hydrant Barrel	Safety Aluminum/ Aluminum 57GR	*	*
Private Hydrant	Private Hydrants shall not be painted COUNTY color schemes.	N/A	N/A

Note: * All manufacturers shall match Tnemec color codes for the above applications.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

Table 3119-2: Ferrous Metals System 1 - Zinc / Urethane / Fluoropolymer

Product	Prime Coat all materials. Zinc Surface Prep NACE 1 or NACE 3		Prime Coat - option for existing FBE or Hydrants only. Inorganic water based epoxy – overcoat existing coatings. Surface Prep NACE 4		Intermediate Coat. Aliphatic Acrylic Polyurethane		Final Coat. Fluoropolymer Polyurethane	
		DFT mils		DFT mils		DFT mils		DFT mils
Tnemec	Zinc Series 90-97	2.5 - 3.5 (Avg. 3.0 MDFT)	Typoxy Series 27WB	4.0 -14.0 (Avg. 5.0 MDFT)	Endura- Shield Series 73	2.0 - 3.0 (Avg. 2.5 MDFT)	Hydroflon Series 700	2.0 - 3.0 (Avg. 2.5 MDFT)
Carboline	Carbozinc 859	3.0 -5.0 (Avg. 3.5 MDFT)	N/A	N/A	Carbothane 133 HB	3.0 -5.0 (Avg. 3.5 MDFT)	Carboxane 950	2.0 - 3.0 (Avg. 2.5 MDFT)
Sherwin Williams	Corothane 1 Zinc	3.0 - 4.0 (Avg. 3.5 MDFT)	N/A	N/A	Acrolon 218 HS Urethane	3.0 -6.0 (Avg. 3.5 MDFT)	Fluorokem HS	2.0 - 3.0 (Avg. 2.5 MDFT)

Table 3119-3: Ferrous Metals System 2 (Hydrants Only) - Zinc / Epoxy / Urethane

Product	Prime Coat all materials. Zinc Surface Prep NACE 1 or NACE 3		Prime Coat - option for existing FBE or Hydrants only. Inorganic water based epoxy – overcoat existing coatings. Surface Prep NACE 4		Intermediate Coat. Epoxy		Final Coat. Urethane	
		DFT mils		DFT mils		DFT mils		DFT mils
Tnemec	Zinc Series 90-97	2.5 - 3.5 (Avg. 3.0 MDFT)	Typoxy Series 27WB	4.0 -14.0 (Avg. 5.0 MDFT)	Color Hi-Build Epoxoline II Series N69	4.0 - 10.0 (Avg. 5.0 MDFT)	Endura- Shield Series 73	2.0 - 3.0 (Avg. 2.5 MDFT)
Carboline	Carbozinc 859	3.0 -5.0 (Avg. 3.5 MDFT)	N/A	N/A	Carboguard 890	4.0 -6.0 (Avg. 5.0 MDFT)	Carboxane 950	2.0 -3.0 (Avg. 2.5 MDFT)
Sherwin Williams	Corothane 1 Zinc	3.0 - 4.0 (Avg. 3.5 MDFT)	N/A	N/A	Epoxy Mastic Aluminum	4.0 -6.0 (Avg. 5.0 MDFT)	Hi-Solid Polyurethane	3.0 -5.0 (Avg. 3.5 MDFT)

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

C. Procedures for Coating DIP and Fittings

1. Wastewater DIP and Fittings

a. Interior:

- i. Interior coatings shall be Protecto 401 or Permox CTF (amine cured novalac epoxy containing at least 20% by volume of ceramic quartz pigment) for all fittings.
- ii. All ductile iron pipe and fittings shall be delivered to the manufacturer certified applicator without asphalt, cement lining, or any other lining on the interior surface and no coating shall have been applied to the first six (6) inches of the exterior of the DIP spigot ends.
- iii. Minimum surface preparation shall be SSPC-SP 1 Solvent Cleaning method to remove oil and grease followed by NACE-4 / SSPC-SP7 Brush-Off Blast Cleaning.
- iv. Protecto 401 or Permox CTF shall be applied within twelve (12) hours of surface preparation to the interior of the pipe / fittings so as to obtain a continuous and relatively uniform and smooth integral lining with a total MDFT of 40 mils for the complete system.
- v. No lining shall take place when the substrate or ambient temperature is below 40°F. The lining shall not be used on the face of the flange of fittings or flanged pipe.
- vi. The system shall be holiday free and holiday testing (Minimum 2,000 volts) shall be conducted and pinhole repaired prior to shipping.

b. Exterior:

- i. Exterior surface of buried fittings shall be asphaltic or zinc coating.
- ii. Exterior flanged fittings shall be as specified per Section 3119, 2.03. B.

c. UTILITIES shall not accept damaged or touched-up epoxy lined materials nor will UTILITIES allow field repairs.

- i. Field touch-up exceptions may be allowed for field cutting only.
- ii. All touch-ups shall be performed by a certified epoxy-trained applicator with a valid certification card.
- iii. Touch-ups shall be performed in accordance with the coating manufacturer's recommendations.

2. Water and Reclaimed Fittings.

a. Interior:

- i. Interior coating shall be FBE or Cement Mortar lined.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

- ii. FBE for Fittings - Fittings shall be supplied with a fusion applied epoxy coating (FBE), both inside and outside for total protection including flanged and buried fittings. The exterior of flange fittings for above ground assemblies shall adhere to final exterior coating requirements per Section 3119, 2.03 B. The FBE coating system shall meet or exceed ANSI/AWWA C-550 and C116/A21.116 requirements and shall have NSF-61 certification. FBE coatings thickness shall be 6 to 8 mils DFT and shall be applied for secure adhesion and shall have a smooth surface and shall be holiday free.
 - iii. Cement-mortar lining for ductile iron pipe and ductile and gray iron fittings for water service shall be in accordance with ANSI/AWWA C104/A21.4.
- b. Exterior:
- i. Exterior surface of buried DIP and cement-mortar lined fittings shall be asphaltic or zinc coating.
 - ii. Exterior flanged fittings shall be as specified per Section 3119, 2.03. B.

2.04 SPECIALTY COATINGS

A. The Specialty Coatings are for rehabilitation of existing precast concrete manholes. New precast structures shall be lined only. All specialty coatings applicators shall follow the procedure as outlined below:

B. General

- 1. Pre-Inspection:
 - a. Applicator shall take appropriate action to comply with all local, state and federal regulations including those set forth by OSHA, EPA, the COUNTY and any other applicable authorities.
 - b. Prior to conducting any work, perform inspection of structure to determine need for protection against hazardous gases or oxygen depleted atmosphere and the need for flow control or flow Diversion.
- 2. Bypass plan:
 - a. Bypass plan for flow control or bypass shall be submitted to the COUNTY for approval prior to conducting the work.
 - b. Any active flows shall be dammed, plugged, or diverted as required to ensure all liquids are maintained below or away from the surfaces to be coated until final applications are cured as recommended by the corrosion protection system manufacturer.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

3. Surface Preparation:
 - a. NACE 6 / SSPC-SP13 “Surface Preparation of Concrete”. Dry abrasive blasting, wet abrasive blasting, vacuum-assisted abrasive blasting, and centrifugal shot blasting, high pressure water cleaning (5,000 to 10,000 psig), water jetting (10,000 to 30,000 psig) or combination of methods to remove deteriorated concrete, brick or mortar, laitance, hard contaminants, existing coatings, localized micro-organisms and gas contaminants from the concrete walls, floor, ceiling, and other concrete surfaces and shall display a surface profile suitable for application of the system.
 - b. Minimum surface profile shall ICRI CSP-5 or greater. Containment shall be provided to capture spent abrasive material and deteriorated concrete for removal by the CONTRACTOR.
4. Substrate Inspection:
 - a. After completion of surface preparation, the CONTRACTOR shall inspect for:
 - i. Leaks, Cracks, Holes, Exposed Rebar, Ring and Cover Condition, Invert Condition, Inlet and Outlet Pipe Condition.
 - ii. After the defects in the structure have been identified, repair with a manufacturer approved underlayment or material to assure proper rehabilitation of the surface defect and compatibility with the specialty coating system product to be applied.
 - iii. Repairs to exposed rebar, defective pipe penetrations or inverts, shall be recommended by the specialty coating manufacturer and approved by the COUNTY prior to proceeding with the repair.
 - iv. Final preparation and cleaning of repaired surfaces is required prior to application of the coating and shall comply with the corrosion protection system manufacturer’s recommendations.
5. Manufacturer’s certification:
 - a. Applicators, installers, welders and application equipment shall be certified by the manufacturer of the corrosion protection system and documentation shall be provided to the COUNTY prior to the work.
6. Area to be coated:
 - a. All exposed concrete of the entire interior surface of precast structure including but not limited to benching, pipe penetrations, walls, bottom of top slab, chimney, etc.
 - b. Flow channel inverts are not necessary to coat.
 - c. Corrosion protection system shall interface with adjoining construction materials/components throughout the manhole structure to effectively seal

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

and protect substrates from attack by corrosive elements and to ensure the effective elimination of infiltration into the sewer system.

7. Application:
 - a. Application of specialty coating system shall be in strict accordance with manufacturer's recommendation.
 - b. Specified surfaces should be shielded to avoid exposure of direct sunlight, other intense heat source or, where cementitious products are employed, excessive ventilation. Where varying surface temperatures do exist, coating installation should be scheduled when the temperature is falling versus rising.
 - c. Verification of the corrosion protection system thickness shall be verified during application via wet gauge methods or following cure of the system using appropriate non-destructive or destructive methods.
8. Holiday Testing:
 - a. Cure time shall be in accordance with the Manufacturers product data sheet.
 - b. Final concrete structure corrosion protection system shall be completely free of holidays, pinholes or voids.
 - c. High voltage Holiday testing shall be required and holidays marked and repaired with same material and to same thickness as required of original installation. All high voltage discontinuity (spark) testing shall be performed using a Tinker & Rasor model AP/W Holiday Detector or equal and at 100-125 volts DC per mil or per the manufacturers recommendations.
9. Destructive Testing:
 - a. Destructive testing may be performed as directed by the COUNTY to verify coating adhesion and coating DFT.
 - b. Repairs to areas tested by destructive means shall be repaired by the certified applicator at the CONTRACTORS expense.
10. Reporting:
 - a. Provide final written report to the COUNTY detailing the location, date of report, description of repair or original installation and manufacturer data and cut sheets of the corrosion protection system and applicable testing results as per Section 3119, 2.04 B: 7, 8 and 9.
11. Warranty:
 - a. The report shall contain a copy of the warranty. The applicator shall supply a minimum ten (10) year non-prorated warranty on both products and installation.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

- C. System SC-1: Sauereisen Sewergard 210 (Trowelable), 210FS (Trowelable Fast Set), 210S (Sprayable) or 210RS (Rotary Spray)
1. Shall be applied and then shall be finished with a coat of Sauereisen Sewergard Glaze 210G.
 2. The lining system to be utilized shall be an epoxy mortar or aggregate filled epoxy.
 3. Material furnished under this specification shall be a pre-packaged from the manufacturer.
 4. Materials shall be trowel applied or sprayed and shall conform to the Manufactures product data sheet as supplied by the manufacturer.
 5. Additional Preparation:
 - a. To ensure a good bond, the newly blasted surface shall be thoroughly vacuumed to remove all sand and debris and surface shall be dry prior to application.
 6. Surfacers for Rehabilitation / Repair:
 - a. Substrate in requiring repairs in excess of 1/8 inch shall be repaired with Sauereisen Underlayment No F-120, F-121 or F-209 filler prior to application of protective lining / coating corrosion protection system.
 7. Thickness:
 - a. Sewergard 210 / 210FS / 210RS- The material shall be applied in one or more layers for a total thickness of minimum of 125 mils DFT (1/8-inch). After application, the material shall be damp rolled with excess water shaken off prior to back-rolling.
 - b. Sprayable 210S – The material shall be applied in one (1) or more layers such a minimum of 60 mils shall be required for the Spray applied 210S.
 8. Finishing Glaze:
 - a. After application, and curing of either the 210, 210FS, 210RS or 210S, the material shall be coated with a minimum of 20 mils of Sauereisen Sewergard Glaze 210G by roller or spray application in accordance with the manufacturers recommendations.
 9. Holiday Testing:
 - a. The protective lining / coating protection system shall be cured in accordance with the manufacturer’s recommendations prior to holiday testing at a minimum of 14,500 volts.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

D. System SC-2: Tnemec Perma-Shield Coating System.

1. Additional Preparation:
 - a. To ensure a good bond, the newly blasted surface shall be thoroughly vacuumed to remove all sand and debris and surface shall be dry prior to application and surface shall be minimum 5 degrees above the dew point. Moisture content not to exceed three pounds per 1,000 sq ft in a twenty-four (24) hour period verify dryness a “plastic film tape-down test” ASTM D 4263 perform Anhydrous Calcium Chloride ASTM F 1869.
2. Surfacer for Rehabilitation / Repair:
 - a. Substrate in requiring repairs in excess of 1/8 inch shall be repaired Series 217 or 218 Filler prior to application of protective lining / coating corrosion protection system. Concrete surface shall be pre-wet or dampened with potable water prior to surfacer application.
3. Thickness:
 - a. Lining Series 434 - The material shall be applied in one or more layers for a total thickness of minimum of 125 mils DFT (1/8-inch).
4. Finishing Glaze:
 - a. After application, and curing, the material shall be coated with a 15 - 20 mils of Series 435 in accordance with the manufacturers’ recommendations.
5. Holiday Testing:
 - a. The protective lining / coating protection system shall be cured in accordance with the manufacturers’ recommendations prior to holiday testing at a minimum 14,500 volts.

E. System SC-3 – SEWPERCOAT (PG and 2000 HS) Calcium aluminate mortar.

1. The lining system to be utilized shall be 100% calcium aluminate cement with 100% calcium aluminate aggregate.
2. Materials shall be sprayed applied by either a wet gunning (low pressure spray) or dry gunning (shotcrete) method and shall conform to the Manufactures product data sheet as supplied by the manufacturer.
3. The equipment shall be clean and free of any hydrated or un-hydrated Portland Cement.
4. Additional Preparation.
 - a. To ensure a good bond, the newly blasted surface shall be fully saturated with water prior to application.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

5. Thickness:
 - a. The material shall be applied in one or more layers to such total thickness as required. A minimum of one (1) inch or 1,000 mils, shall be applied.
 6. Finishing:
 - a. After spraying, the material shall be brushed or trowel finished.
 7. Curing:
 - a. Curing by appropriate methods (curing compound, water mist, etc.) should be implemented as the surface begins to harden and dry (as early as one hour after application).
- F. System SC-4: Raven 405
1. System shall be 100% solids epoxy. Thinning with solvents shall not be permitted.
 2. Surface preparation, mixing, pot life, ambient conditions, application, film thickness per coat, cure time, and recoat time shall be in accordance the manufacturer's recommendations.
 3. Applicator / installer shall be certified by the Manufacturer.
 4. Surfacer for Rehabilitation / Repair:
 - a. Raven 710, 705CA or Raven 700 shall be spray applied or troweled to repair / fill minor surface defected or applied as an underlayment.
 5. Primer:
 - a. Concrete exhibiting a moisture vapor emission rate greater than 3 lbs / 1,000 ft² twenty-four (24) hours, when tested according to ASTM F1869, shall be primed with Raven 171. Raven 171 primer (2 component waterborne epoxy) shall be applied at a maximum of 8 mil WFT (3 mil DFT). Recoat window minimum two (2) to four (4) hours at 72°F with maximum seventy-two (72) hours at 72°F.
 6. Top Coat:
 - a. Raven 405 shall be applied with an approved plural component airless spray system. Coating thickness shall be in relation to the profile of the surface to be coated as recommended by the coating product manufacturer.
 - b. In all cases the coating shall be applied with minimum of 2 coats applied at 40 - 80 mils WFT / DFT each for minimum final film thickness at 125 mils DFT or shall be applied in multiple passes (horizontal, vertical, cross-hatch) for final DFT of minimum of 125 mils.
 - c. Subsequent top coating or additional coats of the coating product(s) shall occur within the products recoat window: minimum cure to a tacky state;

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

maximum cure of eighteen (18) hours at 72°F substrate temperature.

- d. Additional surface preparation procedures will be required if this recoat window is exceeded including inspection for and removal of amine blush and/or other potential contaminates.

7. Holiday Testing:

- a. The protective lining / coating protection system shall be cured in accordance with the manufacturer's recommendations prior to holiday testing at a minimum of 12,500 volts.

G. System SC-5: Sprayroq "SprayWall Spray Applied Polyurethane" 100% VOC-free polyurethane coating.

1. Application:

- a. Applicator / installer shall be certified by the Manufacturer; an authorized member of the Sprayroq Certified Partner (SCP) Network.
- b. The applicators strict adherence to all standard published SprayWall product installation guidelines.
- c. Sprayroq Inc.'s receipt of certified statement from the SCP as to the successful completion of the project shall specifically include:
 - i. The SprayWall batch / lot numbers
 - ii. The amount of product / material utilized by the applicator in the original installation.

2. Film Thickness:

- a. Final installation shall be a minimum of 250 mils (1/4 inch). SprayWall may be applied up to 300 mils thick in a single application.

3. Holiday Testing:

- a. The protective lining / coating protection system shall be cured in accordance with the manufacturer's recommendations prior to holiday testing at a minimum of 25,000 volts.

2.05 ANTI-GRAFFITI COATINGS

A. Anti-graffiti coatings shall be used for all porous masonry vertical surfaces including block, split faced block, or concrete walls. Cleaning, surface preparation, coating application, and thickness shall be as specified herein and shall meet or exceed the coating manufacturer's recommendations.

B. Surface Preparation:

1. Surfaces must be clean, dry, and free from oil, dirt, grease, efflorescence or any other coatings.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

2. New surfaces shall cure a minimum of twenty-eight (28) days (including grout, filler, etc) and caulking applications shall be fully cured prior to application.
 3. After pressure washing allow seventy-two (72) hours to dry and after rain allow forty-eight (48) hours to dry prior to application.
 4. Do not apply if precipitation is expected within twelve (12) hours.
- C. Protection of Surfaces:
1. Shield all surfaces not intended to be treated from overspray including landscaping, asphalt and painted surfaces.
- D. Surface Temperatures:
1. Surface should be dry and at least 5°F above the dew point and between 40°F to 100°F.
- E. Test Application:
1. A test application shall be performed to determine the exact coverage rates prior to full scale application.
- F. Application:
1. Apply brush or roller. Apply with a saturating coat allowing for 4 to 6 inches rundown. Two (2) flood coats required for graffiti protection. All coats should be examined for areas of over application and such areas should be brushed or backrolled to avoid excessive film build and unsightly darkening. Avoid excess overlapping. Allow the first coat to dry approximately two (2) hours before applying second coat.
- G. Graffiti Removal:
1. Surfaces treated with Anti-Graffiti coating shall only be maintained using Manufacture approved product for graffiti removal. Use of other products may damage the coating. Reapply two (2) coats of Anti-Graffiti coating to affected areas.

PART 3 EXECUTION

3.01 QUALITY ASSURANCE

- A. All materials shall be delivered to the job in original sealed and labeled containers of the coating manufacturer, and shall be subject to inspection by the Engineer. Labels shall show name of manufacturer, type of coating, formulation, date, color and manufacturers recommendations. Coatings manufacturer date shall not exceed the manufacturer's recommendations for storage and useful life and Coatings manufactured in excess of one (1) year prior to application shall be rejected.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

- B. Oil and grease shall be completely removed in accordance with SSPC-SP1 before beginning any other surface preparation method. Surfaces of welds shall be scraped and ground as necessary to remove all slag and weld spatter.
- C. All components of equipment that can be properly prepared and coated after installation shall be installed prior to surface preparation. Components that will be inaccessible after installation shall have the surfaces prepared and coated before installation.
- D. All ferrous metal surfaces shall free of all defects and have all sharp edges, welds, slag, defects and weld splatter ground smooth in accordance with NACE Standard RPO178, Appendix C.
- E. Edges, corners, crevices, welds, and bolts shall be given a brush coat (stripe coat) of for each coating. The stripe coat shall be applied by a brush and worked in both directions. Special attention shall be given to filling all crevices with coating.
- F. Coating shall be applied in a neat manner that will produce an even film of uniform and proper thickness, with finished surfaces free of runs, sags, ridges, laps, and brush marks. Each coat shall be carefully examined and faulty material, poor workmanship, holidays, damaged areas and other imperfections shall be touched up prior to applying succeeding coats. Each coat shall be thoroughly dry and hard before the next coat is applied in accordance with the coating manufacturer's recommendations for drying time between coats. In no case shall coating be applied at a rate of coverage greater than the maximum rate recommended by the coating manufacturer. Each coat shall be uniform in coverage and color. Successive coats shall perceptibly vary in color.
- G. Coating failures will not be accepted and shall be entirely removed down to the substrate and the surface recoated. Failures include but are not limited to holidays, sags, checking, cracking, teardrops, fat edges, fisheyes, or delamination.
- H. Surfaces not required to be coated: Brass, Bronze, Stainless steel (Not including SS bolts and nuts)

3.02 INSPECTION FOR ACCEPTANCE

- A. The quality of materials, the process of manufacture and the finished sections shall be subject to inspection and approval by UTILITIES. Such inspection may be made at the place of manufacture, at the site after delivery or at both places and the sections shall be subject to rejection at any time due to failure to meet any of the specification requirements; even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the job shall be marked for identification and shall be removed from the job at once. Sections that have been damaged after delivery will be rejected and if already installed; removed and replaced, entirely at the CONTRACTOR's expense.
- B. At the time of inspection, the sections will be carefully examined for compliance with the specified ASTM designation and with the approved manufacturer's drawings. Sections shall be inspected for general appearance, dimension, "scratch-strength" blisters, cracks, roughness, soundness, etc. The surface shall be dense and close-textured.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3119: Coatings and Linings

October 10, 2021

- C. Precast concrete structures shall be inspected by UTILITIES and defective materials shall be replaced by the CONTRACTOR at the CONTRACTOR's expense.
- D. Any repairs made on surfaces shall be holiday detected in accordance Areas found to have holidays shall be marked and repaired in accordance with the coating manufacturer's instructions. The COUNTY shall be notified of time of testing so that he might be present to witness testing.

3.03 RECORD DOCUMENTS

- A. RECORD DOCUMENTS shall be required for all assets coated or rehabilitated with the exception of hydrants. Prior to contract closeout the CONTRACTOR shall provide UTILITIES a closeout / warranty submittal as a PDF for each asset coated. Each booklet shall include:
 - 1. Site name and location;
 - 2. Description of asset;
 - 3. Prime Contractor's name and Industrial Coating Subcontractor contact information;
 - 4. Coating manufacturer's name and representative's name and warranty identification;
 - 5. Dates of surface preparation and coating application;
 - 6. Type of surface preparation, blasting media, coating names, and method(s) of coating application;
 - 7. Manufacturer cut sheets for each coating; and
 - 8. Complete warranty package for each asset, as applicable.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3210: Water Pipes, Valves, and Appurtenances

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. These specifications cover the pipes, fittings and appurtenances used for water distribution systems.
- B. The CONTRACTOR shall replace, at their expense, all materials found to be defective or damaged in handling or storage. The CONTRACTOR shall, if requested by UTILITIES, furnish certificates, affidavits of compliance, test reports, or samples for analysis for any of the materials specified herein. All pipe delivered to project site for installation is subject to random testing for compliance with the designated specifications.
- C. Pipe and fitting interior linings shall conform to ANSI/NSF-61 list of approved materials standard.
- D. All services saddles, pipes, fittings, valves and appurtenances shall meet NSF-61 AWWA C800/NSF/ANSI 372 Safe Drinking Water Act (SDWA) requirements.

PART 2 PRODUCTS

2.01 PIPE MATERIALS

- A. PVC Pipe:
 1. PVC water distribution mains shall be manufactured in accordance with AWWA standard C900 or C909, latest edition. Pipe shall have a minimum pressure rating of 150 psi and have a minimum dimension ratio of 18. Pipe shall be blue in color.
- B. Ductile Iron Pipe:
 1. Ductile iron pipe shall conform to ANSI/AWWA A21.51/C151. Pipe shall be pressure class of 350 for pipe 4 to 12 inches in diameter. Pipes 16 to 24 inches in diameter shall be pressure class 250. Pipes 30 to 64 inches in diameter shall be pressure class 200.
 2. Pipe shall be color coded blue with tape or oil-based paint. The tape (min 2”) or stripe shall be permanently affixed to the top and each side of the pipe (three locations parallel to the axis of the pipe). For pipes less than 24 inches in diameter, a single tape or stripe may be used along the top of the pipe.
- C. HDPE Pipe:
 1. HDPE pipe shall be in accordance with AWWA C906 and shall have an outside diameter equal to ductile iron pipe for the same size. Pipe shall have a minimum dimension ratio of 11 for use with ductile iron pipe fittings and have a minimum working pressure of 150 psi.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3210: Water Pipes, Valves, and Appurtenances

October 10, 2021

2.02 JOINT MATERIALS

A. PVC Pipe Joints:

1. PVC pipe shall have integral bell push on type joints conforming to ASTM D3139.

B. Ductile Iron Pipe Joints:

1. Joints for ductile iron pipe shall be push-on or mechanical joints conforming to ANSI/AWWA A21.11/C111. Flanged points shall conform to ANSI Standard B 16.1-125 pounds. Restrained or flanged joints shall be provided where called for in the PLANS.

C. HDPE Pipe Joints:

1. HDPE joints shall conform to AWWA C906.

2.03 FITTINGS

A. Ductile Iron and PVC Pipe:

1. Fittings shall be in accordance with Section 3114, "Installation of Pipe". All potable water main fittings shall have NSF-61 certification, and ISO 9001 certification for both the foundry and manufacturer. The NSF-61 certification shall be issued on all coatings and linings, from the said manufacturers that are used for potable water applications.

B. HDPE Pipe:

1. HDPE mechanical joint adapter shall be joined to the HDPE pipe by butt fusion. HDPE mechanical joint adapter shall be molded or fabricated conforming to AWWA C906. Molded fittings shall conform to ASTM D2683 for socket-type fittings, ASTM D3261 for butt-type fittings or ASTM F1055, F1290, and D3350 for electro fusion-type fittings.
2. An electro-fusion or butt fusion MJ adapter shall be used for a connection of HDPE to DIP or PVC based on pipe diameter.
3. On a case-by-case basis as approved by the COUNTY, mechanical bolt-on fittings that are restrained and specifically designed for HDPE may be used as an alternative to butt fusion adapters.

2.04 COATINGS AND LININGS FOR DUCTILE IRON PIPE AND FITTINGS

A. Fittings:

1. Ductile iron fittings shall have fusion-bonded epoxy coating in accordance with ANSI/AWWA C116 or cement-mortar with a seal coat in accordance with ANSI/AWWA A21.4/C104.
2. Fusion-bonded epoxy shall be holiday free and tested in accordance with ASTM G62 method A or method B. Testing method at the discretion of the applicator.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3210: Water Pipes, Valves, and Appurtenances

October 10, 2021

Any holidays indicated by the detector shall be repaired in accordance with the manufacturer's repair procedures.

B. Pipe:

1. Ductile iron pipe shall have an interior protective lining of cement-mortar and seal coated in accordance with ANSI/AWWA A21.4/C104 and AWWA A21.4/C151.
2. Exterior ductile iron pipe shall be coated with zinc or utilize asphaltic material in accordance with the manufacturer's instructions for below ground applications.
3. Exterior ductile iron pipe shall be coated with zinc or epoxy material in accordance with the manufacturer's instructions for above ground applications.

C. Additional Applied Exterior Coatings for Above Ground Pipe and Fittings:

1. Pipe, fittings and valves for above ground applications shall be accordance with the Section 3119, "Coatings and Linings". Primer and field coats shall be compatible and shall be applied in accordance with the manufacturer's recommendations. Refer to Appendix D, "List of Approved Products".
2. Final field coat shall be blue for finished water. Asphaltic seal coat applied to the exterior of above ground piping / fittings shall be blasted and completely removed prior to coating per Section 3119, "Coatings and Linings".

2.05 POLYETHYLENE ENCASEMENT

- A. Polyethylene encasement shall be required for all ductile iron pipe 24 inches and greater and installed in accordance with ANSI/AWWA A21.51/C105, wrapping colors to be blue. Polyethylene encasements are required in accordance with AWWA C105.
- B. All ductile iron pipe shall be encased when crossing or within 20 feet adjacent to; power easements, gas easements, gas lines, any location where induced currents may be present and in areas where aggressive soils exist.

2.06 SERVICE PIPE, STOPS, FITTINGS, AND SERVICE SADDLES

A. Service Connections at Main:

1. One (1) inch service connections shall be brass body reduced port type corporation stops, equipped with connections compatible with the polyethylene tubing and threaded in accordance with specifications in AWWA C800, AWWA C901 and shall comply with NSF-61.
2. Long services crossing NON-LOCAL ROADWAYS shall require a casing pipe as shown in the STANDARD DRAWINGS.
3. Service connections and service taps for ARVs shall utilize, 2 inch through 12 inch, iron body resilient seat gate valves. Two (2) inch services at the water main shall have connections for female iron pipe by female iron pipe thread, conforming to AWWA C509.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3210: Water Pipes, Valves, and Appurtenances

October 10, 2021

B. Service Pipe:

1. One (1) inch and 2 inch service lines shall be blue polyethylene tubing, conforming to specifications in AWWA C800, SDR 9 and AWWA C901.
2. Services 4 inch and larger shall be restrained joint DIP from the point of connection to the main to the meter assembly.

C. Service Control Valves:

1. One (1) inch and 2 inch size service control valves (curb stops) shall be reduced port ball valves, made of brass, cast and machined in accordance with specifications in AWWA C800, AWWA C901, compliant with NSF-61 and compatible polyethylene tubing connections.
2. For metered connections 4 inch and greater, UTILITIES shall provide the valves with the meter.
3. For non-metered connections 4 inch and greater, the CONTRACTOR shall provide resilient seat OS&Y gate valves.

D. Service Fittings:

1. One (1) inch and 2 inch fittings shall be brass, cast and machined in accordance with specifications in AWWA C800, AWWA C901, compliant with NSF-61 with compatible polyethylene tubing connections.
2. Fittings, 4, 6, 8 and 12 inches in size shall be the same as water main fittings, as per this Section.

E. Service Tapping Saddles:

1. Stainless Steel Service Saddles:
 - a. Epoxy or nylon coated ductile iron body with stainless steel, 18-8 type 304 straps, 304 nuts per ASTM A194 and 304 bolts per ASTM A193, AWWA tapered threads for 1 inch and 2 inch to be iron pipe threads. Controlled OD saddles to be used on C900 PVC pipe, double straps to be 2 inch minimum width each, single strap to be minimum of 3 inches wide.
2. Service Connections:
 - a. PVC Pipe, Service Saddle:
 - i. One (1) inch and 2 inch services utilize brass body saddle with controlled OD for 12 inches and smaller pipe.
 - ii. One (1) inch and 2 inch taps on existing pipes larger than 12 inches shall use controlled OD epoxy or nylon coated ductile iron body with stainless steel 18-8 type 304 straps.
 - iii. Four (4) inch or larger services shall be mechanical tapping sleeves.
 - b. Ductile Iron Pipe Service Saddle:

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3210: Water Pipes, Valves, and Appurtenances

October 10, 2021

- i. One (1) inch services shall be direct tapped.
- ii. Two (2) inch services on new or existing DIP pipe shall use a service tapping saddle with stainless steel straps and a ductile iron body that is either nylon or epoxy coated with 2 inch gate valve and 2 inch nut as shown in the STANDARD DRAWINGS.
- iii. Four (4) inch or larger services shall be mechanical tapping sleeves.
- c. Concrete Pressure Pipe Service Saddle:
 - i. Tapped concrete pressure pipe shall be in accordance with AWWA M-9, using a strap-type saddle made specifically for concrete cylinder pressure pipe.
- d. HDPE Pipe Service Saddle:
 - i. One (1) inch and 2 inch shall utilize electro fusion-type saddles. Taps to HDPE pipe may be approved on a case-by-case basis.
 - ii. Taps, 4 inch and larger, shall not be permitted on HDPE.
- e. Steel Pipe Service Saddle:
 - i. Welded-on steel sleeves shall be used for all sizes and applications.

2.07 RESILIENT SEAT GATE VALVES

- A. Gate valves shall be resilient seat gate valves, manufactured to meet or exceed the requirements of AWWA C509 / C515, latest revision, and in accordance with these specifications.
- B. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve.
- C. Valves shall have a minimum pressure rating of 250 psi.
- D. Gate valves shall be installed vertically per the design drawings and with minimum depth of cover per Table 2210-1. Vertical valves 16 inch and larger shall be AWWA C515 resilient seated only (16 inch and 24, inch no gearing required) above 24 inch shall be installed vertically with a spur gear actuator unless noted by the engineer.
- E. The valve body, bonnet and bonnet cover shall be ductile iron ASTM A536. All ferrous surfaces inside and outside shall have a fusion bonded epoxy coating in accordance with AWWA C 550.
- F. A 2 inch wrench nut shall be provided for operating the valve.
- G. All valves are to be tested in strict accordance with AWWA C515.
- H. All hardware shall be 304 SST.
- I. All valves shall open left or counter clockwise.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3210: Water Pipes, Valves, and Appurtenances

October 10, 2021

- J. The valves shall be non-rising stems with the stem made of cast, forged, or rolled bronze as specified in AWWA C509. Two (2) stem seals shall be provided and shall be of the o-ring type. The stem nut must be independent of the gate.
- K. The resilient sealing mechanism shall provide zero (0) leakage at test and normal working pressure when installed with the line flow from either direction.
- L. Tapping Valves with Alignment Lip shall be placed vertical where possible for Water & Reclaimed Water. Tapping Valves 16 inch and larger shall be AWWA C515 resilient seated only (16 inch and 24 inch, no gearing required) above 24 inch shall be installed vertically with a spur gear actuator unless noted by the engineer. When tapping existing mains, valves 24 inch and above shall be furnished with NPT pipe plugs for flushing the tracks.

2.08 BUTTERFLY VALVES

- A. Valves 42 inches and larger may be butterfly valves, as approved by UTILITIES. Butterfly valves and operators shall conform to the “AWWA Standard Specifications for Rubber Seated Butterfly Valves”, Designation C504, latest version, except as hereinafter specified, shall be Class 150.
- B. The valve body materials shall be epoxy coated inside and out per AWWA C550. The valve body shall be constructed of close grain cast iron per ASTM A126, Class B or equivalent material. All retaining segments and adjusting devices shall be of corrosion resistant material. Valves shall have the manufacturer’s name and valve rating cast in body
- C. Valve seats shall be EPDM. Valve seats shall be field adjustable and replaceable without dismantling operator disc or shaft and without removing the valve from the line. All retaining segments and adjusting devices shall be of corrosion resistant material. Valve seats shall be designed to be leak-tight in both directions at differential pressures up to, and including, the rated pressure of the valve class.
- D. Valve disc shall be designed to withstand full differential pressures across the closed valve disc without exceeding a stress level equivalent to one fifth of the tensile strength of the material.
- E. The face to face dimensions of valves shall be in accordance with above-mentioned AWWA specification for short body valve.
- F. The valve shaft shall be turned, ground and polished constructed of 18-8 stainless steel and designed for both torsional and shearing stresses when the valve is operated under its greatest dynamic or seating torque. Shaft shall be of either a one-piece unit extending full size through the valve disc and valve bearing or it may be of a stub shaft design.
- G. Valve Actuator:
 - 1. Actuators shall be designed for input torques based on 150 psi valve pressure and 16 ft/s. velocity. In general, the butterfly valve actuators shall conform to the requirements of AWWA standard specifications for “Rubber Seated Butterfly Valves, Designation C504”, insofar as applicable.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3210: Water Pipes, Valves, and Appurtenances

October 10, 2021

2. Worm Gears shall be constructed and certified in accordance AWWA C504. Buried service worm gears shall be IP68 rated continuous duty to a minimum of 50 ft. (IP68-50). Above ground worm gears shall be IP67 rated continuous duty to 3 ft.
3. Actuators shall be enclosed in a ductile iron housing with outboard seals to protect the bearings and other internal components. The actuator worm shafts shall be supported on permanently lubricated deep ball bearings.
4. All valve and actuators, shall be installed, adjusted, and tested as an assembly by the valve manufacturer at the manufacturing plant. An affidavit of compliance signed by the actuator manufacturer ENGINEER shall be required stating the provisions of ANSI/AWWA C504 have been met. Test certificates, signed by the ENGINEER of gear operator manufacturer, must be supplied showing full compliance to AWWA C504.
5. Fasteners shall be made of minimum 316 SST. Gears shall be efficiency optimized 3-stage for appropriately designed stage gear reduction type.
6. Externally adjustable or traveling nut type open and closed position stops shall be provided to prevent over-travel in both the open and closed position. The adjustable closed position stop shall be used to set closing position and provide adjustments to compensate for change in pressure differential or flow direction. Gears shall be self-locking or incorporate a back winding protection to prevent undesired reverse rotation of the gear train at the extents (i.e. fully closed position) of travel when holding a residual applied torque. If required, a primary gear reducer shall be supplied to reduce the required input torque.
7. Manual operators shall be provided with completely enclosed mounting brackets or adapters. The operators shall be equipped with standard 2 inch square operating nut or with hand wheel if for above ground service.
8. All operator components between the operating nut or hand wheel and the valve shaft, including the primary gear reducer and the adjustable stops shall be designed to withstand, without damage, an input torque of 300 ft. lbs. Rim pull shall be no more than 80 lbs. (to provide least amount of turns to close or open) to operate at full valve rated pressure using a 24 inch tee-wrench or hand wheel.
9. All actuator shafts shall be supported on permanently lubricated bronze bearings. Actuators shall clearly indicate valve position and an adjustable stop shall be provided to set closing torque. All exposed nuts, bolts and washers shall be 316 SST.
10. Above ground valve packing adjustment shall be accessible, adjustable, and replaceable without removing the actuator off the valve and without disassembly of the actuator. Buried service actuators shall be protected from valve packing leaks via unpressurised connection to the valve.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3210: Water Pipes, Valves, and Appurtenances

October 10, 2021

11. A torque limiting / over-torque protector device shall be permanently mounted to provide a minimum of 300 ft. lbs. over torque protection. Buried valves torque limiting / over-torque protector device shall be IP68-50 rated for submerged service with a 2 inch AWWA nut. Above grade valves torque limiting / over-torque protector shall be IP 67 rated and attached to the hand wheel. The independent torque limiting / over-torque protector device shall not be considered in the design, construction or rating of the actuator.
12. Gears shall have a two (2) year warranty from date of shipment and shall have a metal tag containing a serial number, ratio; number of turns shall be riveted to the gear for future identification.
13. Gear Ratio and Number of Turns to open or close the valve shall be per Table 3310-2, Gear Maximum Allowable Number of Turns, unless otherwise reviewed and approved by UTILITIES.

H. Directional opening and Extension Stem:

1. All valves shall open left or counterclockwise and a ground level position indicator and extension stem / shaft for the 2 inch nut shall be provided for buried valves.

2.09 VALVE BOXES

A. Standard Two-Piece Cast Iron Valve Box:

1. Valve boxes shall be H-20/HS-20 heavy duty traffic load rating and provided with suitable heavy bonnets and shall extend to such elevation at or slightly above the finished grade surface as directed by UTILITIES.
2. The top section, extension and bottom section shall be screw type only, having 5 1/4 inch shaft. The bottom section shall have a bell at the bottom having sufficient bearing area to prevent settling and shall be complete with heavy cast iron covers.
3. Covers shall have "WATER" cast into the top for all water mains.

B. Valve Box Assembly:

1. Two (2) piece screw type adjustable valve box shall be installed in accordance with the STANDARD DRAWINGS.
2. Valve box extensions shall be provided as one (1) piece and shall only be stacked once the manufacturers' standard sizes for valve boxes and extensions are exceeded.
3. A valve box centering or stabilizing device designed to eliminate the shifting of the valve box against the operating nut of the valve shall be required.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3210: Water Pipes, Valves, and Appurtenances

October 10, 2021

- C. Extension Stem:
1. The 2 inch valve nut extension insert shall be one (1) complete system that fits inside a standard valve box that will accommodate trench depths 3 feet and greater as shown in the STANDARD DRAWINGS.
 2. Assembly shall include a centering ring or a valve stabilizer as an integral component and self-locking base to the 2 inch nut that can be installed after construction.
 3. The extension stem must be capable of surviving a torque test to 1,000 ft-lb without failure. The material shall be minimum 304 SST.
- D. Valve boxes shall have heavy lids utilizing a minimum 5 inch skirt / vane and weigh a minimum of 22 lbs. Valve lids to be made as shown in the STANDARD DRAWINGS.
- E. All valve boxes in non-paved areas shall be installed with a valve pad as shown in the STANDARD DRAWINGS. Valve pad shall be 18 X 18 inch round or square and poured in place with 3,000 psi fiber mesh concrete as shown in the STANDARD DRAWINGS.
- F. Locating wire shall be 10 gauge single strand solid core copper wire with insulation. The color of the insulation shall be the same color as the color code for the pipe being installed. Locate wire shall be installed in accordance with Section 3114 of this MANUAL and as shown in the STANDARD DRAWINGS.
1. The CONTRACTOR shall conduct a preliminary wire check prior to the installation of road base and shall be responsible for continuity throughout construction.
- G. Valve markers are to be made of schedule 80 PVC and have a decal applied containing information as shown in the STANDARD DRAWINGS. The marker must be the same color as the pipe being marked.

2.10 AIR RELEASE VALVES

- A. The air release valves for use in water mains shall be single body combination air release valves designed to release large quantities of air at start up, admit air on shut down and release air in operation.
- B. Air release valves must be installed in an enclosure as shown on the STANDARD DRAWINGS.
- C. Fittings from the main to the air release valve in the enclosure shall be threaded and made of brass or stainless steel.

2.11 POTABLE WATER JUMPERS

- A. Water supply from the existing distribution system shall be provided through a jumper connection consisting of fittings and a minimum of an RPZ assembly and installed as shown in the STANDARD DRAWINGS.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3210: Water Pipes, Valves, and Appurtenances

October 10, 2021

- B. The CONTRACTOR shall provide a jumper assembly with an approved backflow preventer for making temporary connections to an existing potable water source in order to chlorinate and flush new mains with potable water.
1. Once complete, all temporary connections shall be abandoned on the corporation stop at the main, poly removed, and threaded cap installed to keep dirt from going into corp.
- C. Any temporary potable water connections utilizing a jumper until reclaimed water is available shall also be equipped with an RPZ and installed by a method approved by UTILITIES within a utility easement.

2.12 FIRE HYDRANTS

A. General:

1. Fire hydrants shall have a minimum of 5-1/4 inch valve opening and shall comply with AWWA Standard C502 for fire hydrants for water works service, unless in conflict with this MANUAL, in which case this MANUAL shall apply.
2. Each hydrant shall have 6 inch mechanical joint ends and shall open by turning to the left (counter clockwise).
3. Fire hydrants shall be of ample length for bury to match main installation.
4. Hydrants shall be provided with two (2) 2-1/2 inch hose nozzles and one (1) 4-1/2 inch pumper nozzle, all having National Standard hose threads.
5. Nozzles shall have caps attached by chains. Operating nuts shall be AWWA Standard pentagonal, measuring 1-1/2 inch point to flat. Fire hydrants shall be equipped with o-ring packing. Fire hydrants shall be supplied without drain holes or with permanently plugged drain holes.
6. Pipe from the anchoring tee to the hydrant shall be DIP.

B. Coating and painting:

1. All non-brass parts of the hydrant both inside and outside shall be painted, in accordance with AWWA C 502. The shoe of the hydrant below the ground line shall have a fusion bonded epoxy coating and the barrel of the hydrant below ground shall be coated with a mastic material by the manufacturer.
2. The above ground portion of the hydrant shall be coated in accordance with Section 3119 "Coatings & Linings". The paint used shall be from the manufacturers and type as listed in Appendix D, "List of Approved Products".

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3210: Water Pipes, Valves, and Appurtenances

October 10, 2021

PART 3 EXECUTION

3.01 MATERIAL IDENTIFICATION AND TESTING

A. Pipe Identification:

1. Each length of pipe shall bear the name or trademark of the manufacturer, the location of the manufacturing plant, and the class or strength classification of the pipe.
2. The markings shall be plainly visible on the pipe barrel. Pipe, which is not clearly marked, is subject to rejection.
3. The CONTRACTOR shall remove all rejected pipe from the project site within five (5) NORMAL WORKING DAYS.

B. Material Testing Requirements:

1. If requested by UTILITIES, a sample of pipe to be tested shall be selected at random by UTILITIES or the testing laboratory hired by UTILITIES.
2. When the samples tested conform to applicable standards, all pipe represented by such samples shall be considered acceptable based on the test parameters measured. Copies of test reports shall be available before the pipe is installed on the project.
3. In the event that any of the test samples fail to meet the applicable standards, all pipe represented by such tests shall be subjected to rejection. The CONTRACTOR may furnish two additional test samples from the same shipment or delivery, for each sample that failed and the pipe will be considered acceptable if all of these additional samples meet the requirements of the applicable standards. All such retesting shall be at the CONTRACTOR's expense.
4. Pipe that has been rejected by UTILITIES shall be removed from the site of the work by the CONTRACTOR and replaced with pipe that meets these specifications.

3.02 SEPARATION OF WATER MAINS, RECLAIMED WATER MAINS, FORCE MAINS AND SEWERS

- A. All proposed utilities shall at a minimum comply with the separation requirements outlined in 62-555.314, FAC and in accordance with STANDARD DRAWINGS.

3.03 INSTALLATION OF VALVES

- A. All valves shall be inspected by the CONTRACTOR upon delivery, in the field, to insure proper working order before installation. Valves shall be set and jointed to the pipe in the manner as set forth in the AWWA Standards for the type of connection ends furnished.
- B. All valves and appurtenances shall be installed true to alignment and rigidly supported.
- C. Any damage or neglect to the valve or pipe shall be replaced at no cost to the COUNTY.

CHAPTER 3 **CONSTRUCTION SPECIFICATIONS**

Section 3210: Water Pipes, Valves, and Appurtenances

October 10, 2021

D. All valves shall be installed in accordance with the STANDARD DRAWINGS.

3.04 WATER SERVICE LINES

- A. Water service piping and connection shall be installed as indicated in the STANDARD DRAWING.
- B. The location of all service lines shall be as shown on the STANDARD DRAWING.
- C. On curbed streets the exact location for etching or cutting a “W” in the concrete curb shall mark each installed service. Where no curb exists, locations shall be adequately marked by a method approved by UTILITIES.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3310: Wastewater Pipes, Valves, and Appurtenances

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. These specifications cover wastewater pipes, valves and appurtenances used for the wastewater collection and pumping systems.
- B. The CONTRACTOR shall be responsible for all stored material furnished for the project. The CONTRACTOR shall, if requested by UTILITIES, furnish certificates, affidavits of compliance, test reports or samples for any of the materials specified herein. All materials delivered to project site for installation are subject to random testing for compliance with the designated specifications.

PART 2 PRODUCTS

2.01 PIPE MATERIALS

A. PVC Gravity Pipe and Fittings:

1. PVC gravity pipe (6 inch to 48 inch) shall have a minimum wall thickness equal to SDR 26, shall conform to ASTM D3034 and ASTM F679. Uniform minimum “pipe stiffness” at 5% deflection shall be 115 psi. The joints shall be integral bell elastomeric gasket joints manufactured in accordance with ASTM D3212 and ASTM F477. Applicable UNI Bell Plastic Pipe Association standard is UNI B-4 and UNI-B-7.
2. All PVC pipe shall bear the NSF-DW seal.
3. The minimum standard length of pipe shall be 13 feet.
4. Joints:
 - a. PVC gravity pipe joints shall be flexible elastomeric seals per ASTM D3212.
5. Fittings:
 - a. Unless otherwise specified, wye branches shall be provided in the gravity main for service lateral connections. Wyes shall be 6 inches inside diameter.
 - b. All fittings shall be of the same material as the pipe. Pipe fittings shall be a minimum of SDR 35.
6. Plugs for service laterals shall be of the same material as the pipe, and gasketed with the same gasket material as the pipe joint, or be of material approved by UTILITIES.
 - a. The plug shall be secured to withstand specified test pressures.
7. Locator balls shall be placed under all sanitary sewer service cleanouts.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3310: Wastewater Pipes, Valves, and Appurtenances

October 10, 2021

B. PVC Pressure Pipe and Fittings:

1. All allowable PVC pipe of nominal diameter 4 inches and greater shall be manufactured in accordance with AWWA Standard C900. The PVC pipe shall have a minimum wall thickness as follows:
 - a. DR 18 for 4 through 24 inch pipe.
 - b. DR 21 for 30 through 42 inch pipe.
 - c. All sizes greater than 42 inches must be approved by UTILITIES prior to installation.
2. Pipe shall be the same outside diameter as ductile iron pipe.
3. Joints:
 - a. PVC pipe shall have integral bell push on type joints conforming to ASTM D3139.
4. Fittings:
 - a. Fittings shall be restrained mechanical joint ductile iron or gray iron conforming to ANSI/AWWA A21.10/C110, 250 psi minimum pressure rating, or ANSI/AWWA A21.53/C153. Interior and exterior coatings of ductile iron pipe fittings shall be as specified in Appendix D, “List of Approved Products”.
5. Restrained Joints:
 - a. Restrained joint devices shall be made specifically for PVC pipe and meet or exceed the requirements in ASTM F1674.

C. Joints for Dissimilar Pipe:

1. Joining of dissimilar pipe shall conform to the following table.

Table 3310-1: Joints for Dissimilar Pipe

Type of Line	Material	Material	Use
Gravity	C-900	SDR-26 / 115 psi	PVC Adapter
Force Main	PVC	Ductile iron	Restrained MJ Sleeve
Force Main	PVC	HDPE	Restrained MJ Fitting to Fused HDPE Adapter
Force Main	316SST	DIP	Welded Flange with isolation kit
Gravity	VCP	PVC	Shielded Sewer Coupling

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3310: Wastewater Pipes, Valves, and Appurtenances

October 10, 2021

D. Pipe Markings:

1. Pipes shall have a manufacturer's home-mark on the spigot. On field cut pipe, the CONTRACTOR shall provide home-mark on the spigot in accordance with manufacturers' recommendations.

E. Ductile Iron Pipe and Fittings for Pump Stations :

1. Ductile Iron Pipe:

- a. Ductile iron pipe of nominal diameter 4 through 54 inches shall conform to ANSI/AWWA A21.51/C151. Pipe shall be pressure class of 350 for pipe 4 to 12 inches in diameter. Pipes 16 to 24 inches in diameter shall be pressure class 250. Pipes 30 inches and greater in diameter shall be pressure class 200.

2. Fittings:

- a. Shall be in accordance with Section 3114, "Installation of Pipe".

3. Joints:

- a. Joints shall be flanged conforming to ANSI/AWWA A21.11/C111, unless otherwise called for on the PLANS. Flanged joints shall conform to ANSI Standard B16.1-125 LB. Restrained or flanged joints shall be provided where called for on the PLANS.

4. Exterior Coatings:

- a. Ductile iron pipe and fittings shall be coated as specified in Appendix D, "List of Approved Products". Primer and field coats shall be compatible and shall be applied in accordance with the manufacturer's recommendations.
- b. Final field coat color shall be green for wastewater.
- c. Exterior coatings in pipe or fittings above grade or in pump station shall be holiday free and holiday tested in accordance with ASTM G-62 and ASTM D5262.
- d. Asphaltic seal coat applied to the exterior of above ground piping / fittings shall be blasted and completely removed prior to coating per Section 3119, "Coatings and Linings".

5. Interior Coatings and Linings:

- a. Ductile iron pipe and fittings shall have an interior protective coating in accordance with the manufacturers' recommendations and per Section 3119, "Coatings and Linings". Interior coating shall be holiday free and holiday tested in accordance with ASTM G-62 and ASTM D5162.

F. HDPE Pipe and Fittings:

1. HDPE Pipe:

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3310: Wastewater Pipes, Valves, and Appurtenances

October 10, 2021

- a. Materials used for the manufacture of high-density polyethylene pipe and fittings shall comply with all requirements of ASTM D3350 and Plastic Pipe Institute (PPI) designation PE4710.
 - b. Manufacturer shall be a member in good standing of the Plastic Pipe Institute.
 - c. HDPE pipe and fittings shall comply or exceed AWWA Standards C901/C906, ASTM D3035 and ASTM F714. The manufacturer shall supply a letter of certification stating compliance to all the above standards prior to shipping any material to project site.
 - d. The HDPE material shall have required ultraviolet inhibitors to resist degradation by direct and prolonged sunlight. The design of HDPE materials shall be based on the hydrostatic design basis (HDB) of 1,600 psi at 73.4 degrees Fahrenheit.
 - e. Pipe shall be designed and produced to ductile iron diameters and to a minimum dimension ratio of 11.
2. Fittings:
- a. Fittings shall be HDPE molded and shall be made, at a minimum, to the same pressure rating as the pipe. All fabricated HDPE fittings shall be manufactured to a minimum thickness of DR 9. Ductile iron pipe fittings, with mechanical joint adapters, may be used when required for special connections but must be supplied by a pre-approved manufacturer. Manufacturers of the electrofusion coupling and fittings shall be an ISO 9001 certified company with product having Canada Standards Association (CSA) certification. Molded fittings shall conform to ASTM D2683 for socket-type fittings, ASTM D3261 for butt-type fittings or ASTM F1055, F1290, and D3350 for electro fusion-type fittings.

2.02 AIR RELEASE VALVES

A. General:

1. Wastewater force mains shall be equipped with combination air release valves located as shown on the PLANS. Valves shall be located in an enclosure as detailed on the STANDARD DRAWINGS.

B. Wastewater Combination Air Release Valve:

1. The valve body shall be conical in shape and shall be 316 SST with a funnel shape lower body to automatically drain sewage back into the system. All internal parts shall be corrosion resistant 316 SST or non-metallic plastic materials.

C. On flanged connections 316 SST bolts, nuts and washers are to be used along with the proper sized full flanged gasket.

D. ARV shall be connected to a dedicated service lateral for discharge of odorous airs and

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3310: Wastewater Pipes, Valves, and Appurtenances

October 10, 2021

leakage. The service lateral shall be reduced above grade within the ARV enclosure and reduced down with an air tight connection to the 2 inch downward vent pipe. Service lateral for ARV shall only be constructed with new sanitary sewer system and is not required if the sewer system is existing and active.

2.03 PLUG VALVES

A. General:

1. Wastewater force mains shall have plug valves as shown on the PLANS. Valves shall be installed as detailed on the STANDARD DRAWINGS.

B. Plug Valves:

1. Valves shall be straight-flow non-lubricated resilient plug type suitable for drip tight, bi-directional shutoff at the specified valve design pressure
2. Plug valves shall be eccentric, 100% port rectangular plug.
3. Plug valves shall be installed complete with extension stems, buried gear actuators, and 2 inch operating nuts (buried) or operating hand wheels (exposed), as required for normal operation. All valve nuts shall be brought up to 1 foot below the proposed finish grade.
4. Valves shall have the name of the manufacturer and the size of the valve cast or molded onto the valve body. A permanent plate shall be attached to the valve or operator indicating serial number, order number, accessories, operator model and manufacturer.
5. Eccentric plug valves shall be of the non-lubricated type. Port area shall be 100% of standard pipe area.
6. Minimum pressure rating of valves 4 inches to 12 inches shall be 175 psi bi-directional; valves greater than 12 inches shall be 160 psi bi-directional. Valve bodies shall be cast iron ASTM A126, Class B or ductile iron, ASTM A536 and shall be epoxy coated with minimum 8 mil thickness on the interior and exterior of the valve.
7. Valve ends shall be mechanical joint (buried) or flanged (exposed) as indicated on the STANDARD DRAWINGS. Valve flange drilling for valves 3-inches and larger shall be per ANSI B16.1, Class 125. Plugs shall be ductile iron with buna-N or neoprene facing and shall be of the single piece design. The plug shall be of the same configuration for all valves and shall require no stiffening member opposite the plug for balance or support. Valve body seats shall have a welded-in overlay of not less than 90% nickel. Packing shall be adjustable and safely replaceable without disassembling the valve.
8. Bushing shall be 316 SST in both upper and lower journals and shall be protected from foreign matter with the use of a grit seal or similar. The valve should be capable of drip tight shut off with flow in either direction at the full pressure of

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3310: Wastewater Pipes, Valves, and Appurtenances

October 10, 2021

the valve. All exposed nuts, bolts, springs and washers on buried service valves shall be 304 SST. All above- grade valves shall have 316 SST hardware.

9. Face to face dimensions shall be in conformance to C517.

C. Valve Testing:

1. Plug valves shall be tested in accordance with AWWA C517 but tested to 160 psi.
2. Each valve shall meet the performance, leakage, and hydrostatic tests described in AWWA C517.
3. The leakage test shall be applied to the face of the plug tending to unseat the valve.
4. The manufacturer shall furnish certified copies of reports covering proof of design testing as described in AWWA C517.

D. Actuators:

1. Manual valves shall have lever or gear actuators and tee wrenches, extension stems, floor stands, etc. as indicated on the PLANS. All buried valves 4 inch and larger shall be equipped with buried service rated worm gear actuators.
2. Worm Gears shall be constructed in accordance AWWA C517. Buried service worm gears shall be IP68 rated continuous duty to 50 ft (IP68-50). Above ground worm gears shall be IP67 rated continuous duty to 3 ft. Test certificates, signed by the ENGINEER of gear operator manufacturer, must be supplied showing full compliance to AWWA C517. Valves and actuators up to 12 inch shall be factory tested to minimum 175 psi in both directions. Valves and actuators larger than 12 inch shall be factory tested to 160 psi in both directions.
3. Actuators shall be enclosed in a ductile iron housing with outboard seals to protect the bearings and other internal components. The actuator worm shafts shall be supported on permanently lubricated deep groove ball bearings.
4. Fasteners shall be made of minimum 316 series stainless steel. Gears shall be efficiency optimized 3-stage for appropriately designed stage gear reduction type.
5. Externally adjustable or traveling nut type open and closed position stops shall be provided to prevent over-travel in both the open and closed position. The adjustable closed position stop shall be used to set closing position and provide adjustments to compensate for change in pressure differential or flow direction. Gears shall be self-locking or incorporate a back winding protection to prevent undesired reverse rotation of the gear train at the extents (i.e. fully closed position) of travel when holding a residual applied torque. If required, a primary gear reducer shall be supplied to reduce the required input torque.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3310: Wastewater Pipes, Valves, and Appurtenances

October 10, 2021

6. Manual operators shall be provided with completely enclosed mounting brackets or adapters. The operators shall be equipped with a standard 2 inch square operating nut or with hand wheel if for above ground service. All plug valves shall open by turning the operating nut or hand wheel counterclockwise. Orient operators with horizontal plug shafts such that the plug rotates upward upon opening.
7. All operator components between the operating nut or hand wheel and the valve shaft, including the primary gear reducer and adjustable stops shall be designed to withstand, without damage, an input torque of 300 ft. lbs. Rim pull shall be no more than 80 lbs. (to provide least amount of turns to close or open) to operate at full valve rated pressure using a 24 inch tee-wrench or hand wheel.
8. All actuator shafts shall be supported on permanently lubricated bronze bearings. Actuators shall clearly indicate valve position and an adjustable stop shall be provided to set closing torque. All exposed nuts, bolts and washers shall be 316 stainless steel.
9. Above ground valve packing adjustment shall be accessible, adjustable, and replaceable without removing the actuator off the valve and without disassembly of the actuator. Buried service actuators shall be protected from valve packing leaks via unpressurised connection to the valve.
10. A torque limiting / over-torque protector device shall be permanently mounted to valves 16 inch and larger to provide a minimum of 300 ft. lbs. over torque protection. Buried valves torque limiting / over-torque protector device shall be IP68-50 rated for submerged service with a 2 inch AWWA nut. Above grade valves torque limiting / over-torque protector device shall be IP67 rated and attached to the hand wheel. The independent torque limiting / over-torque protector device shall not be considered in the design, construction or rating of the actuator.
11. Gears shall have a two (2) year warranty from date of shipment and shall have a metal tag containing a serial number, ratio; number of turns shall be riveted to the gear for future identification.
12. Gear Ratio and Number of Turns: Gear number of turns to open or close the valve shall not exceed the following table unless otherwise reviewed and approved by UTILITIES:

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3310: Wastewater Pipes, Valves, and Appurtenances

October 10, 2021

Table 3310-2: Gear Maximum Allowable Number of Turns

Valve Size (Inches)	Max turns to close or open
4	20
6	20
8	20
12	40
16	80
20	140
24	220
30	360
36	480
42	600
48	750
54" and larger	750

2.04 VALVE BOXES

A. Standard Two-Piece Cast Iron Valve Box:

1. Valve boxes shall be H-20/HS-20 heavy duty traffic load rating and provided with suitable heavy bonnets and shall extend to such elevation at or slightly above the finished grade surface as directed by UTILITIES.
2. The top section, extension and bottom section shall be screw type only, having 5-1/4 inch shaft. The bottom section shall have a bell at the bottom having sufficient bearing area to prevent settling and shall be complete with heavy cast iron covers.
3. Covers shall have "SEWER" cast into the top for all wastewater mains.

B. Valve Box Assembly:

1. Two (2) piece screw type adjustable valve box shall be installed in accordance with the STANDARD DRAWINGS.
2. Valve box extensions shall be provided as one (1) piece and shall only be stacked once the manufacturers' standard sizes for valve boxes and extensions are exceeded.
3. A valve box centering or stabilizing device designed to eliminate the shifting of the valve box against the operating nut of the valve shall be required.
4. Valve box assembly shall be adjustable to accommodate variable trench depths 6 foot and greater as shown in the STANDARD DRAWINGS.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3310: Wastewater Pipes, Valves, and Appurtenances

October 10, 2021

- C. Extension Stem:
1. The 2 inch valve nut extension insert shall be one (1) complete system that fits inside a standard valve box that will accommodate variable trench depths 3 feet and greater as shown in the STANDARD DRAWINGS.
 2. Assembly shall include a centering ring or a valve stabilizer as an integral component and self-locking base to the 2 inch nut that can be installed after construction.
 3. The extension stem must be capable of surviving a torque test to 1,000 ft-lb without failure. The material shall be minimum 304 SST.
- D. Valve boxes shall have heavy lids utilizing a minimum 5 inch skirt / vane and weigh a minimum of 22 lbs. Valve lids to be made as shown in the STANDARD DRAWINGS.
- E. All valve boxes in non-paved areas shall be installed with a valve pad as shown in the STANDARD DRAWINGS. Valve pad shall be 18 X 18 inch round or square and poured in place with 3,000 psi fiber mesh concrete as shown in the STANDARD DRAWINGS.
- F. Locating wire shall be 10 gauge single strand solid core copper wire with insulation. The color of the insulation shall be the same color as the color code for the pipe being installed. Locate wire shall be installed in accordance with Section 3114 of this MANUAL and as shown in the STANDARD DRAWINGS.
1. The CONTRACTOR shall conduct a preliminary wire check prior to the installation of road base and shall be responsible for continuity throughout construction.
- G. Valve markers are to be made of schedule 80 PVC and have a decal applied containing information as shown in the STANDARD DRAWINGS. The marker must be the same color as the pipe being marked.

2.05 PRESSURE GAUGES

- A. Pressure gauges shall be installed on each pump station discharge pipe as indicated on the STANDARD DRAWINGS.
- B. Each pressure gauge shall be direct mounted, diaphragm (type) gauge, stainless steel fittings, and 1/4 inch shut off (isolation) valve.
- C. Gauges shall be weatherproofed and wired to SCADA.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3310: Wastewater Pipes, Valves, and Appurtenances

October 10, 2021

PART 3 EXECUTION

3.01 MATERIAL IDENTIFICATION AND TESTING

A. Pipe Identification:

1. Each length of pipe shall bear the name or trademark of the manufacturer, the location of the manufacturing plant and the class or strength classification of the pipe.
2. The markings shall be plainly visible on the pipe barrel. Pipe, which is not clearly marked, is subject to rejection.
3. The CONTRACTOR shall remove all rejected pipe from the project site within five (5) NORMAL WORKING DAYS.

B. Material Testing Requirements:

1. If requested by UTILITIES, a sample of pipe to be tested shall be selected at random by UTILITIES or the testing laboratory hired by UTILITIES.
2. When the samples tested conform to applicable standards, all pipe represented by such samples shall be considered acceptable based on the test parameters measured. Copies of test reports shall be available before the pipe is installed on the project.
3. In the event that any of the test samples fail to meet the applicable standards, all pipe represented by such tests shall be subjected to rejection. The CONTRACTOR may furnish two (2) additional test samples from the same shipment or delivery, for each sample that failed and the pipe will be considered acceptable if all of these additional samples meet the requirements of the applicable standards. All such retesting shall be at the CONTRACTOR's expense.
4. Pipe that has been rejected by UTILITIES shall be removed from the site of the work by the CONTRACTOR and replaced with pipe that meets these specifications.

3.02 SEPARATION OF WATER MAINS, RECLAIMED WATER MAINS, FORCE MAINS AND SEWERS:

- A. All proposed utilities shall at a minimum comply with the separation requirements outlined in 62-555.314, FAC and in accordance with STANDARD DRAWINGS.

3.03 INSTALLATION OF VALVES:

- A. All valves shall be inspected by the CONTRACTOR upon delivery, in the field, to insure proper working order before installation. Valves shall be set and jointed to the pipe in the manner as set forth in the AWWA Standards for the type of connection ends furnished.
- B. All valves and appurtenances shall be installed true to alignment and rigidly supported.
- C. Any damage or neglect to the valve or pipe shall be replaced at no cost to the COUNTY.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3310: Wastewater Pipes, Valves, and Appurtenances

October 10, 2021

- D. All valves shall be installed in accordance with the STANDARD DRAWINGS.
- E. During install on 24 inch and larger plug valves, the manufactures representative shall be onsite and present with the CONTRACTOR.

3.04 INSTALLATION OF PVC GRAVITY PIPE, SEWER LATERALS, AND FITTINGS:

- A. All PVC gravity pipe, sewer laterals, and fittings shall be installed in accordance with the STANDARD DRAWINGS.
- B. The location of all sewer laterals shall be as shown on the STANDARD DRAWING.
- C. On curbed streets the exact location for etching or cutting an “S” in the concrete curb shall mark each installed service. Where no curb exists, locations shall be adequately marked by a method approved by UTILITIES.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3311: Wastewater Manholes

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. These specifications pertain to manholes used for the wastewater collection systems.

1.02 QUALITY ASSURANCE

- A. Pre-cast manholes shall conform to specifications for ASTM C478 “Pre-cast Reinforced Concrete Manhole Sections”.
- B. Fiberglass liner manufacturers shall certify that the manhole has been manufactured, sampled, tested, and inspected in accordance with ASTM D3753.
- C. Polyethylene liner manufacturers shall certify that the manhole has been designed and manufactured in accordance with ASTM F1759 and these specifications.

PART 2 PRODUCTS

2.01 PRE-CAST CONCRETE SECTIONS

- A. Pre-cast manholes shall conform to specifications for ASTM C478 “Pre-cast Reinforced Concrete Manhole Sections”, except as otherwise specified below.
- B. The minimum wall thickness shall be 6 inches. Pre-cast manholes shall be constructed with a pre-cast monolithic base structure as shown on the STANDARD DRAWINGS. The minimum base thickness shall be 8 inches.
- C. Concrete for manholes shall be Type II, 4,000 psi at twenty eight (28) days. Barrel, top and base sections shall have tongue and groove joints. All jointing material shall be a cold adhesive preformed plastic gasket; conforming to ASTM C990 Manholes shall be leak-free.
- D. Sections shall not be shipped until cured by an approved method as per ASTM C 478 for at least twenty eight (28) days, unless the manufacturer provides concrete cylinder break data showing the concrete has cured to 100% design strength prior to shipping.
- E. New concrete structures shall contain a crystalline waterproofing concrete admixture for all new concrete structures including but not limited to: manholes, wetwells and wetwell top slabs.
 - 1. Crystalline Waterproofing Concrete Admixture shall be added to the concrete during the batching operation in accordance with ACI 201.2R.
 - 2. Admixture concentration shall be added based upon manufacturer design percent concentration of admixture to the required weight of cement. The amount of cement shall not be reduced.
 - 3. Integral colorant shall be added to confirm the admixture was added to the concrete for all precast structures. Integral colorant shall be added at the admixture manufacturing facility, not at the concrete batch plant. It is recommended that

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3311: Wastewater Manholes

October 10, 2021

- the admixture be added first to the rock and sand and blended thoroughly before adding cement and water or per the manufacturer's recommendations.
4. Concrete structures without crystalline waterproofing admixture or admixture without sufficient colorant for field verification shall be rejected.
 5. CONTRACTOR shall provide certification from the pre-caster that the admixture was batched in accordance with the manufacturer's recommendations.
 6. UTILITIES may request a core to ensure the admix is properly mixed into the structure.
- F. The date of manufacture and the name or trademark of the precast, admixture, and liner manufacturer shall be clearly marked on each pre cast section on interior and exterior surface, and marked on HDPE or fiberglass interior liner. Product markings shall be waterproof and permanent.
- G. Pre-cast concrete top slabs shall be used where cover over the top of the pipe is less than 4 feet.
- H. Lift rings or non-penetrating lift holes shall be provided for handling pre-cast manhole sections.
- I. Existing manholes shall be coated or lined and new manholes shall be HDPE lined to resist corrosion from a sanitary sewer environment.
1. Coatings or liners shall be applied in strict accordance with the coating or liner manufacturer's recommendations.
 2. Any defect in the coating shall be replaced at no cost to the COUNTY.

2.02 MANHOLE ENCAPSULATION

- A. The top of buried manholes, cone, top slabs, riser rings, iron frame, cover and all joints shall be encapsulated with a heat shrink-wrap with a minimum thickness of 98 mils (2.5mm).
- B. The wrap shall have a cross-linked polyolefin backing coated with a protective heat activated adhesive.
- C. The wrap should effectively bond to the substrate via primer provided by the manufacturer, providing corrosion and moisture protection.
- D. The wrap shall be applied with a high intensity propane torch.
- E. Heat shrink wrap for all barrel section joints of manholes shall be a minimum 9 inch width wrap and a minimum of 17 inch width wrap on the corbel section, riser rings and ring & cover.
- F. Adhesive tape materials shall not be allowed.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3311: Wastewater Manholes

October 10, 2021

2.03 CASTINGS

- A. Gray iron castings for manhole frames, covers, adjustment rings and other items shall conform to the ASTM A 48, Class 35B.
- B. Castings shall be true to pattern in form and dimensions and free of pouring faults and other defects which would impair their strength or otherwise make them unfit for the service intended. The seating surfaces between frames and covers shall be machined to fit true. No plugging or filling will be allowed.
- C. Lifting or “pick” holes shall be provided, but shall not penetrate the cover.
- D. Casting patterns shall conform to those shown or indicated on the STANDARD DRAWINGS.
- E. All manhole frames and covers shall be traffic bearing to meet AASHTO H-20 loadings.
- F. Frames shall be suitable for the future addition of a cast iron ring for upward adjustment of top elevation.

PART 3 EXECUTION

3.01 PRE-CAST CONCRETE MANHOLE INSTALLATION

- A. Bedding, excavation and backfill in accordance with Section 3113, “Excavations, Backfill, Compaction and Grading”.
- B. A pre-cast base section shall be carefully placed on the prepared bedding so as to be fully and uniformly supported in true alignment and making sure that all entering pipes can be inserted on proper grade.
 1. Pre-cast manhole sections shall be handled by lift rings or lift holes. Such holes shall be filled with non-shrink grout or jointing material after installation of the manhole.
 2. The first pre-cast section shall be placed and carefully adjusted to true grade and alignment. The sections shall be uniformly supported by the base structure, and shall not bear directly on any of the pipes. Influent and effluent pipes shall be properly installed so as to form an integral watertight unit.
 3. Pre-cast sections shall be placed and aligned to provide vertical alignment with a 1/4 inch maximum tolerance per five (5) feet of depth. The completed manhole shall be rigid, true to dimensions and watertight.
- C. Cores shall be a minimum of 12 inches from joints, cores, and penetrations for both the interior and exterior of the structure. If the core location does not meet the 12 inch separations, the manhole shall be replaced with a new larger diameter structure at no cost to the COUNTY

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3311: Wastewater Manholes

October 10, 2021

- D. A minimum of two (2) strips of approved jointing material shall be placed in the tongue and groove joints forming a continuous gasket around the circumference with gasket section to generate 1/2 inch “squeeze out” for visible proof of each watertight joint on the interior and exterior of each joint as indicated on the STANDARD DRAWINGS.
- E. Lifting of manhole sections shall be as per manufacturer’s recommendation. Forks shall not be permitted to lift precast sections and are subject to rejection if this method is utilized for moving precast. Only lifting chains or straps with spreaders are permitted to load, move or set precast structures.
- F. Placing Castings:
1. Casting shall be fully bedded in mortar with adjustment courses placed between the frame and manhole.
 2. Bricks shall be a minimum two (2) and maximum four (4) courses.
 3. Mortar shall conform to ASTM C 270, type M and the bricks shall be clay and conform to ASTM C 216, grade SW, size 3-1/2 inches wide by 8 inches long by 2-1/4 inches high.
 4. Adjustment by other approved materials shall be equal to a minimum of 4-1/2 inches and a maximum of 9 inches.
 5. Top of manhole castings located in pavement, shouldered areas and sidewalks shall be set flush with grade. Top of manhole castings located outside these areas shall be placed 2 inches above grade.
- G. Flow Channels:
1. Manhole flow channels and pipe penetrations shall be constructed with smooth and carefully shaped bottoms, built up sides and benching using minimum 2,500 psi concrete with no voids.
 2. No brick, powdered cement, foam, or sand shall be used to construct or fill the channels or benching.
 3. Channels shall conform to the dimension of the adjacent pipe and provide changes in size, grade and alignment evenly. 2,500 psi concrete shall be Portland Cement Type II only.
 4. Flow channels shall be installed as shown in the STANDARD DRAWINGS.
- H. Pipe Connections:
1. Special care shall be taken to ensure that the openings through which pipes enter the structure are provided with watertight connections. Pipe connections shall conform to ASTM C 923, “Standard Specifications for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals”.
 - a. Connecting to Existing Manholes or phase line manholes:

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3311: Wastewater Manholes

October 10, 2021

- i. Refer to Section 3113, “Excavations, Backfill, Compaction and Grading”, requiring removal of all soil burden around an existing structure to the elevation of the point of connection.
- ii. The CONTRACTOR shall modify and install bench work and flow channel in existing manhole to meet current standards.
- iii. Cores proposed in the field shall be a minimum of 12 inches from new or existing joints, cores, and penetrations for both the interior and exterior of the structure. If the proposed core location does not meet the 12 inch separations, the manhole shall be replaced with a new larger diameter structure at no cost to the COUNTY.

3.02 CLEANING

- A. Newly constructed manholes shall be cleaned of any accumulation of silt, debris or foreign matter of any kind and shall be free from such accumulations at the time of final inspection.

3.03 INSPECTION FOR ACCEPTANCE

- A. The quality of materials, the process of manufacture and the finished sections shall be subject to inspection and approval by UTILITIES. Such inspection may be made at the place of manufacture, at the site after delivery or at both places and the sections shall be subject to rejection at any time due to failure to meet any of the specification requirements; even though sample sections may have been accepted as satisfactory at the place of manufacture.
 1. Sections rejected after delivery to the job shall be marked for identification and shall be removed from the job site.
 2. Sections that have been damaged after delivery will be rejected and if already installed; removed and replaced, entirely at the CONTRACTOR’s expense.
- B. At the time of inspection, the sections will be carefully examined for compliance with the specified ASTM designation and with the approved manufacturer’s drawings. Sections shall be inspected for general appearance, dimension, “scratch-strength” blisters, cracks, roughness, soundness, etc. The surface shall be dense and close-textured.
- C. Manholes shall be inspected by UTILITIES and defective manholes shall be replaced by the CONTRACTOR. In the opinion of the UTILITIES, repairs to manholes due to imperfections in manufacture or damage during handling will not be acceptable per ASTM C478 “Pre-cast Reinforced Concrete Manhole Sections”.
- D. Unapproved methods of repair include but are not limited to: pressure grouting, patching, chemical grouting, crack injection, coating or lining and shall not be accepted.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3312: Collection System Bypass

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The WORK covered by this Section consists of providing all temporary bypassing to perform all operations in connection with the flow of wastewater around pipe segment(s) or pump stations. The purpose of bypassing is to prevent wastewater overflows and provide continuous service to all wastewater customers. The CONTRACTOR shall maintain wastewater flow in the construction area in order to prevent backup and/or overflow and provide reliable wastewater service to the users of the wastewater system at all times.

PART 2 PRODUCTS

2.01 GENERAL

- A. The CONTRACTOR shall provide and maintain adequate equipment, piping, tankers and other necessary appurtenances in order to maintain continuous and reliable wastewater service in all wastewater lines as required for construction. The CONTRACTOR shall have tankers, backup pump(s), piping and appurtenances ready to deploy immediately.
- B. Any bypassing equipment that, in the opinion of UTILITIES, has the potential to allow a backup and/or overflow shall be removed from the site of the WORK and replaced with acceptable equipment.

PART 3 EXECUTION

3.01 GENERAL

- A. The CONTRACTOR shall have all materials, equipment and labor necessary to complete the repair, replacement or rehabilitation on the job site prior to isolating the gravity main segment, manhole, or pump station.
- B. The CONTRACTOR shall demonstrate that the pumping system is in good working order and is sufficiently sized to successfully handle flows by performing a test run for a period of twenty-four (24) hours prior to beginning the WORK. The test run shall meet the same materials and operation as submitted in the comprehensive written plan.

3.02 TRAFFIC CONSIDERATIONS

- A. The CONTRACTOR shall locate bypass pumping suction and discharge lines so as to not cause undue interference with the use of streets, private driveways, pedestrian walkways, and alleys to include the possible temporary trenching of piping at critical intersections. Ingress and egress to adjacent properties shall be maintained at all times. Ramps, steel plates or others methods shall be deployed by the CONTRACTOR to facilitate traffic over surface piping. High traffic commercial properties may require alternate methods.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3312: Collection System Bypass

October 10, 2021

3.03 BYPASS PLAN

- A. The CONTRACTOR shall submit a comprehensive written plan to UTILITIES for approval and acceptance that describes the intended bypass for the maintenance of flows during construction.
- B. The CONTRACTOR shall also provide a sketch showing the location of bypass pumping equipment for each pump station or line segment(s) around which flows are being bypassed.
- C. The plan shall include any proposed tanker(s), pump(s), bypass piping, backup plan and equipment, work schedule, monitoring log for bypass pumping, monitoring plan of the bypass pumping operation and maintenance of traffic plan.
- D. The CONTRACTOR shall cease bypass operations and return flows to the new and/or existing sewer when directed by UTILITIES.
- E. All piping shall be designed to withstand at least twice the maximum system pressure or a minimum of 50 psi, whichever is greater.
- F. During bypassing, no wastewater shall be leaked, dumped, or spilled in or onto, any area outside of the existing wastewater system.
- G. When bypass operations are complete, all bypass piping shall be drained into the wastewater system prior to disassembly.
- H. Where WORK requires the line to be blocked beyond NORMAL WORKING HOURS, at minimum, an auto-dialer shall be required.

3.04 BYPASS OPERATION

- A. UTILITIES shall accept the bypass plan prior to implementation of the bypass. The CONTRACTOR shall plug off and pump down the sewer manhole or line segment in the immediate WORK area and shall maintain the wastewater system so that surcharging does not occur.
- B. Where WORK requires the line to be blocked beyond NORMAL WORKING HOURS and bypass pumping is being utilized, the CONTRACTOR shall be responsible for monitoring the bypass operation twenty-four (24) hours per day, seven (7) days per week. If accepted in the bypass plan by UTILITIES, any electronic monitoring in lieu of on-site monitoring must be detailed in the comprehensive written plan and approved by UTILITIES.
- C. The CONTRACTOR shall ensure that no damage will be caused to private property as a result of bypass pumping operations. The CONTRACTOR shall complete the WORK as quickly as possible and satisfactorily pass all tests, inspections and repair all deficiencies prior to discontinuing bypassing operations and returning flow to the sewer manhole or line segment.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3312: Collection System Bypass

October 10, 2021

- D. The CONTRACTOR shall immediately notify UTILITIES Inspector and UTILITIES Dispatch (407-836-2777) should a sanitary sewer overflow occur and take the necessary action to clean up and disinfect the spillage to the satisfaction of UTILITIES and/or other governmental agency. If sewage is spilled onto public or private property, the CONTRACTOR shall wash down, clean up and disinfect the spillage to the satisfaction of UTILITIES and/or other governmental agency.
- E. When bypassing a pump station, one (1) back-up pump equal to the primary unit shall be required.
- F. Bypass pumps shall have a maximum rating of 55 decibels for sound attenuation.

3.05 CONTRACTOR LIABILITY

- A. The CONTRACTOR shall be responsible for all required pumping, equipment, piping and appurtenances to accomplish the bypass and for any and all damage that results directly or indirectly from the bypass pumping equipment, piping and/or appurtenances.
- B. The CONTRACTOR shall provide a minimum response time in the event of bypass failure or a sanitary sewer overflow.
- C. The CONTRACTOR shall also be liable for all COUNTY personnel and equipment costs, penalties and fines resulting from sanitary sewer overflows per section 3110, “General Construction Requirements” of this MANUAL.
- D. It is the intent of these specifications to require the CONTRACTOR to establish adequate bypass pumping as required regardless of the flow condition.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. These specifications within this Section are for equipment, materials, site work, fences or walls and appurtenances for the installation of wastewater pump stations.

PART 2 PRODUCTS

2.01 WETWELL

A. Wetwell Liners:

1. Fiberglass Liners:

- a. Fiberglass liners are for existing structures only.
- b. Fiberglass reinforced polyester wetwell liner shall be manufactured from commercial grade polyester resin or vinyl ester resin with fiberglass reinforcements. The resin system shall be suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid, as well as other gases associated with the wastewater collection systems.
- c. The wetwell liner shall be a one (1) piece unit manufactured in accordance with the requirements of ASTM D3753. All inserts and sleeves for piping shall be in accordance with the liner manufacturer's recommendations and shall result in complete coverage of all precast sections and be capable of passing a spark test.

2. HDPE Liner:

- a. All new structures shall have an HDPE liner.
- b. The HDPE embedment sheeting shall be mechanically bonded to the concrete by integral studs. The liner shall be cast in place by the precast manufacturer and the CONTRACTOR shall field weld the joints. Minimum thickness of liner is 5 mm (195 mils).
- c. All inserts and sleeves for piping shall be in accordance with the liner manufacturer's recommendations and shall result in complete coverage of all precast sections and be capable of passing a spark test.

B. Precast Concrete:

1. Precast wetwells shall conform to specifications for ASTM C 478 "Precast Reinforced Concrete Manhole Sections", except as otherwise specified below.
2. The minimum wall thickness shall be 8 inches. Precast wetwells shall be constructed with a precast monolithic base structure as shown on the STANDARD DRAWINGS. The minimum base thickness shall be 8 inches.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

3. Concrete shall be Type II, 4000 psi at twenty-eight (28) days. All sections shall have tongue and groove joints except for top slab. All jointing material shall be a cold adhesive preformed plastic gasket, conforming to ASTM C 443 “Manhole Section Connections”.
4. All cores and preformed pipe penetrations shall have a minimum of 12 inches of concrete from the tongue and groove joint to the core. Precast sections not meeting this minimum separation shall be rejected and re-cast.
5. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on each precast section.
6. Sections shall not be shipped until cured by an approved method as per ASTM C 478 for at least twenty eight (28) days unless the manufacturer provides concrete cylinder break data showing the concrete has cured to 100% design strength prior to shipping.
7. Precast concrete top slabs shall be used.
8. Lift rings or lift holes shall be provided for handling precast sections. Lift holes shall be filled with non-shrink grout or jointing material after installation of the sections.
9. New concrete structures shall contain a crystalline waterproofing concrete admixture for all new concrete structures, including but not limited to: manholes, wetwells and wetwell top slabs. Crystalline waterproofing concrete admixture shall be added to the concrete during the batching operation in accordance with ACI 201.2R. Admixture concentration shall be added based upon manufacturer design percent concentration of admixture to the required weight of cement. The amount of cement shall not be reduced. Integral colorant shall be added to confirm the admixture was added to the concrete for all precast structures. Integral colorant shall be added at the admixture manufacturing facility, not at the concrete batch plant. It is recommended that the admixture be added first to the rock and sand and blended thoroughly before adding cement and water or per the manufacturers’ recommendations. Concrete structures without crystalline waterproofing admixture or admixture without sufficient colorant for field verification shall be rejected. CONTRACTOR shall provide certification from the precaster that the admixture was batched in accordance with the manufacturers’ recommendations.
10. All interior wall and top surfaces shall have a protective liner.
11. All ARV’s shall be vented back into the wetwell and sealed around entrance point.
12. The wetwell joints shall be encapsulated with a heat shrink-wrap with a minimum thickness of 98 mils (2.5mm). The wrap shall have a cross-linked polyolefin backing coated with a protective heat activated adhesive. The wrap should effectively bond to the substrate via primer provided by the manufacturer,

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

providing corrosion and moisture protection. The wrap shall be applied with a high intensity propane torch. Heat shrink wrap for all barrel section joints of wetwells shall be a minimum 11-inch width wrap. Adhesive tape materials shall not be allowed.

C. Cast-in-Place Bases:

1. Cast-in-place bases shall be utilized only when specifically approved by UTILITIES. Unless otherwise specified, cast in place bases shall be at least 8 inches in thickness. Reinforcement and connection to the riser sections shall be designed by the DEVELOPER's ENGINEER and submitted to UTILITIES for approval.

- D. Concrete structures shall be inspected by UTILITIES and defective structures shall be replaced by the CONTRACTOR. Pressure grouting, patching, chemical grouting, crack injection, etc. of structures for repair shall not be accepted.

2.02 ACCESS FRAMES AND HATCHES

- A. The wetwell shall be furnished with an access frame and hatches. Equipment furnished shall include the necessary aluminum access frames, complete with hinged and slide bar equipped hatches, 316 SST upper guide holder and level sensor cable holder.
- B. Hatches shall be of aluminum diamond plate.
- C. There shall be one (1) access wetwell hatch per pump. The wetwell hatches shall be sized according to pump manufacturer's recommendations.
- D. The access frame and hatches shall have 316 SST hardware.
- E. The support beam for load rating shall be mounted on the door.
- F. Each wetwell hatch cover shall be permanently embossed "CONFINED SPACE" in minimum 3 inch engraved letter. Painted lettering shall not be acceptable. Each hatch shall be equipped with a recessed hasp.
- G. See STANDARD DRAWINGS for hatch detail and design.

2.03 PUMPS AND CONTROLS

- A. Pumps and miscellaneous accessories shall be as specified in Section 3411, "Submersible Wastewater Pumps". Controls, electrical equipment and miscellaneous accessories shall be as specified in Section 3412, "Wastewater Pump Station Electrical Power and Control System".

2.04 PACKAGED ODOR CONTROL SYSTEMS

A. Introduction:

1. Furnish a complete two-stage modular odor control system consisting of a pre-manufactured, self-contained biotrickling filter followed by a polishing stage containing virgin activated carbon media.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

2. A single odor control supplier shall be totally responsible for all components of the odor control system. The supplier shall have at least five (5) successful years of experience in design, construction and operation of equipment of the scheduled type.
3. All system appurtenances shall be furnished by the odor control supplier including but not limited to: media vessel(s), inlet plenum, fans, VFDs, odor control module, grease mist eliminator, all interconnecting inlet air ducting from lift station to odor control system, electric service connection, and a control system.
4. All components and materials of the odor control system shall be compatible with the conditions and chemicals to which they will be subjected during normal operation of the system. Compounds with which the materials must be compatible with include, but are not limited to: hydrogen sulfide gas, organic sulfides, sulfuric acid and mercaptans.
5. Refer to Appendix D, "List of Approved Products".

B. Biotrickling Filter:

1. The system air flow rate and other design criteria shall be as specified in Section 2410, "Wastewater Pump Station Design Standard". The odor control module shall consist of one (1) or more foul air distribution plenums, (plenums shall be approved by UTILITIES), odor control media compartment, easily removable weather cover system and recirculation system for the biotrickling filter section.
2. The odor control system shall have a built in provision for the collection and drainage of any filtrate or other materials generated by odor control system.
3. The drains shall be provided with traps, cleanouts and inspection/test ports to facilitate testing of the discharges from the units.
4. Unless prior approval by the UTILITIES and based on ENGINEER and supplier recommendations, no vessel, piping, or appurtenances shall be more than ten (10) feet high as measured from the top of slab, and shall be sufficient to treat the entire airflow.
5. The odor control vessel shall be constructed for outdoor application, contain an ultraviolet inhibitor, have a flanged inlet at the bottom of the unit and an integral exhaust port with rain protection.
6. Means shall be provided to exhaust the discharge from the biotrickling filter directly to atmosphere in order to perform maintenance activities or to reconfigure the system in the future.

C. Fan Enclosure:

1. The noise level of the complete system operating at the installation location shall not exceed 50 dBA overall sound pressure level (referenced to 20 micro pascals) at any point along the pump station's property line. Following system

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

substantial completion, UTILITIES shall conduct a field noise survey to determine if the unit meets the noise level requirement of this paragraph.

2. At a minimum, the fan shall be provided with a sound attenuating enclosure.
3. The enclosure shall be manufactured from aluminum or 316 SST and be designed with adequate ventilation to prevent fan overheating overall operating conditions.
4. The enclosure shall be equipped with a sufficient quantity of removable panels to allow access to all sides and top of the fan and motor. Panels shall be of sufficient size to allow removal of blower, housing, and other elements. Panels shall incorporate handles and a maximum of four hand knobs for ease of loosening and removing each panel.
5. Inlet and outlet ducted blower connections shall be plain end and connected to the ductwork via flexible expansion couplings. Custom escutcheon plates manufactured from the same material as the enclosure shall be provided to block any gaps between the piping and the enclosure.

D. Media Types:

1. The biotrickling filter shall include a minimum of one (1) layer of highly porous, chemically resistant synthetic media material with a minimum ten (10) year life, with additional layers as recommended by the odor control supplier to meet the site specific requirements.
2. Media layers shall be self-supporting and removable for inspection, cleaning, or replacement.
3. The media installation shall be constructed to minimize the potential for short-circuiting or bypass of the air being treated.
4. Organic materials such as compost, wood, wood mulch, tree bark, lava rock, or activated carbon shall not be acceptable.
5. A media support system shall be provided inside each vessel. The support system shall consist of nonmetallic, removable grating supported from either the vessel sides or bottom.
6. Polishing stage media shall be virgin activated carbon as specified herein. At a minimum, the bed depth shall be 3 feet, and bed face velocity shall not exceed 50 feet per minute. Polishing stage shall be provided by the biotrickling filter manufacturer and shall be sized as specified and per manufacturer's recommendations.
 - a. Virgin Activated Carbon Media:
 - i. The media shall be high-quality, virgin, activated carbon.
 - ii. Virgin activated carbon media shall have the following physical and chemical properties as specified in Table 3410-1:

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

Table 3410-1: Carbon Media Parameters

Carbon Parameter	Requirement	Test Method
Apparent density (bulk dense packing)g/cc	0.38 to 0.42	ASTM D2854
Ball-pan hardness number, minimum	95	ASTM D3802
Mean particle diameter, mm	3.4 to 4.0	ASTM D2862
Moisture, percent, maximum	5	ASTM D2867
Maximum pressure drop at 50 fpm air velocity through a dense-packed bed, inches water column / ft bed depth.	1.5	ASTM D2854
Butane Activity, weight percent, minimum.	23.3	ASTM D5742
Hydrogen Sulfide Breakthrough Capacity, minimum, g H2S adsorbed / g carbon	0.04	ASTM D6646-03

E. Biotrickling Filter Recirculation and Nutrient Addition System:

1. The biotrickling filter shall be equipped with a recirculation system. The system shall be capable of operating on either potable or reclaimed water and be capable of interfacing with a nutrient addition system. The recirculation pumps shall be corrosion-resistant without the need for seal water, and suitable for outdoor installation. Each pump motor shall be suitable for 480 volt, 3 phase, 60 Hz electrical service and shall be provided with a NEMA rated enclosure suitable for the location.
2. The reactor shall be configured with at least one fluid injection spray nozzle or orifice. The spray system shall be located above the primary treatment layers and shall disperse the fluid evenly across the treatment layer.
3. A nutrient storage and feed system shall be provided. The system shall utilize the upper surface spray system to automatically apply a liquid nutrient mixture to the media. The dosing rate shall be adjustable and capable of both automatic and manual control. A suitable free standing chemically resistant covered nutrient storage container shall be provided with the system. Container shall hold a minimum of thirty (30) day supply of nutrient.

F. Odor Control Piping and Ducting:

1. Above grade foul air duct shall be FRP minimum of 75 psi design and below grade foul air duct shall be SDR 17 HDPE pipe minimum.
2. All hard-plumbing of non-foul air ducting piping shall comprise of either ultraviolet (UV) resistant polyvinyl chloride PVC or chlorinated polyvinyl chloride CPVC pipe.
 - a. All plumbed piping shall be schedule 80.
 - b. Fittings shall be bulkhead or two-flanged style and be constructed of UV resistant PVC or CPVC. All metal fittings and hardware shall be compression type 316 SST only. The orientation of the piping connections,

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

access openings, and other appurtenances shall be as indicated on the drawings.

- c. All fittings shall be solvent welded or threaded. All flange gaskets, union seals, valve seals and piping seals shall be fully compatible for their intended use. The orientation of the piping connections, access openings, and other appurtenances shall be as indicated on the drawings. Piping shall be routed such that it does not impede mobility around the site or block access to any equipment, doors or hatches

G. Stack Velocity:

1. Stack velocity shall be between 2,500 and 3,000 fpm for dispersion.

H. Electrical Controls:

1. Enclosure shall be NEMA 4X 316 SST and mounted on a stand located adjacent to the odor control unit. Panel support shall be 3 inch 316 SST pipe and cap installed with concrete base. All mounting hardware, brackets, accessories and panels shall be 316 SST.
2. Control system shall include a minimum of the following as required as part of the supplier's standard design:
 - a. Programmable timer for recirculation and nutrient addition;
 - b. 460-volt, single phase starter for blower fan;
 - c. Control transformers;
 - d. Dedicated circuit breaker for controls;
 - e. Odor control fan on-off switch;
 - f. Odor control fan run indicate light;
 - g. Odor control fan fail indicate light; and
 - h. Reset push button.
3. The panel shall provide dry contacts for odor control system running and odor control system fail.
4. All LCD screens shall have an aluminum sunshield painted white with hinged flap covering the screen surrounding the enclosure.
5. Class 1, Division 2, Group D ratings of instrumentation shall be applied to control panels, electrical equipment, conduit and wiring methods located within 3 feet of air duct, fans, and scrubber vessel.

I. Biotrickling Filter Recirculation and Nutrient Feed Controls:

1. A water control cabinet shall be provided with each odor control system when required as part of the supplier's standard design. The cabinet shall regulate the non-potable or reclaimed water used within the odor control system.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

2. The enclosure shall have a NEMA rating suitable for the location and shall be NEMA 4X 316 SST if located in an unclassified area.
 3. Each water control cabinet shall be furnished with a main power disconnect switch and weather shield. The panel shall be mounted as indicated on the drawings and factory tested to full operation with all other components prior to shipment.
 4. The cabinet shall contain the following components as required as part of the supplier's standard design:
 - a. Nutrient metering pump;
 - b. Recirculation system shutoff valve;
 - c. Recirculation system pressure gauge;
 - d. Make-up water shutoff valve;
 - e. Make-up water strainer; and
 - f. Make-up water pressure gauge.
- J. Control Dampers:
1. Dampers shall be heavy duty industrial type with a channel flanged frame, an external damper position indicator, manual adjustment and position locking arrangement. Dampers shall be constructed of 316 SST.
 2. Dampers shall have a replaceable neoprene or EPDM seals provided with the damper. Install seals along each blade edge.
 3. Dampers shall meet the tight leakage requirements stated within AMCA Standard 500D.
- K. Centrifugal Foul Air Fans:
1. The use of a manufacturer's name and model of catalog number is for the purpose of establishing the standard quality, grade, type, size, physical arrangement, performance characteristics and availability.
 2. The fan motor shall be explosion proof and installed in the bottom horizontal outlet orientation. The motor shall be selected to be non-overloading for the entire fan curve range and for the reasonable expected temperature and humidity.
 3. The FRP fan wheel shall be made of chemical grade vinyl ester resin. Except as modified or supplemented herein, the fan shall comply with the applicable provisions of ASTM D4167. The fan shall be suitable for operation with temperatures up to 150°F without de-rating the safe operating speed of the fan. The entire housing and airstream surfaces shall be graphite impregnated and grounded to prohibit static buildup. The fan shall have an ASTM E-84 Class I flame spread rating. Fan housings and supports shall contain an ultraviolet

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

inhibitor or coating. Lift and hold-down lugs shall be integrally molded into the fabrications. Housings shall have a plugged drain connection at the low point of the scroll and a gasketed access door. The fan shaft shall be completely encapsulated in an FRP sleeve where exposed to the airstream. A Viton shaft seal shall be furnished.

4. Fans shall be factory assembled, complete with fan wheel, fan housing or cabinet, bearings, drives, drive guard, motor, motor base, unit base and vibration isolators and electrical disconnect switch, dampers and bird screens unless otherwise specified. All fans shall be statically and dynamically balanced prior to shipment from factory. Bearings shall be self-aligning, antifriction type with external grease fittings and shall have an AFBMA L10 Life Rating of 100,000 hours at specified operating conditions.
5. Where belt drives are used, motors shall be provided with adjustable slide bases. Adjustable sheaves and slide bases shall be selected so that the midpoint of the adjustable range matches the fan schedule data. Drives selected shall have a safety factor of 1-1/2 times motor horsepower.
6. All fans shall be AMCA certified for air performance and sound ratings tested in accordance with AMCA 300°F.
7. Fans shall be assembled with OSHA shaft and motor guards. Provide access for greasing bearings, tachometer readings of fan and motor speed without removing the cover. All grease fittings and tubing shall be 316 SST and plumbed for termination outside of the OSHA guards, but within the sound attenuating enclosure. Enclosure shall be properly ventilated to prevent motor overheating.
8. Fans shall be of FRP construction. Fasteners shall be 316 SST.
9. The supporting frame shall be fiberglass reinforced plastic construction.

L. Grease Filter / Mist Eliminator:

1. A grease filter / mist eliminator shall be installed upstream of the biotrickling filter stage and upstream of the foul air fan. A second mist eliminator shall be installed between the biotrickling filter and the carbon polishing unit for stations with more than three (3) pumps.
2. The grease filter / mist eliminator shall consist of a 316 SST enclosure, with an internal demister assembly consisting of a 316 SST pad in front of a polypropylene pad.
3. The demister efficiency shall provide at least 99.9% removal of particulates equal to or larger than 10 micron in size.
4. The pads shall be removable for cleaning and the housing shall be flanged or have a door to allow removal and replacement of the filter pads.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

5. This unit shall ship loose and be ready for installation into the odor control system supply ductwork. The 316 SST housing shall be flanged and drilled, and come complete with gaskets, ready for installation.

M. Biotrickling Filter Performance Testing:

1. A performance test shall be conducted on the odor control equipment to demonstrate that the equipment meets the specified requirements, prior to final acceptance. The performance tests shall not begin until all airflow rates have been adjusted and balanced, and the CONTRACTOR has proven that all systems are properly installed and are functioning as designed.
 - a. CONTRACTOR, with the aid of qualified odor control supplier representatives, shall operate all systems for a minimum of thirty (30) days before performance tests are conducted, or until all systems are performing to the satisfaction of the UTILITIES. Written documentation indicating the proper operation of all system components shall be provided to ENGINEER before the performance test will be allowed.
 - b. After completion of the thirty (30) day trial operation, and prior to final acceptance, performance tests shall be conducted on each of the odor control systems to demonstrate that the equipment meets the specified requirements.
 - c. CONTRACTOR shall provide all necessary personnel, materials and equipment for the tests. Prior to the start of the test, CONTRACTOR shall operate the systems until the stable biological operating parameters and biotrickling filter controls are established. All fine-tuning of operating conditions shall be performed prior to testing.
 - d. The performance test will be conducted under actual loading conditions for each of the systems. Continuous data logging meters (OdaLog meters or similar) will be used to record inlet and outlet H₂S simultaneously for a period of one week at each system. Two meters are required at each system with the outlet meter having a sensitivity of 0.01 ppm H₂S or less. Where mixed flow fans are used at the system outlet, outlet monitoring shall be at the fan inlet. Logging monitors shall be programmed with a maximum sampling interval of ten (10) minutes.
 - e. As a minimum, at the start and conclusion of each test, CONTRACTOR shall monitor the airflow, recirculation rate, makeup water rate, and operating pH.
 - f. Exhaust from the biotrickling filter shall not be directed to the carbon adsorber until the Contractor has proven the biotrickling filter has acclimated and is performing within the specified requirements.
 - g. The performance tests shall establish that an H₂S removal efficiency of 99% is maintained under the variable loading conditions that occur over

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

the week long test. For minor short-term excursions a one (1) hour average will be used to determine compliance. For inlet H₂S concentrations below 10 ppm a maximum outlet H₂S of 0.50 ppm will be an acceptable biotrickling filter effluent concentration. The carbon polishing unit effluent concentration shall be a maximum of 0.05 ppm.

- h. Results of the performance tests shall be provided to ENGINEER in a written report. The report shall include the raw test data and a graphical plot for each of the tests showing inlet and outlet H₂S. The graph shall also show H₂S removal efficiency over the duration of each test. The report shall also include operating data including airflow, recirculation rate, makeup water rate, and operating pH for each system tested.
- i. If the equipment fails to meet the performance requirements, operational adjustments to the system and repeat testing may be allowed at the discretion of the ENGINEER. Subsequent failure of the equipment to meet the performance and design requirements specified will require equipment modifications to be made by, and at the expense of CONTRACTOR. Costs of additional testing will be at the expense of the CONTRACTOR.

N. Training:

1. After completion of the field testing, a minimum eight (8) hour operator instruction and training on equipment and system operation shall be provided. The training should provide a complete overview of all equipment, testing, adjusting, operation, and maintenance procedures. The training shall take the form of classroom instruction and shall cover:
 - a. Documentation in the final Operation and Maintenance manuals; one (1) electronic copy
 - b. Use the Operation and Maintenance manuals;
 - c. Equipment and system startup and shutdown;
 - d. System operation procedures for all modes of operation; and
 - e. Procedures for dealing with abnormal conditions and emergency situations for which there is a specified system response.
2. The training shall take the form of classroom sessions at the project site conducted by the odor control supplier representatives who are knowledgeable and familiar with the project. Hands-on instruction and training will be conducted so that actual operation and maintenance of the equipment and systems can be performed by UTILITIES upon completion of the training.

O. Monitoring And Service:

1. For a period of one (1) year following the date of acceptance of the odor control systems, the odor control SUPPLIER shall provide a monitoring package consisting of, but not limited to, the following:

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

- a. Inlet air temperature;
 - b. Media differential pressure;
 - c. Media temperature;
 - d. Inlet air relative humidity; and
 - e. Flow rate.
2. The package shall include this service at a frequency of every three (3) months. A quarterly report will summarize the collected and analytical data and will list deficiencies, recommendations and corrective actions.
- P. Spare Parts:
1. Belts (one (1) set of each type);
 2. Pillar block bearings (if applicable);
 3. Fuses (one (1) set of each type);
 4. Additional filters for grease mist eliminators (one (1) set);
 5. Any specialty tools for normal operation and maintenance; and
 6. Sufficient amount of required supplemental nutrients for continued operations to last for one (1) year. CONTRACTOR shall provide nutrient supplied by odor control system manufacturer.

2.05 CHAIN LINK FENCE

- A. The CONTRACTOR shall furnish and erect a chain link fence as required in Section 2410 "Wastewater Pump Station Design Standard".
- B. Materials:
1. The fabric, posts, fastenings, fittings and other accessories for chain link fence shall meet the requirements of AASHTO M 181 with the following changes:
 - a. The weight of coating of wire fabric shall be 1.2 ounces of zinc per square foot (Class B);
 - b. The galvanizing of steel materials shall be hot dipped galvanized; and
 - c. The weight of coating on posts and braces shall be 1.8 ounces of zinc per square foot, both inside and outside to meet the requirements of AASHTO M 111.
 2. The base metal of the fabric shall be a good commercial quality 9 gauge steel wire. The fabric shall be of uniform quality and shall be 6 foot high with a 2 inch mesh size and shall be black vinyl clad coated.
 3. All posts and rails and miscellaneous fittings shall be black vinyl dipped coated and in accordance with the following schedule:
 - a. End, corner and pull posts: 3 inches OD, schedule 40;

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

- b. Line posts and gate frames, as needed for support of gate size 2-3/8 inch OD, schedule 40;
- c. Gate posts: 3 inch OD, schedule 40; and
 - i. All slide gate openings shall be a minimum of 15 feet wide
- d. Post braces and top rail: 1-5/8 inch OD, schedule 20.
- 4. Tension wire shall be 0.177 inch coiled spring wire tensioned along the bottom of the fabric and shall be coated similarly to the wire fabric.
- 5. Post caps, designed to provide a drive fit over the top of the tubular post to exclude moisture, shall be provided.
- 6. Painted materials shall not be accepted.

2.06 BLOCK WALL:

- A. The CONTRACTOR shall furnish and erect a split face block wall or precast concrete panel wall as required in Section 2410 “Wastewater Pump Station Design Standard”.
- B. Block wall shall be integrally colored one-sided split face CMU type construction and shall be painted with graffiti resistant material. Split face concrete masonry units shall conform to ASTM C90 normal weight Type 2, solid load bearing units.
- C. Units shall be 8 inch by 8 inch by 16 inch nominal size.
- D. Minimum compressive strength on the net area (average of three (3) units) when tested in accordance with ASTM C140 shall be 2,000 psi on the net area. Minimum compressive strength of any individual unit shall be not less than 80% of the required three-unit average. Units shall be colored with integrally mixed, alkali-stable, lightfast and weather-resistant pigment.
- E. Top two (2) courses of wall shall be poured and finished with a top cap.
- F. Color shall be maintained uniformly throughout the job within the normal manufacturing tolerances. Integral water repellent shall be a liquid polymer admixture resistant to water penetration with a Class E rating in accordance with ASTM E514-74.

Table 3410-2: Pump Station Block Wall Color

Type of Block	Color *
CMU	Tan
Top Cap	Tan

Note: *All manufacturers shall use a tan colored concrete for the above applications. Coloring will vary slightly by manufacturer. Anti-graffiti paint to be applied on concrete.

- G. Eight (8) foot high structural precast concrete wall panels are acceptable in lieu of block if designed by an ENGINEER. The design and details shall be submitted and approved through plan review and must be on the APPROVED CONSTRUCTION PLANS.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

2.07 GATES

A. Chain Link Fencing Gates:

1. Slide gates shall be a minimum 15 foot wide gate as indicated on the STANDARD DRAWINGS.
2. Gates shall be complete with locking device, stops keeper, fabric and braces. Each gate opening shall have box-outs for hand access to install chain and locks for securing gates. All gate box-out connections shall be welded at a 90 degree angle to prevent rusting and exposed interior of pipe.
3. Gates shall be the same height as the fence and the gate fabric shall be the same as the fence fabric.
4. Gate leaves shall have truss rods or intermediate braces. Gate leaves 8 feet or more in width shall have intermediate braces and diagonal truss rods or shall have tubular members as necessary to provide rigid construction, free from sag or twist.

B. Block Wall Gates:

1. When block walls are required, 16 foot wide ornamental aluminum slide gates shall be installed.
2. The aluminum gates shall be either black anodized or painted black.
3. Gates shall be complete with latches, locking device, stops keeper, and braces.
4. Each gate opening shall have box-outs for hand access to install chain and locks for securing gates.
5. The aluminum gate shall comply with ASTM B221.
6. Gate leaves shall have truss rods or intermediate braces. Gate leaves 8 feet or more in width shall have intermediate braces and diagonal truss rods or shall have tubular members as necessary to provide rigid construction, free from sag or twist.

2.08 316 SST SLUICE GATES

A. 316 SST sluice gates shall be rising stem, self-contained or separate lift. Sluice Gates shall be installed with a Motorized Operator as per Appendix D.

1. Sluice gates, frames, guides, wedges, fasteners, and anchors shall be fabricated 316 SST construction with resilient seats. A de-seating system shall be incorporated into each gate.
2. Actuator pedestals and stem guides shall be 316 SST with adjustable guide bushing.
3. Minimum material thickness shall be 3/8 inch. Frame member shall be 3/8 inch by 3 inch by 3 inch hot rolled angle.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

4. The gate seat shall have a neoprene or hypalon seal around the perimeter.
5. Gates shall be supplied with accessories, including lift and lift stem, extension stem, stem guides, stem covers, wall thimbles, brackets and stop nuts. Gates shall be designed to meet seating and unseating heads.
6. Sluice gates and accessories shall operate satisfactory under the conditions of installation, including operating frequency ranging from twice daily to periods of prolonged idleness.
7. Opposing gate and frame mounted wedges shall be factory set to provide zero (0) leakage at the design head pressures with factory certified test reports available.

B. Wedges:

1. Factory fixed to provide tight shutoff over an extended life and repeated use of the gate.
2. 316 SST (same material as the gate) welded into position on the gate at both the top and bottom.
3. Designed with intermediate wedges to eliminate any bowing or gate deflection when seated.

C. Seat:

1. The gate seat shall have a mechanically retained neoprene or hypalon seal around the entire perimeter of the gate opening.
2. The rubber seat to 316 SST combination shall be as specified in AWWA C-517.
3. The seat shall be raised away from the frame to allow a clearance area so that solids and debris can be pushed aside by the gate. The design of the seat shall be such that solids or debris does not get trapped on the seat and cause a leak path or damage.
4. The resilient seat is mechanically retained with 316 SST fasteners and field replaceable.

D. Wall Thimble:

1. Wall thimble shall be fabricated 316 SST or sufficient section to resist permanent distortion and shall be provided by the gate manufacturer.
2. Wall thimbles shall be of bent leg design or F-Type and of a depth equal to the thickness of the structure wall upon which the gate is mounted.

E. Stem and Couplings:

1. Operating stem shall be 316 SST designed to transmit in compression at least two times the rated output of the operating manual mechanism with a 40-pound effort on the crank or hand-wheel.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

2. The threaded portion of the stem shall have machined cut or rolled threads of the Acme type and shall have a surface finish of 32 microns or less.
3. When hydraulic, pneumatic or electric operators are used, including portable operators, stem design force shall not be less than 1.25 times the output thrust of the hydraulic or pneumatic cylinder with a pressure equal to the maximum working pressure of the supply, or 1.25 times the output thrust of the electric or hydraulic motor in the stalled condition. Sections of stem assemblies of diameter 1-3/4 inches and larger shall be joined together with solid couplings. The couplings shall be grooved and keyed and shall be of greater strength than the stem.
4. Gates having widths equal to or greater than two (2) times the height shall be provided with two (2) lifting mechanisms connected by a tandem shaft.
5. Clear acrylic threaded stem cover with graduated markings to show the position of the gate with a protective cover to prevent from sun degradation.

F. Stem Guides:

1. Stem guides shall be fabricated from type 316L SST and ultra-high molecular weight polyethylene (UHMWPE) bushed where required by the manufacturer.
2. Guides shall be adjustable in two directions and shall be spaced in accordance with manufacturer's recommendation.
3. Stem guides shall not be located on the threaded portion of the stem.

G. Thrust Nut:

1. For rising stem arrangement, the thrust nut shall be located at the operator level.

2.09 316L SST PIPING AND FITTINGS

- A. All SST piping and fittings shall be shop fabricated SST pipe and fittings shall be furnished by a single fabricator who is reputable, qualified, and able to demonstrate proven minimum ten (10) year history of reliable fabrication of SST pipe and fittings. The fabricator shall be an ASME Code Shop and work in accordance with ASME Section IV, B31.1 and B31.3. The fabricator shall have the capability to provide and submit pipe layouts, shop fabrication drawings, and fabrication schedules. Submittals shall include dimensions, wall thickness, welding procedures and qualifications. All SST pipe and fittings shall be fabricated from Type 316L extra low carbon (ELC) grade austenitic SST sheet and plate in accordance with ASTM A312. Pipe shall be beveled according to procedure, root pass welded with the TIG (GTAW), and subsequent weld passes performed using TIG (GTQW), MIG (GMAW), or Metallic Arc (SMAQ) process. Filler metal of equal or superior ELC grades only shall be added to all welds to provide a cross section of the weld equal to or greater than the parent metal. Concavity, undercut, cracks or crevices shall not be allowed and all fabrications with such will be rejected and removed from the project site. Pipe shall be manufactured to nominal pipe

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

- sizes as listed in ANSI B36.19, Table 2. All pipes shall be schedule 40 SST with IPS OD dimensions.
- B. Flanges shall be ASTM A182, Grade F316L, Class 150 forged weld neck or slip-on flanges per ANSI B16.5. Flanges shall match the connecting flanges on the adjacent fitting, valve or piece of equipment (with a flat facing where connecting to ductile iron piping flanges). Flanges shall be installed in accordance with common industry wide practices and methods.
 - C. Fittings shall be butt weld type manufactured in accordance with ASTM A403 WP of the same grade (alloy) and in the same thickness as the pipe and manufactured to ANSI B16.9. Elbows shall be long radius; i.e., centerline to end of elbow equals 1.5 times the nominal pipe size, unless otherwise approved by the COUNTY. Elbows shall be smooth flow, seamless or with one longitudinal weld.
 - D. Following final fabrication, all SST pipe spools and fittings shall be cleaned and descaled in accordance with the requirements of ASTM A380. Descaling shall include full immersion in an appropriate pickling solution for the type and grade of material being treated. The type of acid used, acid concentration, solution temperature, and contact time shall be consistent with industry standards for such work.
 - E. Bolts and nuts for SST piping flanges shall be Type 316 SST conforming to ASTM A193, Grade B8M and with a pickled and passivated finish for bolts and ASTM A194, Grade 8M, for nuts. Provide washers of matching material for each nut.
 - F. SST fabricators shall hold at least one (1) of the following ASME accredited code stamps (“U”, “S”, “PP”) for consideration as an approved fabricator.

2.10 LANDSCAPING

- A. UTILITIES shall not accept or maintain landscaping. If landscaping is desired by HOA/Private Owner, a minimum 3 feet clear zone shall be maintained from the pump station tract, shall not obstruct in any way access to the pump station, and shall be the responsibility of the HOA/Private Owner.

PART 3 EXECUTION

3.01 FENCE INSTALLATION

- A. Post Setting:
 - 1. All posts shall be set 3 feet deep in concrete footings, 12 inches in diameter for line posts, gate and corner posts.
 - 2. After the post has been set, aligned and plumbed, the hole shall be filled with 2,500 psi concrete. The concrete shall be thoroughly worked into the hole so as to leave no voids. The exposed surface of the concrete shall be crowned to shed water.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

3. End, corner, pull and gate posts shall be braced to the nearest post with horizontal brace used as a compression member and a galvanized 3/8 inch steel truss rod and truss tightener used as a tension member. Corner posts and corner bracing shall be constructed at all changes of fence alignment of 30 degrees or more. All chain link fences shall be constructed with a top rail and bottom tension wire.

B. Placing Fabric:

1. The fabric shall not be placed until the posts have been permanently positioned and concrete foundations have attained adequate strength. The fabric shall be placed by securing one end and applying sufficient tension to remove all slack before making permanent attachments at intermediate points.
2. The fabric shall be fastened to all corner, end and pull posts by substantial and approved means. Tension for stretching the fabric shall be applied by mechanical fence stretchers.

3.02 WETWELL INSTALLATION

A. Bedding:

1. Shall be placed on bedding rock conforming to the requirements in Section 3113, "Excavations, Backfill, Compaction and Grading" shall apply. The bedding rock shall be firmly tamped and made smooth and level to assure uniform contact and support of the precast element.

B. Precast Sections:

1. Precast base section shall be carefully placed on the prepared bedding so as to be fully and uniformly supported in true alignment and making sure that all entering pipes can be inserted on proper grade.
2. Precast sections shall be handled by lift rings or lift holes. Such holes shall be filled with non-shrink grout or joint material after installation of the wetwell. Lifting of wetwell sections shall be per manufacturer's recommendation.
3. The first precast section shall be placed and carefully adjusted to true grade and alignment. All inlet pipes shall be properly installed so as to form an integral watertight unit. The sections shall be uniformly supported by the base structure and shall not bear directly on any of the pipes.
4. Precast sections shall be placed and aligned to provide vertical alignment with a 1/4 inch maximum tolerance per five (5) feet of depth. Each precast section joint shall be grouted flush with the outside wall. The completed wetwell shall be rigid, true to dimensions and watertight.
5. All wetwell excavations shall be dewatered and precast sections installed in the dry. After placement of the precast sections, a concrete seal shall be poured using a tremie. All seal concrete shall be deposited in one continuous pour. The wetwell shall then be dewatered and the balance of the concrete placed in the dry.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

- C. Excavation and Backfilling:
 - 1. Requirements of Section 3113, “Excavations, Backfill, Compaction and Grading”, shall apply.
- D. Pipe Connections:
 - 1. Special care shall be taken to ensure that the openings through which pipes enter the structure are provided with an approved watertight gasketed seal connections. Pipe connections shall conform to ASTM C923, “Standard Specifications for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals”.
- E. Hatches:
 - 1. Wetwell frames shall be securely mounted and hatches shall open above the pumps. Hatches shall open to a minimum of 90 degrees and installed as shown in the STANDARD DRAWINGS.
- F. Power Cable:
 - 1. Each pump power cable shall be supported on a separate 316 SST hook located within 6 inches of guide rail bracket for each pump. Each pump power cable shall be run as not to restrict removal of pumps.
 - 2. Hook size shall be based off of pump size as specified in Table 3410-3, Pump Hook Size.

Table 3410-3: Pump Hook Size

Pump Size	Hook Size
Less than 25 HP	3/8”
25 HP and larger	1/2”

3.03 CLEANING

- A. All newly constructed wetwells shall be cleaned of any accumulation of silt, debris, or foreign matter of any kind and shall be free from such accumulations at the time of final inspection.

3.04 SLUICE GATE INSTALLATION AND TESTING

- A. Manufacturer shall certify in writing that the field leakage test meets the specified leakage rate.
- B. The manufacturer shall guarantee the sluice gate, actuator and appurtenance items for a period of three years covering the equipment and installation from the UTILITIES acceptance.
- C. After installation, all gates shall be tested for leakage. Each gate shall be operated through one (1) complete cycle and then closed for testing, zero (0) leakage tight shutoff as detailed in the manufacturer’s manual.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3410: Wastewater Pump Stations

October 10, 2021

3.05 WATER SUPPLY

- A. All wastewater pump stations shall be provided with a potable water system with adequate capacity and pressure for station wash down and other requirements.
- B. Stations with water service by UTILITIES shall be provided with a minimum 2 inch service, 2 inch meter, backflow preventer, 2 inch connection with an additional 3/4 inch hose bib and pressure transducer.
- C. Stations with water service not served by UTILITIES shall be provided with a minimum 1 inch service (2 inch preferred), 5/8 inch meter, backflow preventer, 2 inch connection after the meter, with an additional 3/4 inch hose bib.
- D. The water supply shall be supplied with a potable water meter and equipped with backflow protection assembly:
 - 1. A reduced pressure zone (RPZ) principle backflow assembly standard ASSE 1013 shall be installed.
 - 2. The RPZ shall be installed and located just inside fenced area as described in the STANDARD DRAWINGS.
- E. If reclaimed water is available for a biotrickling filter, a separate reclaimed water meter shall be installed.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3411: Submersible Wastewater Pumps

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The specifications within this Section are for equipment that is intended to be standard pumping equipment of proven ability as manufactured by a reputable firm having at least five (5) years' experience in the production of such equipment. The equipment furnished shall be designed, constructed and installed in accordance with the best practices and methods and shall operate satisfactorily when installed as shown on the PLANS.
- B. All parts shall be so designed and proportioned as to have liberal strength and stiffness and to be especially adapted for the WORK to be done. Ample space shall be provided for inspection, repairs and adjustment. All necessary foundation bolts, plates, nuts, and washers shall be furnished by the equipment manufacturer and shall be of Type 316 SST. Brass or SST nameplates identifying the name of the manufacturer, voltage, phase, rated horsepower, speed and any other pertinent data shall be attached to each pump. The nameplate rating of the motors shall not be exceeded.
- C. The pumps shall be capable of handling raw unscreened domestic wastewater. Pump operation shall be controlled automatically by means of level transducer with float ball backup system for each individual pump and alarm level, except for the high-high level which shall be controlled by backup float only. Pumps shall be mounted in the wetwell as shown in the STANDARD DRAWINGS. Refer to Appendix D, "List of Approved Products".

1.02 QUALITY ASSURANCE

- A. Warranty/Service Center shall be located in Orange County, Lake, Volusia, Brevard, Polk, Seminole, or Osceola Counties and service response shall be within two (2) hours during NORMAL WORKING HOURS, and provide emergency service twenty four (24) hours, seven (7) days a week.
- B. Vendor shall have an exchange program in place with ability to exchange out-of-service pumps that require shop work for pump in vendor stock until repairs are complete or serviceable pump is available.

PART 2 PRODUCTS

2.01 PUMP CONSTRUCTION DETAILS

- A. Shaft:
 - 1. The pump shaft shall be of Series 300 or 400 SST. The shaft and bearings shall be adequately designed to meet the maximum torque required for any start up or operating condition and to minimize vibration and shaft deflection.
 - 2. As a minimum, the pump shaft shall rotate on two (2) permanently lubricated bearings. The upper bearing shall be a single row ball bearing. The lower bearing

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3411: Submersible Wastewater Pumps

October 10, 2021

shall be a two (2) row angular contact ball bearing, if required to minimize vibration and provide maximum bearing life. Bearings shall be designed to provide a minimum life of 50,000 hours.

B. Impeller:

1. The impeller shall be constructed of gray cast iron, ASTM A 48, class 30 - 40. All external bolts and nuts shall be of Type 316 SST.
2. Each pump shall be provided with a replaceable wear ring system to maintain pump efficiency. Only standard non-trimmed impellers shall be acceptable.
3. Impellers can be of the closed or open type. The closed type can be single or double-vaned. The open type shall be single vane with a self-cleaning, adjustable cast iron wear plate.
4. All impellers shall be non-clogging and dynamically balanced.

C. Mechanical Seal:

1. Each pump shall be provided with a tandem double mechanical seal running in an oil reservoir, composed of two (2) separate lapped face seals, each consisting of one stationary and one rotating tungsten carbide ring with each pair held in contact by a separate spring, so that the outside pressure assists spring compression in preventing the seal faces from opening.
2. The compression spring shall be protected against exposure to the pumped liquid. Silicon carbide may be used in place of tungsten carbide for the lower seal. The pumped liquid shall be sealed from the oil reservoir by one face seal and the oil reservoir from the air filled motor chamber by the other.
3. The seals shall require neither maintenance nor adjustment, and shall be easily replaced. Seal shall be held in place by locking ring.
4. Conventional double mechanical seals with a single spring between the rotating faces, requiring constant differential pressure to effect sealing and subject to openings and penetration by pumping forces, shall not be considered equal to tandem seal specified and required. Cartridge seal shall be acceptable.

D. Guides:

1. A sliding guide bracket shall be an integral part of the pump casing and shall have a machined connecting flange to connect with the cast iron discharge connection (pump base elbow), which shall be bolted to the floor of the wetwell with SST anchor bolts and so designed as to receive the pump discharge flange without the need of any bolts or nuts.
2. The pump base elbow design shall be interchangeable such that it will provide a watertight connection for any of the specified or otherwise accepted pumps without requiring any special tools, gaskets or adapters.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3411: Submersible Wastewater Pumps

October 10, 2021

3. Assembly shall be capable of receiving a standard Flygt pump without special modification to the either the pump or existing base elbow.
4. Sealing of the pumps to the discharge connection shall be accomplished by a simple linear downward motion of the pump with the entire weight of the pumping unit guided by two (2) Type 316 seamless tubular SST guides which will press it tightly against the discharge connection.
5. All Type 316 seamless tubular SST guides shall be 2 inch for use with pumps less than 25 horsepower. Pumps 25 horsepower and above shall use 3 inch Type 316 seamless tubular SST guides.
6. No brackets for guide rail system will be mounted to discharge piping. No portion of the pump shall bear directly on the floor of the wetwell and no rotary motion of the pump shall be required for sealing.
7. Sealing at the discharge connection by means of a diaphragm or similar method of sealing will not be accepted as an equal to a metal to metal contact of the pump discharge and mating discharge connection specified and required.
8. Approved pump manufacturers, if necessary to meet the above specification, shall provide a sliding guide bracket adapter. No reducing brackets or adapters shall be placed on or between the base elbow seating surface and pump volute.
9. All base elbows shall meet the standard Flygt specification. ABS Pumps shall provide factory installed drilled adaptor to the pump to allow connection to the Flygt base elbow. No retrofitting shall be permitted in the field. The base elbow shall be installed at proper height above the wetwell floor. The design shall be such that the pumps shall be automatically connected to the discharge piping when lowered into place on the discharge connection.
10. The pumps shall be easily removable for inspection or service, requiring no bolts, nuts or fastenings to be removed for this purpose and no need for personnel to enter the wetwell. Type 316 SST with a minimum of 6 feet of lifting chain, with 1/4 inch SST aircraft rated cable shall be provided between the cable holder and the lifting chain sized per the manufacturers' requirements. The lifting bail shall be constructed of 316 SST for each pump.

2.02 MOTORS

A. General Requirements:

1. All motors shall be built in accordance with latest NEMA, IEEE, ANSI and AFBMA standards where applicable.
2. Pump motors shall be housed in an air filled, watertight casing and shall have Class H insulated windings which shall be moisture resistant. Motors shall be NEMA Design B, rated 155 degrees C maximum. Pump motors shall have cooling characteristics suitable to permit continuous operation, in a totally, partially or non-submerged condition.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3411: Submersible Wastewater Pumps

October 10, 2021

3. The pump shall be capable of running continuously in a non-submerged condition under full load without damage, for extended periods.
4. The motor shall be capable of a minimum of ten (10) starts per hour.
5. If a field running test demonstrating this ability, with twenty four (24) hours of continuous operation under the above conditions, shall be performed for all pumps being supplied before final acceptance, as required by UTILITIES.
6. Motors below 25 horsepower shall be rated 230/460-volt, 3-phase and speed shall be nominal 1750 RPM or less. Motors 25 horsepower and above shall be 460-volt, 3-phase and speed shall be nominal 1750 RPM or less. Pump motors shall be non-overloading over the published performance curve.

B. Heat and Moisture Sensors:

1. Each motor shall incorporate a minimum of one (1) ambient temperature compensated overheat sensing device.
2. This protective device shall be wired into the pump controls in such a way that if excessive temperature is detected the pump will shut down. This device shall be self-resetting.

C. Cables:

1. Cables shall be designed specifically for submersible pump applications and shall be properly sealed. A type CGB watertight connector with a neoprene gland shall be furnished with each pump to seal the cable entry at the control panel.
2. The pump cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal. The cable entry shall be comprised of a single cylindrical elastomer grommet, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the entry body containing a strain relief function, separate from the function of sealing the cable. The assembly shall bear against a shoulder in the pump top.
3. The cable entry junction chamber and motor shall be separated by a stator lead sealing gland or terminal board, which shall isolate the motor interior from foreign material gaining access through the pump top. Secondary sealing systems utilizing epoxy potting compounds may be used.
4. The manufacturers shall supply a cable cap as part of the spare parts for each pump when this type of sealing system is used.
5. All cables shall be continuous, without splices from the motor to the control panel, unless otherwise approved by UTILITIES.
6. The junction chamber, containing the terminal board, shall be perfectly leak proof.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3411: Submersible Wastewater Pumps

October 10, 2021

2.03 PUMP CONTROL SYSTEM

- A. Refer to Section 3412, “Wastewater Pump Station Electrical Power and Control System” for control system specifications.

PART 3 EXECUTION

3.01 SHOP PAINTING

- A. Before exposure to weather and prior to shop painting, all surfaces shall be thoroughly cleaned, dry and free from all mill scale, rust, grease, dirt and other foreign matter. All pumps and motors shall be shop coated with a corrosion resistant paint proven to withstand an environment of raw wastewater. All nameplates shall be properly protected during painting.
- B. Gears, bearing surfaces, and other similar surfaces obviously not to be painted shall be given a heavy shop coat of grease or other suitable rust resistant coating.
- C. This coating shall be maintained as necessary to prevent corrosion during periods of storage and erection and shall be satisfactory to UTILITIES up to the time of the final acceptance test.

3.02 HANDLING

- A. All parts and equipment shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the units and equipment are ready for operation. Finished surfaces of all exposed pump openings shall be protected by wooded planks, strongly built and securely bolted thereto. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.

3.03 WARRANTY

- A. The pump manufacturer shall provide a five (5) year non-prorated highest level comprehensive extended certified written warranty to cover materials, labor and workmanship from date of UTILITIES’ pump station acceptance for maintenance and operation.

3.04 TOOLS AND SPARE PARTS

- A. One (1) set of all special tools required for normal operation and maintenance shall be provided.
- B. The manufacturer shall furnish the following spare parts for each size pump supplied:
 - 1. One (1) impeller wear ring or bottom wear plate.
- C. Spare parts and tools shall be delivered to UTILITIES at the pump station start up.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section specifies the electrical power and control system requirements for wastewater pump stations. These requirements apply to duplex and triplex pump stations. Additional site specific requirements shall apply to stations with four (4) or more pumps.
- B. Pump station control panel(s) shall be provided for each wastewater pump station.

PART 2 PRODUCTS

2.01 PANEL CONSTRUCTION

- A. The manufacturer of the control panel shall be Underwriters Laboratories (UL) certified and provide data to indicate that the manufacturer has a minimum of three (3) years' experience in the building of pump control panels, and must be an approved vendor per Appendix D.
- B. The pump control panel shall be housed in a white polyester powder coated finish inside and out, NEMA 12/3R, Type 316, 14-gauge SST enclosures, with drip shield and door gasket. The control panel door shall be operated by a three point latch. An additional remote access terminal strip shall be added with six (6) additional terminal blocks. Enclosure shall have provisions for padlocking the door and a dead front inner door unit for mounting controls. All exterior hardware and hinges shall be SST. All LCD screens shall have an aluminum sunshield painted white with hinged flap covering the screen surrounding the manufacturer's enclosure.
- C. There shall be permanently affixed to the interior side of the enclosure door both a nameplate and a 10 inch by 12 inch pocket for log sheet storage. The nameplate shall contain the following information, voltage, phase, rated horsepower, rpm, date manufactured, pump and control panel manufacturer's name, pump data, including impeller data, operating point and head, kilowatt input, amperes at the operating point and at least two (2) other points on the pump curve, and pump serial numbers.
- D. The control panel enclosure shall be UL 50 type NEMA 3R listed. Install overhead LED lighting. The lighting shall be controlled by a two (2) position switch installed inside of the control panel.
- E. The control panel shall include; a main circuit breaker and generator breaker with mechanical interlock, and an emergency power receptacle. Each pump motor shall have a circuit breaker and soft start.
 - 1. There shall be three (3), 20-amp, 120-volt circuit breakers for the SCADA panel, GFCI and control circuit.
 - 2. All main circuit breaker and generator circuit breaker shall be equal in rating when the main breaker is less than 200-amp. If the main breaker is larger than 200-amp, then the generator breaker shall be 200-amp.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

3. Additional breakers will be needed for any station with a generator or odor control system.
 4. All circuit breakers shall be operable through the dead front inner door.
 5. Additional multi-lug assemblies shall be provided to prevent more than one (1) wire per lug.
 6. All circuit breakers shall be molded case.
- F. The control panel shall respond to liquid level float switches and transducer signals transmitted through SCADA to automatically start and stop pumps as well as sound an alarm upon high wet well levels. Control switches shall provide means to operate each pump manually or automatically. When operated in the automatic mode, the control assembly shall provide means to manually select or automatically alternate the position of the “lead” and “lag” pumps after each pumping cycle.
- G. A level transducer and float type liquid level control system shall continuously monitor wet well liquid level. The transducer system shall control the operation of the pumps under normal operating conditions. The float liquid level control system shall act as a backup in case there is failure of the transducer or SCADA system. Refer to the STANDARD DRAWINGS for additional information and control positions.
- H. The control panel shall operate a minimum of two (2) electrical submersible pumps at the power characteristics stipulated. The control function shall provide for the operation of the lead pump under normal conditions. If the incoming flow exceeds the pumping capacity of the lead pump, the lag pump shall automatically start to handle this increased flow. As the flow decreases, pumps shall be cut off at elevation as shown on the PLANS.
- I. Pumps shall alternate positions as lead pump at the end of each cycle. A failure of the alternator shall not disable the pumping system. The alternator shall include a safe, convenient method of manual alternation and also have provisions to prevent automatic alternation without disturbing any wiring. Should the “pump off” regulator fail, the system shall keep the station in operation.

2.02 POWER SUPPLY AND MAIN DISCONNECT

- A. Power supply to the pump station shall be 120/240-volt, 3-phase, 4-wire (Open Delta or Delta) or 277/480-volt, 3-phase, 4-wire (WYE). Minimum service shall be 100-amp. Single-phase power shall not be accepted. All conductors shall be copper wire.
- B. In all pump stations, a main disconnect shall be installed between the meter and the panel. Provide dual lugs on load side of disconnect for connection of TVSS equipment. 100-amp services shall utilize a multi-lug to connect the TVSS on the load side of the breaker. Services above 100-amp shall use a multi-tap cable connector.
1. Exception: At pump stations with a generator and transfer switch, provide molded case circuit breaker located ahead of transfer switch for service main disconnect.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

- C. Disconnect shall be rated for the maximum available fault current from the utility serving the pump station with electrical power.
- D. On all 480-volt systems, an additional UL approved lockable, non-fused, safety type switch utility service disconnect shall be installed ahead of the meter.

2.03 MOTOR CIRCUIT PROTECTORS

- A. Each pump motor shall be protected by a 3-pole molded case circuit breaker, (see Appendix D, “List of Approved Products”).
- B. The motor circuit breaker shall be operated by a toggle type handle and shall have a quick make, quick break over-center switching mechanism that is mechanically trip free from the handle so that the contacts cannot be held closed against a short circuit and abnormal currents which cause the motor circuit breaker to trip. Tripping shall be clearly indicated by the handle automatically assuming a position midway between the normal “on” and “off” positions.
- C. All latch surfaces shall be ground and polished. All poles shall be so constructed that they open, close, and trip simultaneously. Motor circuit breaker must be completely enclosed in a high strength glass polyester molded case. Ampere ratings shall be clearly visible. Contacts shall be of non-welding silver alloy. Arc extinction must be accomplished by means of arc chutes.
- D. A manual push to trip button shall be provided for manual exercising of the trip mechanism.

2.04 MOTOR STARTER AND SELECTOR SWITCHES

- A. The panel shall contain a soft start for each motor.
- B. For pumps 25 HP and above, the panel shall contain a soft start and IEC rated isolation contactor. The IEC rated contactor shall be non-reversing with solid state overload protection on each power leg. The panel shall contain a secondary IEC rated bypass motor starter wired as a bypass starter system if the soft start shall be in-operative.
- C. The panel shall have a reset button installed though the dead front inner door for each pump.
- D. Selector switches shall be installed on the face of the inner dead front door unit. Selector switch shall be a heavy-duty oil tight “Hand - Off - Auto” three-position switch to control the operation mode of each pump motor starter.

2.05 MOTOR DISCONNECT

- A. Where pump motor disconnect and starter is not mounted within sight of pump wet well, (where electrical equipment is mounted within a building or other enclosure) provide additional NEMA 4X SST non-fused disconnect for each pump within sight of pump location.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

2.06 PUMP ALTERNATOR

- A. A solid-state alternator shall be provided to change the pump starting sequence on each pumping cycle. A three-position alternator test switch shall be provided to control the alternation operation. Switch positions to include the “auto” to provide normal automatic sequence, “off” position to disable alternator, and “test” position with a spring return to allow the alternating of the pump sequence to check alternator operation.

2.07 LIGHTS AND ALARMS

A. Indicator Lights:

1. There shall be installed on the face of the dead front inner door, LED indicator lights as shown on the STANDARD DRAWINGS.

B. High Level Alarm:

1. A vapor proof red light shall be mounted on top of the horn via a 12 inch aluminum nipple protruding 6 inches above the top of the control panel and horn shall be mounted on the side of the panel for high-level alarm.
2. There shall be an alarm silence pushbutton on the dead front inner door and a silence relay which will silence the horn and automatically reset when these signals are restored to normal. The pushbutton shall be heavy-duty oil tight.
3. The red globe shall be the screw on type.

2.08 EMERGENCY POWER RECEPTACLE

- A. This item shall be required on all stations as approved in Appendix D, “List of Approved Products”.

2.09 ADDITIONAL CONTROL PANEL REQUIREMENTS

A. Wiring:

1. All power wires shall be THW or THWN 75 degree Celsius insulated stranded copper conductors and shall be appropriately sized for the given load application. All control circuit wire shall be type THW/THWN stranded. All wiring within the enclosure shall be neatly routed by the use of slotted type wiring duct with snap on type covers.
2. Interior wiring shall be neatly bundled with nylon ties and include sufficient loop across the hinges to prevent wire damage, with each end of conductor marked (ID), color: red, 24-volt; white, neutral; black, 120-volt.

B. Terminal Points:

1. Terminal points of all terminal strips shall be permanently identified. All terminal numbers and identifying nomenclature shall correspond to and be shown on electrical diagrams. All wiring shall be permanently identified with heat shrink preprinted labels and be shown on electrical schematic diagrams.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

C. Engraved and / or etched Nameplates:

1. All equipment enclosures, circuit breakers, control switches, indicator pilot lights and other control devices shall be identified with permanently affixed legend plates and lamicoïd type engraved nameplates where applicable. Nameplates may also be permanently etched into dead front cover of control panel.

D. Transient Voltage Surge Suppressor (TVSS):

1. A transient voltage surge protector shall be included and wired to protect motors and control equipment from lightning induced line surges. All surge protectors shall be UL approved and installed per respective power company requirements and manufacturer's specifications. TVSS shall be attached to the load side of the station main disconnect and be mounted in a separate NEMA 4X enclosure.
 - a. The TVSS unit shall be UL listed and labeled as per UL 1449-Current edition.
 - b. The unit shall meet "Testing Requirements" of IEEE 62.41 and 62.45.
 - c. The unit shall be certified to pass NEMA LS-1 Testing. Manufacturer shall provide documentation of NEMA LS-1 certification.
 - d. The CONTRACTOR must provide copy of sales receipt for manufacturer warranty at pump station start-up.

E. Elapsed Time Meters:

1. Elapsed time meters shall be 115-volt not reset type and shall totalize pump-running time in hours and tenths of hours to 99999.9 hours.

F. Convenience Receptacle:

1. On the face of the dead front inner door unit, there shall be installed a 20-amp 120-volt, duplex convenience receptacle. It shall be provided with its own single pole, 20-amp circuit breaker for protection. Ground fault interrupt type shall be required.

G. SCADA Circuit Breaker:

1. A 20A-1P, 120-VAC circuit shall be provided for connection to SCADA equipment provided for the pump station.

H. Control Terminal Blocks:

1. Control terminal blocks shall be of the clamp screw type, rated for 600 volts. Amperage rating shall accommodate the control circuit amperage.

I. Control Power Transformers:

1. On 480-volt control panels, there shall be a 480/120 volt power transformer with a minimum size of 2 KVA to provide 120 VAC power for: coils for starters, 20-amp duplex receptacle, indicator pilot lights, alarm horn, alarm light, pump

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

alternator, elapsed time meters, SCADA control panel, etc. The secondary side shall have one leg fused and the other grounded.

2. A 120/24-VAC 75 VA control power transformer shall provide power for float switches.

J. Control Relay:

1. The level control relays shall operate from 24-VAC. They shall be enclosed, plug in 8-pin type with octal style screw terminal sockets.

K. Electrical Schematic:

1. There shall be permanently affixed to the interior side of the exterior enclosure door an electrical schematic diagram and a copy supplied to UTILITIES personnel at start up. The schematic shall be laminated and include the rated amperage and voltage for all components.

L. Phase Monitor:

1. For all 240/480-volt stations an 8-pin plug in type phase monitor shall be provided for protection of electrical components due to phase loss. An approved breaker shall provide phase monitor protection. Fuses shall not be used for phase monitor protection.

M. Pump / Float Junction Box:

1. A separate junction box shall be installed at pump stations with pumps 25 horsepower and above. Refer to the STANDARD DRAWINGS.

N. Panel Support:

1. Main support posts shall be minimum 3-inch, schedule 40, 316 SST with 316 SST cap. All other control panel support brackets and hardware shall be 316 SST. Hardware shall include, 316 SST 12 gauge slotted U-channel strut systems, brackets, nuts, bolts, washers, toggle bolts, clamps, straps, etc. Each channel strut system shall have a protective cap on the ends.

O. Operation Under Generator Power:

1. On a pump station with three or more pumps, the controls shall be configured to limit operation of pumps, to one less than total installed.
2. Under generator power, pumps shall be prevented from starting simultaneously.

2.10 STANDBY POWER GENERATOR SYSTEM

A. General:

1. A standby power generator system shall be installed at pump stations, as required by Section 2410 "Wastewater Pump Station Design Standard".

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

B. Generator Set:

1. The generator set shall consist of a diesel engine directly coupled to an electric generator, together with the necessary controls and accessories. The generator shall have sufficient capacity to start up and maintain the total rated running capacity of the station, including all pumps on, lighting, ventilation, and other auxiliary equipment necessary for safety and proper operation.
2. The fuel tank shall be constructed and installed in accordance with Florida Administrative Code Chapter 62-762; this shall apply to fuel tanks of all sizes, including those below the threshold of Code applicability.
3. The fuel tank shall be sized to store sufficient fuel to power the station for a period of 48 hours, assuming that pumps will be operating at the design condition for a total of 48 hours (high head condition with one pump on for a duplex, two pumps on for a triplex, etc.). Include ancillary equipment such as lighting and odor control components in the 48 hour power demand calculation. The selected tank size shall include an additional 10% of the required volume for head space and overfill prevention.
4. A complete engine generator system shall be furnished and installed with fuel transfer pump, fuel tank, day tank (only if required by manufacturer), battery, battery charger, muffler, radiator, control panel, remotely mounted automatic transfer switch, and all other accessories required for an operational system. A normally closed control solenoid with manual override in the supply line and backflow preventer in the return line shall be provided in the generator fuel line.
5. All materials and parts of the generator set shall be new and unused. Each component shall be of current manufacture from a firm regularly engaged in the production of such equipment. The set shall be of a standard model in regular production at the manufacturer's place of business.
6. Generators mounted or stacked above the fuel tank shall not be permitted.

C. Requirements:

1. The emergency generator set and accessories shall be of a type that complies with the latest edition of the National Electrical Code and all applicable state and local building codes and shall be UL listed per UL 2200 Standard for Stationary Engine Generator Assemblies, current edition.
2. The material and workmanship used in the manufacture of this equipment shall be of the highest quality consistent with the current standards for like equipment, and the equipment shall be manufactured in such a manner so as to conform to the latest applicable IEEE, ANSI, ISA, and NEMA standards.

D. Engine:

1. The engine shall be water-cooled, four-stroke cycle, compression ignition diesel. It shall meet specifications when operating on No. 2 domestic burner oil.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

The engine shall be equipped with fuel, lube oil and intake air filters; lube oil coolers, fuel transfer pump, fuel priming pump, and jacket water heater, 105°C / 220°F gear driven water pump.

2. The engine and generator shall be torsionally compatible to prevent damage to either engine or generator. An engine instrument panel shall be installed on the generator set in an approved location.
3. The panel shall include oil and fuel pressure and water temperature gauges. A mechanically driven engine hour meter shall also be provided.
4. The engine governor shall be of the isochronous electronic type. Frequency regulation shall not exceed plus/minus 0.25% under steady state conditions. The engine shall start and assume its rated load within ten (10) seconds, including transfer time.

E. Generator:

1. The generator shall be a three phase, 60-hertz, single bearing, synchronous type, Permanent Magnet Generator (PMG) built to NEMA Standards. Epoxy impregnated Class F insulation shall be used on the stator and the rotor.
2. The excitation system shall employ a generator mounted volt per hertz type regulator. Voltage regulation shall be plus/minus 2% from no load to full load. Readily accessible voltage drop, voltage level and voltage gain controls shall be provided. Voltage level adjustment shall be a minimum of plus/minus 5%.

F. Engine Generator Control Panel:

1. Control panel shall be mounted inside generator enclosure. Panel shall contain, but not be limited to, the following equipment:
 - a. Control Equipment:
 - i. Control equipment shall consist of all necessary exciter control equipment, generator voltage regulators, voltage-adjusting rheostat, and speed control equipment and automatic starting controls, as required to satisfactorily control the engine/generator set.
 - ii. In addition an automatic safety shut down shall be provided for low oil pressure and/or high temperature conditions in the engine.
 - iii. An emergency shut down lever switch shall be provided on the air intake.
 - iv. Provide a minimum of twelve (12) form "C" auxiliary contacts to include contacts for generator run and generator failure for connection to SCADA.
 - v. All LCD screens exposed to the sun shall have an aluminum sunshield painted white with hinged flap covering the screen surrounding the manufacturer's enclosure.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

2. Metering Equipment:

- a. Metering equipment shall include 3-1/2 inch meters (dial or digital type frequency meter, two percent accuracy voltmeter, and ammeter and ammeter voltmeter phase selector switch). The control panel shall also include the engine water temperature, lube oil pressure and hour meter.

3. Fault Indicators:

- a. Individual press to test fault indicator lights for low oil pressure, high water temperature, low water level, over speed, over crank, and for aboveground storage tank and high and low fuel level shall be provided. Provide relay dry contacts for interface of fault alarms with SCADA system.

4. Function Switch:

- a. A four-position function switch marked "Auto", "Manual", "Off/Reset", and "Stop" shall be provided.

G. Battery Charger:

1. The battery charger shall be readily accessible and designed that it shall not be damaged and shall not trip its circuit protective device during engine cranking or it shall be automatically disconnected from battery during cranking period. The charger shall be mounted inside the emergency generator enclosure. The charger shall have a seven (7) day / twenty-four (24) hour timer control.

H. Battery:

1. The battery shall be an absorbed glass mat (AGM) battery type with sufficient capacity to provide 90 seconds total cranking time without recharging. The battery shall be adequately rated for the specific generator set. The battery shall be encased in hard rubber or plastic and shall be furnished with proper cables and connectors, together with rack and standard maintenance accessories.

I. Base Mounting:

1. A suitable number of spring type vibration isolators with a noise isolation pad shall be provided to support the set and its liquids. Isolators shall be bolted to concrete generator pad.

J. Electrical Connections:

1. All connections to the generator set shall be underground.

K. Cooling System:

1. The generator set shall be equipped with an engine-mounted radiator sized to maintain safe operation at 50°C / 122°F maximum ambient temperature. A blower type fan shall be used directing the airflow from the engine through the radiator. The entire cooling system shall be filled with 50% glycol water solution.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

L. Fuel System:

1. All fuel systems shall be installed, removed, demolished or upgraded by a certified Pollutant Storage Systems Specialty Contractor (PSSSC) as defined in Section 489.113, Florida Statutes. CONTRACTOR shall contact COUNTY Risk Management ninety (90) days prior to installation or removal of fuel tanks to coordinate State and local permit requirements.
2. All storage tank systems installations, removals and upgrades shall meet all current and proposed FDEP and FAC rules and regulations. All equipment utilized as a part of a fuel system installation or upgrade shall meet the most current FDEP approved equipment list as provided on the FDEP website (Storage Tank Regulation). CONTRACTOR shall be responsible to permit the fuel tank through FDEP prior to fueling, start-up and acceptance by the COUNTY.
3. All aboveground fuel tanks shall be, double-walled, and consist of main fuel storage tank with float switch and fuel level indication shall be furnished and installed by the CONTRACTOR. All tanks shall meet FDEP regulations and have an approved FDEP Inspection Report provided to UTILITIES prior to fueling the aboveground storage tank or pump station startup. The emergency system shall include low fuel level contacts for remote alarm.
4. Fuel tanks are required to alarm at 90% (high) and 10-15% (low) fuel levels. If necessary to guard against loss of prime to pump, a check valve and fuel shut off valve shall be mounted on pump intake. The emergency system shall include a float switch, fuel level gauge and standard control panel. Provide fuel level gauge with 4-20 ma output to indicate tank fuel level. Leak detection shall be provided with contact points for SCADA monitoring and shall have the ability to be monitored at or near the tank. The fill port shall have spill containment.
5. Fuel piping, including mounting of any required fuel tanks shall be 316 SST and welded at all joints. Unions shall be supplied between the fuel tank and the generator on both the supply and return lines to allow for easy removal of piping. Any surface mounted piping that may be a trip hazard shall be painted Safety red. Fuel piping shall receive surface preparation and coating schedule prior to installation.
6. Sampling and reporting shall be conducted as required by FDEP and FAC rules and regulations associated with fuel system installations, removals, and upgrades as required.
7. All aboveground fuel tanks shall be UL listed per UL 2085 Standard for Protected Aboveground Tanks for Flammable and Combustible Liquids, current edition.

M. Exhaust System:

1. The generator set supplier shall provide a residential grade critical type silencer, with minimum 25 DB reduction. The residential grade critical-type silencer shall be 316 SST and supplied with flexible exhaust fittings properly sized and

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

installed, according to the manufacturer's recommendation. The silencer shall be mounted so that the engine does not support its weight.

2. Exhaust pipe size shall be sufficient to ensure that measured exhaust backpressure does not exceed the maximum limitations specified by the generator set manufacturer. The exhaust system shall be 316 SST and include a flexible, seamless, SST connection between the engine exhaust outlet and the muffler. The exhaust system shall be a part of generator enclosure. A 316 SST weatherproof rain cap shall be installed over the exhaust pipe.

N. Weatherproof Generator Enclosure: Walk-in sound attenuated type

1. A weatherproof walk in sound attenuated type enclosure shall be provided to house the engine/generator and accessories. The enclosure shall be designed to perform without overheating in the ambient temperature specified and shall be UL listed per UL 2200 Standard for Stationary Engine Generator Assemblies, current edition.
2. The enclosure is to be in complete compliance with the National Electrical Code (NEC), and the National Fire Protection Association (NFPA) with regard to clearances around electrical equipment specified herein. The enclosure shall conform to the following construction and design criteria as set forth.
 - a. Rigidity wind test equal to 120 MPH
 - b. Roof load equal to 50 lbs. per sq. ft.
 - c. Florida Department of Community Affairs Modular Building Insignia
3. Enclosure shall consist of a roof, two (2) sidewalls, two (2) end walls, and be manufactured of formed aluminum components. The enclosure is to be provided with a means for securely attaching the entire structure to the structural steel base as specified within.
4. A minimum clearance of 24 inches shall be allowed for walkway space between the generator frame and interior sidewalls. A minimum walkway clearance of 30 inches shall be allowed between the generator end frame and the interior rear wall of the enclosure. The radiator front face shall be sealed to the front wall utilizing and 2 inch minimum rubber gasket material to minimize recirculation of radiator air discharge and prevent the transmission of vibration from the packaged generator set to the enclosure.
5. Wall framing shall be incorporated in the panels by forming an open back box structure. Skin material shall be minimum thickness .090 inch marine grade aluminum. Enclosure shall have a baked on powder-coat finish for maximum corrosion resistance. Exterior skin panels shall be integral to the wall structure and not separate pieces riveted onto framing members. Wall panels shall be no wider than 36 inches each and shall be removable without the use of special tools. Wall and roof panels shall be designed so that field replacement can be

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

accomplished without disassembly of the entire structure if damage should occur.

6. Standard enclosure exterior color is white unless otherwise specified.
7. Roof assembly shall be peaked to aid in rainwater runoff. Cambered roof designs and roofs with thicknesses of less than 0.090 inches nominally shall not be considered. Roof assemblies are to be mechanically fastened to the vertical wall sections. Glued or crimped roofs shall not be allowed nor considered as an acceptable alternative.
8. Air handling shall be as follows:
 - a. Air will enter the enclosure through a hood, plenum or sound attenuated louvers/baffles, as determined by the specific application and shall allow for the airflow demand for proper cooling to generator set package. The cooling air inlet system shall prevent water intrusion into the enclosure with the generator set operating at full rated load while allowing for a maximum air restriction of less than 0.30 inches of water.
 - b. Radiator discharge shall be through a gravity operated extruded aluminum back draft type damper and into a vertical discharge plenum or hood. Discharge plenum/hood shall discharge air upward and be provided with a means to positively drain any and all water entering the discharge device.
 - c. Air discharge devices shall in no event restrict airflow by more than 0.25 inches of water. To ensure adequate airflow for cooling and combustion the static restriction over the entire system shall not exceed 0.50 inches of water. Both intake and discharge hoods and plenums shall be provided with removable bird/rodent screening to prevent the entrance of debris, birds, rodents and other vermin.
9. Acoustical insulation materials shall consist of a UL Classified Thermofiber® or equal insulation material with a heat/fire resistance rating up to 2400°F and provide superior sound attenuation performance. Acoustical insulation material on interior roof and walls is to be mechanically held in place by 0.032 inch mill finished perforated aluminum with tuned engineered hole diameter for optimum sound attenuation at 1000 Hz. Interior perforated aluminum material shall protect the insulation material as well as allow noise to permeate the absorptive material.
10. Four-point lifting provisions shall be provided and have sufficient capacity suitable for rigging the entire Enclosure assembly.
11. A minimum of two (2) single personnel access doors minimum size 36 inches shall be provided. Doors shall be manufactured of the same material as enclosure. Doors shall be fully gasketed to form a weather tight perimeter seal. Door hinges shall be full length SST piano type and shall be attached with SST hardware.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

Door handles shall be of a corrosion resistant material. Main enclosure entry doors shall be equipped with weatherproof SST pushbutton combination locks. Doors shall be insulated with no less insulation than is provided in the enclosure walls for sound attenuation.

12. Enclosure manufacturer shall provide all necessary hardware to internally mount the exhaust silencer(s) specified herein. Silencer mounting hardware shall maintain the weatherproof integrity of the enclosure system. Silencer shall discharge through radiator discharge plenum of enclosure and have rain shield to prevent entry of moisture.
13. As a minimum the enclosure shall provide an average 30db (A) sound reduction as measured at seven meters, five feet above grade level under free field conditions.
14. Electrical Package: Enclosure Shall Contain a minimum 100-amp, 120/208, 1-Phase Load Center Main Lug Only with minimum 8/16 circuit spacing. Panel shall be mounted to provide minimum 36 inch front working space per NEC. Load Center Shall Contain Adequate Circuit Breakers to Support the following loads:
 - a. Three (3) 48 inch, LED lights in vapor proof fixtures. Lights shall be controlled by three (3) way switches located at each of the personnel entrance doors.
 - b. Two (2) 20-amp, Duplex, 120 Volt AC, GFCI Receptacles. One (1) receptacle shall be located adjacent to each personnel entrance door.
 - c. Engine Jacket Water Heater
 - d. Alternator Space Heater (if equipped)
 - e. Engine Starting Battery Charger
15. Structural Steel Base with Interior Finish Floor:
 - a. A base under frame with interior finished floor shall be provided and designed to support the installed equipment specified. The floor structure shall be rated for a minimum distributed load of no less than 200 lbs/ft² and reinforced as required to support equipment loading requirements. The under frame assembly shall consist of structural or formed steel channel or I-beams welded together to form the outer perimeter of the sub-frame. Structural or formed steel cross members shall be installed and welded on nominal 16 inch centers to create a welded steel support structure for internal equipment installation and distributed load support. The top deck interior shall consist of a minimum 3/16 inch diamond steel deck plate mechanically fastened to the under frame structure. Seams of the interior deck plate shall be solid seam welded their entire width. Tack welded or caulked seams will not be allowed.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

- b. Vibration isolator mounts shall be each located above a frame member and securely welded to the top plate to ensure adequate load support. Isolator mounting plates are to be 1 inch thick steel plate, tapped for isolator bolting.
 - c. The entire steel frame, interior floor and under frame shall be coated with a wear resistant, high quality anti-corrosive material and topcoat and shall meet Section 3117, "Coatings and Linings".
16. Enclosure shall be provided with adequate overhead fluorescent vapor proof lighting controlled by three (3) way switches located at each side of the personnel entry doors.
 17. Enclosure hardware shall be SST.
 18. Four (4) hinged doors shall be provided to allow complete access without their removal. Doors shall be pad lockable on handles. Main enclosure entrance doors shall be equipped with weatherproof SST push button combination locks.
 19. Each door shall have at least two (2) latch bearing points.
 20. Panels shall be completely and simply removable for major service access. Additional doors in front of the radiator shall be supplied for easy removal of radiator assembly.
 21. Enclosure shall be waterproof and the roof shall be peaked to allow drainage of rainwater.
 22. Baked enamel finish with primer and finish coat shall be painted before assembly. All fasteners shall be SST.
 23. Unit shall have sufficient guards to prevent entrance by small animals.
 24. Batteries shall be designed to fit inside enclosure and alongside the engine and shall be easily removable for service. Batteries under the generator are not acceptable.
 25. Unit shall have coolant and oil drains outside the unit to facilitate maintenance. Each drain line shall have a high quality valve located near the fluid source.
 26. Fuel filter shall be inside the base perimeter and located so spilled fuel cannot fall on hot parts of engine or generator. A cleanable primary fuel strainer shall be used to collect water and sediment between tank and main engine fuel filter.
 27. Crankcase fumes disposal shall terminate in front of the radiator to prevent oil from collecting on the radiator core and reducing cooling capacity.
- O. Automatic Transfer Switch:
1. The automatic transfer switch shall be housed in a NEMA 4X 316-SST enclosure with drip shield and door gasket, There shall be permanently affixed to the interior side of the enclosure door both a data-plate that includes generator KVA/KW, fuel tank capacity, rated fuel consumption, serial and model number of generator set, and a 10 inch x 12 inch pocket for log sheet storage.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

2. The transfer switch shall be provided with the following features:
 - a. Complete protection, close differential voltage sensing relays monitoring all three phases (pick up set for 95% of nominal voltage, dropout set for 85% nominal voltage).
 - b. Voltage sensing relay on emergency source (pick up set for 95% of nominal frequency).
 - c. Time delay on engine starting-adjustable from one (1) second to three-hundred (300) seconds (factory set at three second)
 - d. Time delay normal to emergency transfer-adjustable from zero (0) second to three-hundred (300) seconds (factory set at one (1) second). The CONTRACTOR shall request time delay settings in accordance with the priority rating or their respective loads.
 - e. Time delay emergency to normal transfer-adjustable thirty (30) seconds to thirty (30) minutes (factory set at five (5) minutes), and time delay bypass switch shall be provided on door of the switch cabinet.
 - f. Unload running time delay for emergency engine generator cooling down adjustable from zero (0) to five (5) minutes (factory set at five (5) minutes) unless the engine generator control panel includes the cool down timer.

P. Stairs

1. Stairs shall be installed to inspect the top of the fuel tank including but not limited to: piping, electronic monitoring, mechanical monitoring, pull probes, spill containment, overflow and release detection devices.

2.11 FLOW MONITORING SYSTEM

- A. When indicated on the PLANS or as required by Section 2410 "Wastewater Pump Station Design Standard" a flow monitoring system capable of indicating, recording, and totalizing wastewater flows shall be provided. The system shall include magnetic flow meter/transmitter, electronic recording receiver, and miscellaneous related accessories as specified herein. It shall be the CONTRACTOR's responsibility to provide and install such equipment resulting in a completely operational flow monitoring system.

B. Magnetic Flow meter/Transmitters:

1. The magnetic flow meter shall be of the low frequency electromagnetic induction type and shall produce a DC pulsed signal directly proportional and linear to the liquid flow rate. The meter shall be designed for operation on 120-VAC plus/minus 10%, 60 hertz, plus/minus 5% with a power consumption of less than 20 watts for sizes through 12 inches.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

2. The metering tubes shall be constructed of SST. All magnetic flow meters shall be designed to mount directly in the pipe between ANSI Class 150 flanges and shall consist of a flanged pipe spool piece with laying length, diameter and velocity per the manufacturer's specifications. Meters shall have polyurethane liners with SST electrodes.
3. The electronics portion of the magnetic flow meter shall include both a magnet driver to power the magnet coils and a signal converter. The signal converter shall be integrally mounted. The converter shall include a separate customer connection section to isolate the electronics compartment and protect the electronics from the environment. A separate terminal strip for power connection shall be supplied. The electronics shall be of the solid state, feedback type and utilize integrated circuitry. The input span of the signal converter shall be continuously adjustable between 0 to 1 and 0 to 31 fps for both analog and frequency outputs. The converter shall not be affected by quadrature noise nor shall it require zero adjustment or special tools for startup.
4. Input and output signals shall be fully isolated. The converter output shall be 4 to 20 ma DC into 0 to 900 ohms. Two (2) conductor shielded cable shall be utilized for 4-20 ma signal between flow meter and County SCADA system.
5. Meter shall be suitable for outdoors installation and shall be furnished complete with grounding rings and installation hardware including studs, nuts, gaskets, and flange adapter hardware.
6. The converter shall include an integral zero (0) return to provide a constant zero (0) output signal in response to an external dry contact closure.
7. Converter shall also include digital type switches for direct adjustment of scaling factor in engineering units along with integral calibration self-test feature to verify proper operation of the electronics.
8. The meter shall be hydraulically calibrated at a facility located in the United States and the calibration shall be traceable to the National Bureau of Standards. A computer printout of the actual calibration data giving indicated versus actual flows at a minimum of three (3) flow rates shall be provided with the meter. A certification letter shall accompany the computer printout of the calibration data for each meter referencing the meter's serial number. The accuracy of the metering system shall be 1 percent of rate from 10 to 100 % of flow for maximum flow velocities of 3 to 31 feet per second.
9. Complete zero (0) stability shall be an inherent characteristic of the meter system to eliminate the need to zero (0) adjust the system with a full pipe at zero (0) flow.
10. The meter housing shall be splash proof and weather resistant design. The meter shall be capable of accidental submergence in up to 30 feet of water for up to forty-eight (48) hours without damage to the electronics or interruption of the

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

flow measurement. All LCD screens shall have an aluminum sunshield painted white with hinged flap covering the screen surrounding the manufacturer's enclosure.

C. Electronic Recording Receiver:

1. The electronic recording receiver shall be of the solid state construction.
2. Meter accuracy shall be plus or minus 1.5% of actual flow.
3. Transmitter shall be a solid-state electronic device with LCD digital readout for flow rate and totalized flow. Transmitter shall have a battery backup with EPROM memory to avoid loss of totalized flow value.

2.12 ELECTRICAL GROUNDING SYSTEM

A. A grounding system shall be installed as per National Electrical Code, local codes and ordinances. The STANDARD DRAWINGS shall clearly show the electrical grounding system. A counterpoise cable grounding system installed a minimum of 30 inches below grade, shall be installed with connections to at least the following equipment:

1. Wet well cover;
2. Control panels;
3. Generator;
4. Electrical system grounding electrode conductor;
5. Main disconnect switch;
6. Emergency bypass piping;
7. Water spigot to be bonded; and
8. Connection to electrical rack.

B. Material and Installation:

1. The STANDARD DRAWINGS shall show details of material and installation to construct a completely functional and operational electrical grounding system.
2. The grounding wire shall be corrosion resistant (CRES) 316L SST above ground and NO. 2/0 awg tinned copper below ground.

2.13 VALVE ACTUATORS

A. The actuators shall be suitable for use on a nominal 460-volt three (3) phase 60-hertz power supply and are to incorporate motor, integral reversing starter, local control facilities, and terminals for remote control and indication connections. It shall be possible to carry out the setting of the torque, turns, and configuration of the indication contacts without the necessity to remove any electrical compartment covers.

B. The electric motor shall be Class F insulated with a time rating of at least fifteen (15) minutes at 104°F (40°C) or twice the valve stroking time, whichever is the longer, at

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

an average load of at least 33% of maximum valve torque. Electrical and mechanical disconnection of the motor should be possible without draining the lubricant from the actuator gear case. Plugs and sockets are not acceptable as a means of electrical connection for the motor.

C. Motor Protection:

1. Protection shall be provided for the motor as follows:
 - a. The motor shall be de-energized in the event of stall when attempting to unseat a jammed valve.
 - b. A thermostat to protect against overheating shall sense motor temperature.

D. Gearing:

1. The actuator gearing shall be totally enclosed in an oil- filled gear-case suitable for operation at any angle. All main drive gearing must be of metal construction. Where the actuator operates gate valves or large diameter ball or plug valves, the drive shall incorporate a lost-motion hammer-blow feature. For rising spindle valves, the output shaft shall be hollow to accept a rising stem and incorporate thrust bearings of the ball or roller type at the base of the actuator, and the design should be such as to permit the gear-case to be opened for inspection or disassembled without releasing the stem thrust or taking the valve out of service. Standard SAE80EP gear oil shall be used to lubricate the gear-case.
2. The actuator shall also be in accordance with section 3310, 2.03, "Wastewater Pipes Valves and Appurtenances".

E. Hand Operation:

1. A hand wheel shall be provided for emergency operation engaged when the motor is declutched by a lever or similar means; the drive being restored to power automatically by starting the motor. The hand/auto selection lever should be pad lockable in both "hand" and "auto" positions. It should be possible to select hand operation while the actuator is running or start the actuator motor while the hand/auto selection lever is locked in "Hand" without damage to the drive train.
2. The handwheel drive must be mechanically independent of the motor drive, and any gearing should be such as to permit emergency manual operation in a reasonable time. Clockwise operation of the handwheel shall give closing movement of the valve unless otherwise stated in the job specification. For safety purposes, it shall be possible to disengage the electric drive with the declutch lever. This disengagement and any subsequent reengagement shall not cause any damage to the valve or operator, even with the motor running.

F. Drive Bushing:

1. The actuator shall be furnished with a drive bushing easily detachable for

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

machining to suit the valve stem or gearbox input shaft. Normally the drive bush shall be positioned in a detachable base of the actuator. Thrust bearings, when housed in a separate thrust base, should be of the sealed-for-life type.

G. Torque and Turns Limitations:

1. Torque and turns limitation to be adjustable as follows:
 - a. Position setting range: 2.5 to 100,000 turns, with resolution to 7.5 degrees of actuator output.
 - b. Torque setting: 40 to 100 percent rated torque. Torque sensing must be affected directly electrically or electronically. Extrapolating torque from mechanically measured motor speed is not acceptable due to response time. Torque measurement shall be independent of variations in frequency, voltage or temperature.
 - c. “Latching” to be provided for the torque sensing system to inhibit torque off during unseating or during starting in mid-travel against high inertia loads.
 - d. The electric circuit diagram of the actuator should not vary with valve type remaining identical regardless of whether the valve is to open or close on torque or position limit. An inexpensive setting tool is required for non-intrusive calibration and interrogation of the actuator. This setting tool will provide speedy interrogation capabilities as well as security in a non-intrusive intrinsically safe watertight casing.

H. Remote Valve Position /Actuator Status Indication:

1. In the event of a (main) power (supply) loss or failure, the position contacts must continue to be able to supply remote position feedback and maintain interlock capabilities. If batteries are required to maintain contact functionality the actuator vendor shall provide a supply sufficient for thirty (30) continuous days of unpowered operation with one (1) complete valve cycle every hour. A backup power source must be provided in the actuator to ensure correct remote indication should the actuator be moved manually when the power supply is interrupted. Four (4) contacts shall be provided which can be selected to indicate any position of the valve with each contact externally selectable as normally open or normally closed. The contacts shall be rated at 5-amp, 250-VAC, 30-VDC.
2. As an alternative to providing valve position, any of the four (4) above contacts shall be selectable to signal one (1) of the following:
 - a. Valve Opening or Closing;
 - b. Valve Moving (Continuous or Pulsing);
 - c. Local Stop Selected;

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

- d. Local Selected;
 - e. Remote Selected;
 - f. Open or Close Interlock Active;
 - g. ESD Active;
 - h. Motor Tripped on Torque in Mid-Travel;
 - i. Motor Tripped on Torque Going Open;
 - j. Motor Tripped on Torque Going Closed;
 - k. Pre-Set Torque Exceeded;
 - l. Valve Jammed;
 - m. Actuator Being Operated by Handwheel;
 - n. Lost Main Power Phase;
 - o. Customer 24V DC or 120V AC Supply Lost;
 - p. Battery Low;
 - q. Internal Failure Detected; and
 - r. Thermostat Tripped.
3. Provision shall be made in the design for the addition of a contact less transmitter to give a 4 to 20 ma analog signal corresponding to valve travel for remote indication when required.
- I. Local Position Indication:
1. The actuator must provide a local display of the position of the valve, even when the power supply is not present. The display shall be able to be rotated in 90-degree increments so as to provide easy viewing regardless of mounting position. The actuator shall include a digital position indicator with a display from fully open to fully closed in one percent (1%) increments.
 2. Red, green, and yellow lights corresponding to open, closed, and intermediate positions shall be included on the actuator. The digital display shall be maintained even when the power to the actuator is isolated.
- J. Integral Starter and Transformer:
1. The reversing starter, control transformer, and local controls shall be integral with the valve actuator, suitably housed to prevent breathing and condensation buildup. For "On/Off" service, this starter shall be an electromechanical type suitable for sixty (60) starts per hour and of rating appropriate to motor size. For modulating duty, the starter shall be suitable for up to a maximum of one thousand two-hundred (1,200) starts per hour. The controls supply transformer shall be fed from two (2) of the incoming three (3) phases. It shall have the

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

necessary tapings and be adequately rated to provide power for the following functions:

- a. 120-VAC energization of the contactor coils;
- b. 24-VDC output where required for remote controls; and
- c. Supply for all the internal electrical circuits.

2. Easily replaceable fuses shall protect the primary and secondary windings.

K. Integral Push Buttons and Selector:

1. Integral to the actuator shall be local controls for open, close, and stop, and a local/remote selector switch, pad lockable in any one (1) of the following three (3) positions:
 - a. Local Control Only;
 - b. Off (No Electrical Operation); and
 - c. Remote Control plus Local Stop Only.
2. It shall be possible to select maintained or non-maintained local control. The local controls shall be arranged so that the direction of valve travel can be reversed without the necessity of stopping the actuator.

L. Control Facilities:

1. The necessary wiring and terminals shall be provided in the actuator for the following control functions: Removable links for substitution by external interlocks to inhibit valve opening and/or closing. Connections for external remote controls fed from an internal 24-VDC supply and/or from an external supply of (minimum 12-volt, maximum 120-volt) to be suitable for any one (1) or more of the following methods of control:
 - a. Open, Close, and Stop;
 - b. Open and Close;
 - c. Overriding Emergency, Shutdown to Close (or Open) Valve from a “make” contact; and
 - d. Two-Wire Control, Energize to Close (or Open), De-Energize to Open (or close).
2. Selection of maintained or push-to-run control for modes “1.a.” and “1.b.” above shall be provided and it shall be possible to reverse valve travel without the necessity of stopping the actuator. The starter contactors shall be protected from excessive current surges during travel reversal by an automatic time delay on energization of approximately 300 ms.
3. Provision shall be made for connectivity with field bus control systems via a

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

plug-in card. The following interfaces shall be available:

- a. Pakscan;
 - b. Modbus;
 - c. Profibus; and
 - d. Foundation Fieldbus.
4. The internal circuits associated with the remote control and monitoring functions are to be designed to withstand simulated lightning impulses of up to 2.0-KV.

M. Monitoring and Diagnostics Facilities:

1. Facilities shall be provided for monitoring actuator operation and availability as follows:
 - a. Monitor (availability) relay, having one change-over contact;
 - b. Relay being energized from the control transformer only when the Local/Off/Remote selector is in the "Remote" position to indicate that the actuator is available for remote (control room) operation;
 - c. Where required, it shall be possible to provide indication of thermostat trip and "Remote" selected as discreet signals.
2. A non-intrusive hand-held computer must be available, capable of duplex communication for uploading and downloading all variables for the actuator as well as performing detailed diagnostics.
3. Actuators shall include a diagnostic module, which will store and enable download of historical actuator data to permit analysis of changes in actuator or valve performance. A software tool for a PDA and laptop shall be provided to allow configuration and diagnostic information to be reviewed and analyzed and reconfigured. Additionally, diagnostic data shall be available over an IrDA™ port, which can be relayed to a remote facility by an IrDA™ compatible cellular telephone after remote analysis, changes to the actuator configuration can be relayed back to the actuator via cellular telephone.
4. Diagnostic status screens must be provided to show multiple functions simultaneously so troubleshooting can be affected rapidly and efficiently. All diagnostic information should be contained on no more than eight (8) screens so multiple functions can be checked simultaneously.
5. Provision shall be made to display valve torque demand as a percent of rated actuator torque and position simultaneously, so as to facilitate valve troubleshooting and diagnostics.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

N. Wiring and Terminals:

1. Internal wiring shall be of tropical grade PVC insulated stranded cable of appropriate size for the control and three- phase power. Each wire shall be clearly identified at each end. The terminals shall be embedded in a terminal block of high tracking resistance compound. The terminal compartment shall be separated from the inner electrical components of the actuator by means of a watertight seal.
2. The terminal compartment of the actuator shall be provided with a minimum of three threaded cable entries. When required, a fourth cable entry shall be provided. All wiring supplied as part of the actuator to be contained within the main enclosure for physical and environmental protection. External conduit connections between components are not acceptable. Control logic circuit boards and relay boards must be mounted on plastic mounts to comply with double insulated standards. No more than a single primary size fuse shall be provided to minimize the need to remove single covers for replacement. A durable terminal identification card showing plan of terminals shall be provided attached to the inside of the terminal box cover indicating:
 - a. Serial Number;
 - b. External Voltage Values;
 - c. Wiring Diagram Number; and
 - d. Terminal Layout.
3. This must be suitable for the contractor to inscribe cable core identification beside terminal numbers.

O. Enclosure:

1. Actuators shall be O-ring sealed, watertight to IP68 7 meters for seventy two (72) hours, NEMA 4, 4x and 6, and shall at the same time have an inner watertight and dustproof O-ring seal between the terminal compartment and the internal electrical elements of the actuator fully protecting the motor and all other internal electrical elements of the actuator from ingress of moisture and dust when the terminal cover is removed on site for cabling. Enclosure protection of NEMA 6, IP68, shall be guaranteed without the need of suitable cable glands. Enclosure must allow for temporary site storage without the need for electrical supply connection.
2. All external fasteners should be of SST.
3. Actuators for explosion/hazardous applications shall in addition be certified flameproof for Zones 1 and 2 (Divisions 1 and 2) Group gases.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

P. Startup Kit:

1. Each actuator shall be supplied with a startup kit comprising installation instruction, electrical wiring diagram, and sufficient spare cover screws and seals to make good any site losses during the commissioning period.

Q. Experience:

1. All technologies and devices used in the actuator must have a minimum of five (5) years of commercial operating experience for that specific manufacturer, including torque and position sensing, lubrication, and electrical compartment design. Manufacturer must provide ten (10) Florida municipal site references of similar applications, including telephone numbers and individual contact names.

PART 3 EXECUTION – TESTING, SERVICE AND WARRANTY

3.01 TESTING

A. Start Up Procedure:

1. As specified in Section 4410 “Testing and Inspection for Acceptance of Pump Stations”.

B. Control Panel Testing:

1. After fabrication in the control panel manufacturer’s plant, an operational test shall be performed to check out the entire panel before delivery. Panels for three-phase source voltage shall be used for the testing.

C. Ground System Testing:

1. The grounding system shall be tested to less than five (5) ohms of resistance. Testing results by a certified testing agency using fall of potential testing as described by NETA (International Electrical Testing Association), shall be provided to UTILITIES during pump station startup.

D. Generator Testing:

1. Equipment shall be completely assembled and tested at the factory prior to shipment. Certified copies of the data obtained during these tests shall be submitted to UTILITIES.
2. Regulated fueling systems associated with the generator shall be inspected by the FDEP and approved prior to filling the tank with fuel. All tanks (Regulated and Unregulated) fueling systems associated with the generator shall provide Breach of Integrity testing once the tank is set in its final location at the site (even if it was completed at the factory). Tanks delivered to the site under vacuum meet the Breach of Integrity testing requirement as long as the vacuum test is properly documented by the manufacturer or company representative

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

before and after delivery. Prior to placing fuel in the tank, the tank components (spill containment, overfill, and release detection, etc.), associated piping, and any electronic monitoring equipment must be tested in accordance with 62-762. Information shall be provided from a licensed Pollutant Storage System Specialty Contractor (PSSSC), prior to filling the tank with fuel. Copies of all inspection/testing information shall be provided to COUNTY Risk Management prior to filling the tank with fuel, startup or acceptance.

3. Final tests shall be conducted at the site, after installation has been completed, in the presence of UTILITIES' representative. The CONTRACTOR prior to testing shall fill all fuel tanks to 90% of tank capacity. The emergency generator manufacturer shall furnish a service representative to operate the engine during the tests, to check all details of the installation and to instruct UTILITIES' representatives in proper equipment operation.
4. Field tests shall include operating the diesel generating set for carrying normal lift station loads. A full load bank test at 90% for three (3) hours shall be required unless otherwise noted by UTILITIES. The CONTRACTOR shall fill the main fuel tank at the completion of the tests to 90% of tank capacity.
5. The rating of the generator shall be as shown on the DRAWINGS. These ratings must be substantiated by the manufacturer's standard published curves. Special ratings shall not be acceptable. The set shall be capable of supplying the specified usable kilowatts for the specified duration, including the power required for the pump start up, without exceeding its safe operating temperature. The generator shall be sized to run number of pumps to meet design capacity.

E. Actuator Testing:

1. Actuator testing shall be performance tested and individual test certificates shall be supplied free-of-charge. The test equipment should simulate a typical valve load and the following parameters should be recorded:
 - a. Current at Maximum Torque Setting;
 - b. Torque at Maximum Torque Setting;
 - c. Flash Test Voltage; and
 - d. Actuator Output Speed or Operating Time.
2. In addition, the test certificate should record details of specification, such as gear ratios for both manual and automatic drive, closing direction, and wiring diagram code number.

3.02 SERVICE

A. Control panel service:

1. Warranty/service center for the control panel shall be located in Orange County, Volusia, Brevard, Lake, Polk, Seminole, or Osceola Counties and service

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3412: Wastewater Pump Station Electrical Power & Control System October 10, 2021

response shall be within two (2) hours during NORMAL WORKING HOURS, and provide emergency service twenty four (24) hours seven (7) days a week.

2. Provide the following spare parts for the control panel:
 - a. One (1) complete replacement set(s) of fuses of each different size and type;
 - b. One (1) set of all specialty tools required for normal operation and maintenance.

B. Generator service:

1. Warranty/service center for the generator shall be located in Orange County, Volusia, Brevard, Lake, Polk, Seminole, or Osceola Counties and service response shall be within two hours during normal working hours, and provide emergency service twenty four (24) hours seven (7) days a week.
2. Provide one (1) set of all special tools that are required for the normal operation and maintenance of the engine driven generator unit.
3. Provide the following spare parts for the generator engine:
 - a. One (1) complete replacement set(s) of fuses of each different size and type;
 - b. One (1) SPCC spill kit containing proper quantities and sizes of spill booms, pads, pillows, etc., to control spills.
4. The spare parts and maintenance tools shall be packed in containers, permanently labeled by description and part number for easy identification of the items and with the words "Diesel Engine Generator Only".

3.03 WARRANTY

A. General:

1. Equipment installed under this section shall have a one (1) year warranty against defects in materials and workmanship covering parts and labor unless noted otherwise.

B. Generator:

1. The generator manufacturer shall provide a five (5) year non-prorated highest level comprehensive extended certified written warranty to cover materials, labor and workmanship from date of UTILITIES' pump station acceptance for maintenance and operation.

C. Generator Batteries:

1. The generator batteries shall be provided with a forty eight (48) month warranty for the replacement of the battery if found to be defective.

D. Actuator shall be warranted for two (2) years from date of pump station acceptance.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3413: SCADA RTU Panel

October 10, 2021

PART 1 GENERAL

1.01 SUMMARY

- A. The CONTRACTOR shall provide and install a SCADA Remote Terminal Unit (RTU).
- B. SCADA Panel:
 - 1. Panels shall be purchased and installed by the CONTRACTOR. The CONTRACTOR shall provide conduits between devices and SCADA panel location.
 - 2. Programmable Logical Controller (PLC) equipment installed as part of the SCADA panel shall have the type of inputs and outputs identified in Table 3413-1.

Table 3413-1: Pump Station SCADA Panel Matrix

Number of Pumps	Monitor	Digital Input (DI)	Digital Output (DO)	Analog Input (AI)	Analog Output (AO)	Flow Meter	Analog Pressure	Analog Level
2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. The SCADA Panel and appurtenances shall be supplied by a COUNTY approved fabricator. Approved fabricators are listed in Appendix D.

PART 3 EXECUTION

3.01 INSTALLATION OF SCADA RTU PANEL

- A. The CONTRACTOR shall furnish and install all the necessary hardware, conductors, conduits, and all other associated equipment as specified and approved by the COUNTY for a complete system.
- B. All work shall conform to the latest national and local codes and be in strict conformance with STANDARD DRAWINGS specifically developed for pump station SCADA panel.
- C. A Florida certified electrical CONTRACTOR shall perform the installation. All work shall be in accordance with the current edition of the NFPA, NEC, UL and COUNTY electrical codes. The CONTRACTOR shall leave a minimum of thirty-six (36) inch clear on the pump equipment electrical rack for the SCADA control panel. The CONTRACTOR shall install SCADA RTU panel on electrical rack and wire the SCADA control panel into the pump control panel in accordance with the STANDARD DRAWINGS and specifications within this MANUAL.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3413: SCADA RTU Panel

October 10, 2021

- D. The CONTRACTOR shall provide and install the following instruments. Minimum conduit sizes are specified below.
1. Forcemain Pressure Gauge Transmitter – one (1) 1 inch conduit.
 2. Float Cable and LIT Cable – one (1) 2 inch conduit.
 3. Flow Meter – one (1) 1 inch conduit.
 4. Biofilter – one (1) 1 inch conduits per unit.
 5. Generator – one (1) 1 inch conduit.
 6. Pump Control – three (3) 1 inch conduits.
 7. Fuel Tank – one (1) 1 inch conduit.
 8. Water Pressure Transducer – one (1) 1 inch conduit.
- E. All hardware and brackets used to mount the RTU panel shall be 316 SST.
- F. The SCADA RTU panel shall be interfaced to the pump control panel by the CONTRACTOR. CONTRACTOR shall provide all wiring between SCADA RTU panel and the pump control panel.
1. Analog wire shall be run in a separate conduit from VAC wiring to minimize inductance and false signals in the analog signal wiring.
 2. Provide shielding using a drain wire that is connected to the ground at the RTU cabinet. Do not connect the drain wire at the device end so as to minimize ground loops.

3.02 SITE SPECIFIC REQUIREMENTS

- A. Uniformity of SCADA panel configuration is a requirement. The intent is to provide uniformity of SCADA control panel configuration for similar pump station and limit the number of unique panels within the system. Pump stations that do not clearly fit into a particular category shall be addressed individually.
- B. The SCADA panel design for a particular type shall be similar in layout and configuration. SCADA panels must incorporate the following criteria.
1. Same type panels shall have similar mounting, configuration and orientation of equipment.

3.03 STARTUP AND ACCEPTANCE

- A. Before acceptance, a complete documented checkout of the RTU, central HMI interface and RF communications shall be completed and witnessed by UTILITIES and the RTU manufacturer's representative.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3413: SCADA RTU Panel

October 10, 2021

3.04 FIELD TESTING AND ACCEPTANCE

- A. All inputs, outputs, discrete, analog and internal calculated points shall be checked out and verified in the presence of a UTILITIES representative. The RTU/SCADA supplier shall give UTILITIES five (5) days written notice prior to this procedure. The supplier shall arrange to force all physical inputs and verify the proper response at the PLC.

3.05 WARRANTY

- A. The RTU shall have a two (2) year after acceptance warranty to include lightning damage. The RTU supplier shall provide all material and labor to repair or replace failed components at no cost to UTILITIES.
- B. Warranty service shall be completed within the following period of time:
1. Major issues rendering the RTUs non-functional shall have on site response with qualified personnel within one (1) business day.
 2. Minor issues involving a failure of the RTU or any of its components shall have on site response within qualified personnel within two (2) business days.
 3. UTILITIES will have the option to proclaim any hardware failure an emergency if in the opinion of UTILITIES the failure could result in a public health or safety concern. The CONTRACTOR shall immediately repair all damaged hardware at the CONTRACTOR's expense. If the repair is not made in a timely manner, as determined by UTILITIES, UTILITIES may perform repairs and the CONTRACTOR will be charged for the repair(s).

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3510: Reclaimed Water Pipes, Valves, and Appurtenances

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Shall meet section 3210, Part 1 “Water Pipes, Valves, and Appurtenances”.

PART 2 PRODUCTS

2.01 PIPE MATERIALS

- A. Shall meet section 3210, Part 2, 2.01 “Water Pipes, Valves, and Appurtenances” with the following exceptions:
 - 1. Ductile Iron Pipe shall be color coded pantone purple 522-C with tape or paint.
 - 2. HDPE Pipe shall be color coded pantone purple 522-C.

2.02 JOINT MATERIALS

- A. Shall meet section 3210, Part 2, 2.02 “Water Pipes, Valves, and Appurtenances”.

2.03 FITTINGS

- A. Shall meet section 3210, Part 2, 2.03 “Water Pipes, Valves, and Appurtenances”.

2.04 COATINGS AND LININGS FOR DUCTILE IRON PIPE AND FITTINGS

- A. Shall meet section 3210, Part 2, 2.04 “Water Pipes, Valves, and Appurtenances” with the following exceptions:
 - 1. Additional applied exterior coating for above ground pipe and fittings shall have a final field coat be pantone purple 522-C for reclaimed water pipe, valves and appurtenances.

2.05 POLYETHYLENE ENCASEMENT

- A. Shall meet section 3210, Part 2, 2.05 “Water Pipes, Valves, and Appurtenances” with the following exceptions:
 - 1. Polyethylene encasement wrapping colors shall be pantone purple 522-C.

2.06 SERVICE PIPE, STOPS, FITTINGS, AND SERVICE SADDLES

- A. Shall meet section 3210, Part 2, 2.06 “Water Pipes, Valves, and Appurtenances” with the following exceptions:
 - 1. Pipe shall be pantone purple 522-C in color.

2.07 RESILIENT SEAT GATE VALVES

- A. Shall meet section 3210, Part 2, 2.07 “Water Pipes, Valves, and Appurtenances”.

2.08 BUTTERFLY VALVES

- A. Shall meet section 3210, Part 2, 2.08 “Water Pipes, Valves, and Appurtenances”.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3510: Reclaimed Water Pipes, Valves, and Appurtenances

October 10, 2021

2.09 VALVE BOXES

A. Shall meet section 3210, Part 2, 2.09 “Water Pipes, Valves, and Appurtenances” with the following exceptions:

1. Covers shall have “RECLAIM” cast into the top for all reclaimed water mains.

2.10 AIR RELEASE VALVES

A. Shall meet section 3210, Part 2, 2.10 “Water Pipes, Valves, and Appurtenances”.

2.11 POTABLE WATER JUMPERS

A. Shall meet section 3210, Part 2, 2.11 “Water Pipes, Valves, and Appurtenances”.

B. The CONTRACTOR shall not be permitted to remove potable water jumpers without coordination and authorization from UTILITIES. When preparing to abandon potable water jumper connections to connect portions of our service area to live reclaimed water, the potable jumper connection shall be closed at least seventy two (72) hours before the reclaimed water mains are placed into service. This period will provide opportunity to discover any potable water service inadvertently connected to the reclaimed water main.

PART 3 EXECUTION

3.01 MATERIAL IDENTIFICATION AND TESTING

A. Shall meet section 3210, Part 3, 3.01 “Water Pipes, Valves, and Appurtenances” with the following exceptions:

1. Pipe shall be color coded pantone purple 522-C

3.02 SEPARATION OF WATER MAINS, RECLAIMED WATER MAINS, FORCE MAINS AND SEWERS

A. Shall meet section 3210, Part 3, 3.02 “Water Pipes, Valves, and Appurtenances”.

3.03 INSTALLATION OF VALVES

A. Shall meet section 3210, Part 3, 3.03 “Water Pipes, Valves, and Appurtenances”.

3.04 RECLAIMED WATER SERVICE

A. Shall meet section 3210, Part 3, 3.04 “Water Pipes, Valves, and Appurtenances” with the following exceptions:

1. On curbed streets the exact location for etching or cutting an “R” in the concrete curb shall mark each installed service.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3511: Reclaimed Water Master Meter Electrical Control Systems

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section specifies the supervisory control and data acquisition (SCADA) system requirements for reclaimed water monitoring stations. A typical station will include a flow meter, dual pressure transmitters and a solenoid-operated pressure-regulating valve (supplied under separate section).

1.02 DESCRIPTION OF SYSTEM

- A. The SCADA system specified herein shall include two pressure transmitters, one flow meter, one control panel, and all associated electrical components as listed herein and shown on the STANDARD DRAWINGS.
- B. The system shall monitor flow and pressure and allow for remote operation of the pressure-regulating valve. Decision to open or close a valve at a station shall be made manually by the operators.
- C. The control panel shall typically consist of radio-based RTU equipment based on standard components used by UTILITIES. In some cases, leased telephone or fiber optic communications may be required in lieu of radio. See Section 3413, "SCADA RTU Panel" specification for SCADA RTU.
- D. The system shall typically be powered by a new 120-volt power feed from the local power company. Coordination with and cost of the new feed is to be made under this Section of the WORK. Provide all components, whether specifically mentioned or not, to provide electrical power as needed. In the case of power not being available, provide a suitable solar power pack as specified herein to power the station (including instruments, RTU equipment, and solenoid).

1.03 QUALITY ASSURANCE

- A. Refer to Section 3413, Part 3 "SCADA RTU Panel" specification for SCADA RTU.

PART 2 PRODUCTS

2.01 SCOPE OF WORK

- A. Equip all panel devices with an engraved nameplates located next to the device to reference the name of the device used on the wiring diagram.
- B. For the purposes of uniformity and conformance to industry standard, provide analog signal transmission modes of electronic 4-20 ma DC. No other signal characteristics are acceptable.
- C. Fully isolate outputs for transmitted electronic signals between all transmitters and receivers, equipment of different manufacturers and between control panels to conform to ISA Standard S 50.1.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3511: Reclaimed Water Master Meter Electrical Control Systems October 10, 2021

- D. Provide electrical transient protection for all electrical elements of the system. Locate surge suppressors at any connection between AC power sources and electrical equipment including panels, assemblies and field devices and at both ends of all analog signal circuits that have any portion of the circuit extending outside of protecting buildings. Coordinate grounding requirements with the surrounding ground system.
- E. A ground system shall be installed in accordance with the National Electrical Code, local codes and local ordinances and be tested showing 5 ohms or less resistance to ground. An underground perimeter cable grounding system (counterpoise) shall be installed with connections to piping (bolted connection), control panel and disconnect switch. A copy of the ground test report shall be provided to a UTILITIES representative.

2.02 MATERIALS

A. Pressure Transmitter, Electronic:

1. Unit shall be an all-electronic force transfer type instrument producing a 4 to 20 ma DC signal in linear proportion to the sensed pressure. Wetted parts, including process flanges, shall be 316 SST. Units shall operate within a temperature range of -20 to 160 degrees Fahrenheit. Unit shall have dampening adjustment. Units shall be reconfigurable through the current loop. Process connection shall use 1/2 inch 316 SST piping. Supply piping and stainless steel isolation valve for each unit.
2. Transmitter shall be a two-wire device and shall transmit an isolated signal into a load impedance of 0 to 600 ohms without load adjustments. Accuracy shall be plus or minus 0.5% of span maximum. Device shall be rated NEMA 4X construction. Housing shall be modular with separate compartments for electronics and field connections. Transmitter shall include integral indicator with range of 0 to 100% of full scale.
3. Unit shall be supplied with 316 SST support brackets for mounting shown. Supply one transmitter upstream of the valve and one transmitter downstream of the valve.

B. Flow Meter, Turbine Type:

1. Unit shall be a turbine-type water flow meter, which shall provide local totalization and indication of the specified flow. Flow range and totalizer unit digit value shall be suitable for the expected flow rate in the pipeline. Unit shall also include an integral transmitter to output a loop-powered 4-20 ma signal proportional to flow.
2. Unit shall consist of a turbine and shaft assembly, sealed oil-filled gearbox, signal transmitter, flow indicator and six (6) digit totalizer, all integrally mounted on a flanged meter tube. The rotation of the turbine shall be magnetically coupled with a driven mechanism in the sealed gearbox. The indicator/totalizer transmitter head shall be completely sealed from the process fluid, magnetically coupled with the driven mechanism.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3511: Reclaimed Water Master Meter Electrical Control Systems October 10, 2021

3. Meter accuracy shall be plus or minus 1.5% of actual flow over an approximate 100 to 1 turndown. Meter tube shall be cast steel with flange rating that matches the pressure rating of the installed piping. The meter tube shall be coated with a fusion-bonded epoxy. Meter tube shall be furnished with integrally cast straightening vanes and built-in strainer with removable stainless steel screen. Meter shall maintain stated accuracy when installed immediately adjacent to a 90-degree bend in the pipe just upstream of the strainer.
4. Materials of construction shall include a ceramic type magnet; stainless steel internal bearings, separator, shafts, and bolts, ceramic propeller bearing sleeve, ceramic-coated steel spindle, molded thermoplastic propeller, cast bronze meter head and epoxy-coated meter tube.
5. Transmitter shall be a solid-state electronic device with LCD digital readout for flow rate and totalized flow. Transmitter shall have battery backup with EPROM memory to avoid loss of totalized flow value.

C. Control Panel, SCADA RTU and Electrical System:

1. See Section 3413, "SCADA RTU Panel" specification for SCADA RTU Equipment.
2. Nameplates:
 - a. There shall be a permanently affixed, laminated copy of the control panel-wiring diagram on the interior side of the door. An engraved plastic nameplate shall be permanently affixed to the front of the exterior door to name the station.
3. Power Feed and Main Disconnect:
 - a. Power supply to the control panel shall be 120-volt, single-phase, unless power is not available from the local power company. Provide a 316 SST main disconnect and power meter box that meet the power company's standards and requirements.
4. Circuit Breakers:
 - a. All circuit breakers shall be heavy-duty molded case breakers, Cutler-Hammer QC series or equal.
5. Wiring:
 - a. All power wires shall be THWN 75 degrees Celsius insulated stranded copper conductors and appropriately sized for the given load application. All control circuit wire shall be type THWN; minimum No.16, stranded type. Analog signal wiring shall be 300-volt, stranded copper in twisted shielded pairs, no smaller than No. 16. Separate analog or dc circuits at least six inches from any ac power or control wiring. All wiring within the enclosure shall be neatly routed by the use of slotted type wiring duct with

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3511: Reclaimed Water Master Meter Electrical Control Systems October 10, 2021

snap on type covers. Wiring on the rear of the inner door shall be neatly bundled with nylon ties and include sufficient loop across the hinges to prevent wire damage. Each end of each conductor shall be permanently identified with typed, heat-shrink labels, separate number for each conductor.

D. Wire Color Coding:

1. See table below.

Table 3511-1: Wire Color Code

Wire Color	Voltage	Type
Blue	24	DC positive
Red	12	DC positive
Grey		DC negative
White		Neutral
Black	115	
Green		Ground wiring

E. Ground System:

1. Provide control panels with an isolated copper grounding buss to ground all signal and shield connections. Ground each analog signal shield on one (1) end at the receiver end only. Properly ground all surge and transient protection devices.

F. Electrical Conduit:

1. All conduit shall be rigid, non-metallic, schedule 80 PVC for buried service, rigid aluminum for above ground and through slabs, and flexible, liquid-tight, non-metallic PVC where connecting directly to equipment. Conduit shall be securely fastened to slab, rack supports, or piping with non-metallic, lock-in clamps.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install the system in strict accordance with the respective manufacturer's instructions and recommendations and in locations as specified.

CHAPTER 3 CONSTRUCTION SPECIFICATIONS

Section 3511: Reclaimed Water Master Meter Electrical Control Systems October 10, 2021

3.02 INSPECTION AND TESTING

- A. A factory representative knowledgeable in SCADA operation and maintenance shall inspect and supervise a test run at the reclaimed water station. Additional test run time made necessary by faulty or incomplete work or equipment malfunctions shall be taken so that the requirements of this specification are met at no cost to UTILITIES. Upon satisfactory completion of the test run, the factory representative shall issue the required manufacturer's certificate.
- B. The test run shall demonstrate that all requirements have been met by the equipment as installed, verify that all SCADA equipment has been properly installed, flow and pressure are measured to the accuracy specified, all values can be monitored from the central site and that the valve can be successfully controlled from the central site.

3.03 WARRANTY AND SERVICE

- A. Flow and Pressure Monitoring Equipment:
 - 1. Products shall be guaranteed to be free from defects in material and workmanship under normal use and service for a period of two (2) years after start-up. Service shall be available for in place repair of the products. Manufacturer's repair personnel shall be based in Florida to insure a reasonable response time of not more than two (2) NORMAL WORKING DAYS.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4110: General Inspection Requirements

October 10, 2021

PART 1 GENERAL

- A. The CONTRACTOR shall request the inspection in writing to UTILITIES in accordance with the schedule of notification provided Table 4110-1.
- B. UTILITIES will notify the CONTRACTOR of utilities deficiencies or acceptance in accordance with the schedule of notification provided in Table 4110-1.

Table 4110-1: UTILITIES' Schedule of Notification(s)

Service	Type of Inspection	Timeframe * (NORMAL WORKING DAYS)	Timeframe * (CALENDAR DAYS)
Water / Reclaimed Water	Cross Connection	5	7
Wastewater	Request to schedule Pump Station Start Up after Approval of Final RECORD DOCUMENTS	10	14
Wastewater	Pump Station Start Up and Acceptance / Rejection Letter	3	5
Construction Inspection	Wire Continuity for all Pressurized Mains shall be conducted by the CONTRACTOR during Construction	As Required	As Required
Construction Inspection	Notice of Commencement of Construction by CONTRACTOR	7	10
Construction Inspection	Notice of Utility WORK	3	5
Construction Inspection	Notice of Connection, Tap, Shutdown, Directional Drill, Jack & Bore, Existing Manhole, etc.	7	9
Construction Inspection	Request to Schedule Flushing of Pressurized Pipe.	5	7
Construction Inspection	Pressure Testing (WM, RWM, FM) after approval of AsBuilts / Deflection table	3	5
Construction Inspection	Chlorination after Approval of Partial / Final RECORD DOCUMENTS	3	5
Construction Inspection	Vacuum and Air Testing Prior to CCTV Operations	3	5
Construction Inspection	Notice of CCTV Operations per Mobilization	2	4

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4110: General Inspection Requirements

October 10, 2021

Table 4110-1. UTILITIES' Schedule of Notification(s) (continued).			
Service	Type of Inspection	Timeframe * (NORMAL WORKING DAYS)	Timeframe * (CALENDAR DAYs)
Construction Inspection	Inspection of CCTV Camera system and clean water surcharge of gravity sewer prior to CCTV	1	3
CCTV Review	CCTV Data Review and Acceptance / Rejection Letter	10	14
Construction Inspection	Notice of Overtime or Weekend WORK	3	5
Construction Inspection	Review of RECORD DOCUMENTS Submittals	10	14
Construction Inspection	Review of Previously Rejected RECORD DOCUMENTS Submittals	5	7
GIS	Process RECORD DRAWINGS into GIS and Asset Management Software.	20	30
Water, Wastewater, Reclaimed water	Request to Schedule Walk Through for Subdivisions and Notification of Acceptance or Rejection (Water, Wastewater, Reclaimed Water) after Approved RECORD DRAWINGS, GIS Processing, and all FDEP Clearances obtained.	15	21
Construction Inspection	Inspection of Punch list Deficiencies and Notification of Acceptance or Rejection after written notification of completion by CONTRACTOR	5	7
Warranty Inspection	Year-end Walk Thru and Acceptance / Rejection Letter	N/A	90 Days Prior to Expiration (270 days after COC)

Note: * Timeframe does not include the day of notification. NORMAL WORKING DAYS do not include weekends or holidays.

- C. If there are any deficiencies or the system is not ready for inspection, as determined by UTILITIES, the CONTRACTOR shall request a re-inspection which will restart the

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4110: General Inspection Requirements

October 10, 2021

- inspection period, as noted above.
- D. If more than one RECORD DOCUMENT review or inspection is required for acceptance, testing or clearance, the CONTRACTOR will be charged for each additional re-inspection per the Orange County Office of Management and Budget (OMB) Fee Directory – Re-inspection Fee. If the CONTRACTOR works beyond NORMAL BUSINESS HOURS or NORMAL BUSINESS DAYS, the CONTRACTOR shall be responsible for payment per the Orange County OMB Fee Directory – Inspection Fee Other than Normal Working Hours. Payment shall be delivered to UTILITIES Customer Service located at 9150 Curry Ford Road (first floor) prior to re-inspection or overtime inspection work.
 - E. If written coordination of activities is not provided to UTILITIES or if the CONTRACTOR deviates from the provided schedule without notification to UTILITIES, all WORK and inspections shall be rejected, removed, and replaced at no cost to the COUNTY.
 - F. Including but not limited to: any pipe, valve, structure, and appurtenances that has been rejected by UTILITIES shall be removed from the site of the WORK by the CONTRACTOR and replaced with new that meets current specifications at no cost to the COUNTY. Repairs, refurbishing, or reusing of rejected items shall not be permitted.
 - G. No excavation and connection or repair of sanitary sewer systems shall be permitted unless the UTILITIES is present to inspect the excavation, witness the repair, confirm proper compaction of the area, and witness compaction testing performed by the CONTRACTOR’s geotechnical company.
 - H. A digital copy of the AS-BUILT SURVEY with deflection tables shall be submitted, and approved by UTILITIES prior to scheduling pressure testing of water mains, reclaimed water mains, and/or force mains.
 - I. For WORK constructing water mains, reclaimed water mains, force mains, pump stations and/or sanitary sewer in a project: RECORD DOCUMENTS shall be submitted, and approved by UTILITIES prior to scheduling the following inspections: air testing, vacuum testing, or review of the CCTV of gravity sewer, pressure testing and disinfection of water systems, pressure testing of forcemains, pressure testing of reclaimed water mains, pump station startup, and walk through inspections. Under no circumstances shall the aforementioned inspections be scheduled or executed without approved RECORD DOCUMENTS.
 - J. CONTRACTOR As-Builts shall be located on the project site and maintained concurrently with Construction of the WORK including SURVEYOR coordinate data. Current coordinate data shall be provided a minimum monthly and shall be available for UTILITIES review.
 - K. A walk through inspection will be scheduled with UTILITIES after the RECORD DOCUMENTS are processed in GIS and available in UTILITIES asset management software. The combined walk through will take place in the field with UTILITIES and the CONTRACTOR.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4210: Testing and Inspection for Acceptance of Water Systems

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. These specifications cover the testing and inspection for the acceptance of water systems.
- B. Hydrostatic tests shall be conducted for pressure pipes, joints, fittings and valves for allowable limits of pressure and leakage. Air testing of pressure pipes will not be permitted under any circumstance.
- C. Requests for testing and acceptance of water systems shall follow the procedure listed in Section 4110, "General Inspection Requirements".
- D. The purpose of swabbing a new pipeline is to conserve water while thoroughly cleaning the pipeline of all foreign material, sand, grit, gravel, construction debris and other items not found in a properly cleaned system. Prior to pressure testing and chlorinating of a new pipeline swabbing shall be utilized as specified on the construction plans for each project.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 TESTS

- A. The CONTRACTOR shall thoroughly clean the new pipe lines by flushing with water or other means to remove all dirt, stones or other material which may have entered the line during the construction period.
 1. Preliminary flush shall have a minimum of 2.5 feet per second full diameter in accordance with AWWA C651 Standard, "Disinfecting Water Mains". Flushing shall be allowed for pipes less than or equal to 8-inch.
 2. Swabbing:
 - a. In lieu of flushing, new water mains may be hydraulically or pneumatically cleaned with a polypropylene swabbing device to remove dirt, sand and debris from main.
 - b. Swabbing shall be required for 12 inch mains and greater.
 - c. If swabbing access and egress points are not provided in the design drawings, it will be the responsibility of the CONTRACTOR to provide temporary access and egress points for the cleaning, as required.
 - d. Passage of cleaning poly swabs through the system shall be constantly monitored, controlled and all poly swabs entered into the system shall be individually marked and identified so that the exiting of the poly swabs from the system can be confirmed.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4210: Testing and Inspection for Acceptance of Water Systems October 10, 2021

- e. Cleaning of the system shall be done in conjunction with the initial filling of the system for its hydrostatic test. After initial slow-fill, pipe shall sit full for twenty four (24) hours to facilitate cleaning and collection of debris from interior of pipe.
 - f. The CONTRACTOR shall insert flexible polyurethane foam swabs (minimum 2 pounds per cubic foot density) complete with rear polyurethane drive seal, into the first section of pipe. The swabs shall remain there until the pipeline construction is completed.
 - g. The line to be cleaned shall only be connected to the existing distribution system at a single connection point.
 - h. Locate and open all new in-line valves beyond the point of connection on the pipeline to be cleaned during the swabbing operation.
 - i. At the receiver or exit point for the poly swab, the CONTRACTOR is responsible for creating a safe environment for collection of debris, water and the swab. Considerations shall be made for protecting surrounding personnel and property and safe retrieval of the swab.
 - j. Only UTILITIES personnel shall operate the supply valve from the existing distribution system. Cleaning and flushing shall be accomplished by propelling the swab down the pipeline to the exit point with potable water. Flushing shall continue until the water is completely clear and swab is retrieved.
 - k. Re-apply a series of individual swabs in varying diameters and/or densities as required, to attain proper cleanliness of pipeline.
 - l. Swabbing speed shall range between 2 and 5 feet per second.
 - m. After the swabbing process, pressure testing and disinfection of the pipe shall be completed in accordance with this MANUAL.
- B. Hydrostatic tests shall consist of pressure test and leakage test.
1. Hydrostatic tests shall be conducted on all newly laid pressure pipes, joints and valves including all service lines to the curb stops.
 2. Tests shall be made between valves.
 3. The CONTRACTOR shall pressure test both sides of the valve. If testing against an existing valve, the CONTRACTOR shall provide means and methods to ensure the pipe is tested at the required pressure.
 4. The CONTRACTOR shall furnish all necessary equipment and material, make all taps and furnish all closure pieces in the pipe as required. Equipment to be furnished by the CONTRACTOR shall include graduated containers, pressure gauges, hydraulic forces pumps and suitable hoses and piping. UTILITIES' representative shall monitor a satisfactory test.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4210: Testing and Inspection for Acceptance of Water Systems October 10, 2021

5. Multiple sections may be tested simultaneously providing there are dead or zero (0) pressure sections in between each pressure tested section.
 6. The CONTRACTOR may conduct preliminary hydrostatic tests after the trench has been partially backfilled with the joints left exposed for inspection for informational purposes only.
 7. The hydrostatic tests for acceptance shall only be conducted after the trenches have been completely backfilled and compacted as specified.
 8. Where any section of pipe is provided with concrete thrust collar, pressure test will not be made until at least five (5) days have elapsed after the thrust collar is installed. If high-early cement is used for the concrete thrust collar, the time may be reduced to twenty-four (24) hours if the concrete has cured and reached adequate strength.
 9. All pipe sections to be pressure tested shall be subjected to a minimum hydrostatic pressure of 150 psi.
 10. The duration of each pressure test shall be for a period of two (2) hours. If during the test, the integrity of the tested line is in question, UTILITIES may require a six (6) hour pressure test.
 11. The basic provisions of AWWA C600 shall be applicable.
- C. Document and certify the testing and quantity of acceptable leakage with pressure test form in Appendix B, "Pressure Test Form".
- D. Water supply from the existing distribution system shall be provided through a jumper connection consisting of fittings and an RPZ assembly and installed as shown in the STANDARD DRAWINGS.
- E. Procedure for Pressure Test:
1. Pipe, inclusive of all appurtenances to be tested, shall be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the pipe in a satisfactory manner.
 2. Provisions shall be made to expel air entrapped in the pipe before applying the specified test pressure. To accomplish this, taps shall be made, and appropriate valves installed to ensure bleeding of all air from the main.
 3. If defective pipes, fittings, valves, or hydrants are discovered in consequence of this pressure test, all such items shall be removed and replaced by the CONTRACTOR with sound material and the test shall be repeated until satisfactory results are obtained. Provisions of AWWA C600, and C651 where applicable, shall apply.
- F. Procedure for Leakage Test:
1. After completion of the pressure test, a leakage test shall be conducted to determine the quantity of water lost by leakage under the specified test pressure. Applicable provisions of AWWA C600 shall apply.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4210: Testing and Inspection for Acceptance of Water Systems October 10, 2021

2. Allowable leakage in gallons per hour for pipeline shall not be greater than that determined by the formula:

$$L = \frac{SD (P)^{0.5}}{148,000}$$

Note:

L - Allowable leakage in gallons per hour.

S - Length of pipe tested, in feet.

D - Nominal diameter of the pipe in inches.

P - Average test pressure during leakage test in pounds per square inch gauge.

3. Leakage is defined as the quantity of water to be supplied in the newly laid pipe or any valve section under test, which is necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled. Should any test of pipe laid disclose leakage greater than that allowed, the CONTRACTOR shall locate and replace or repair the defective joints, pipe or valve until the leakage from subsequent testing is within the specified allowance.
4. Reasons for rejection of the hydrostatic testing are listed below and shall require retesting.
 - a. Pressure drops below 150 psi during any part of the testing period;
 - b. Pressure drop exceeds 5 psi at any point during the testing period;
 - c. Measured amount of make-up water pumped into main to return the pressure to the testing start psi exceeds the allowable leakage in gallons as calculated per the above formula;
 - d. Equipment failure or improper equipment during testing;
 - e. All gauges shall zero (0) out after testing; and
 - f. Site conditions or reasons as determined by UTILITIES for rejection of the testing, including but not limited to: fluctuation of pressure, tampering, increase in pressure, and inclement weather.

G. Disinfection:

1. Newly installed mains shall be filled, flushed with a minimum velocity of 2.5 feet per second and disinfected in accordance with the ANSI/AWWA C651.
2. During the chlorination period, valves, hydrants and appurtenances in the treated section shall be operated to ensure they are disinfected with the new main.
3. Before being placed into service, new mains or extensions to existing mains shall be chlorinated so that the initial chlorine residual is not less than 25 milligrams per liter and that a chlorine residual of not less than 10 milligrams per liter remains in the water after standing twenty-four (24) hours in the pipe.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4210: Testing and Inspection for Acceptance of Water Systems October 10, 2021

4. The free residual chlorine concentration shall be monitored and documented by the CONTRACTOR for the initial application and after a twenty-four (24) hour contact period.
5. The testing/monitoring location points, the disinfection process utilized and free chlorine residuals shall be documented on Appendix B, "Water Main Disinfection Certification".
6. The interior of all pipe and fittings, including couplings and fittings, used in making repairs and ties in shall be swabbed or sprayed with a 1% hypochlorite solution before they are installed.

H. Final Flushing and Testing:

1. Following chlorination, all treated water shall be thoroughly flushed from the new main. A neutralizing chemical shall be applied to the water to be wasted to thoroughly neutralize the residual chlorine. Flushing shall take place until, upon testing, the free chlorine residual obtained is not in excess of that normally carried in the system.
2. Water samples shall be collected from the approved sampling points. Each sample result shall show acceptable bacteriological results for two consecutive days. The CONTRACTOR will perform the bacteriological testing by a private laboratory. Private laboratories require approval by UTILITIES and certification by the State of Florida.
3. Proper chain of custody procedures must be followed and samples shall only be collected by certified laboratory personnel in the presence of UTILITIES' personnel.
4. Copies of testing results and all related correspondence with the FDEP shall be submitted to UTILITIES.

I. The distribution system piping shall remain isolated and out of service until UTILITIES receives clearance from FDEP.

J. Repetition of Flushing and Testing:

1. Should the initial treatment result in an unsatisfactory bacterial test, the CONTRACTOR shall repeat the original disinfection procedure and flushing as required until satisfactory results are obtained.

PART 4 ACCEPTANCE

4.01 WIRE CHECK

- A. The locating wire will be inspected and tested for continuous continuity along the entire length of the main and correct material as specified in Appendix D, "List of Approved Products".

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4210: Testing and Inspection for Acceptance of Water Systems October 10, 2021

- B. The CONTRACTOR shall conduct a preliminary wire check coordinated with the INSPECTOR, prior to the installation of road base and shall be responsible for continuity throughout the warranty period.
- C. Valve locations will be inspected for the proper installation of the locating wire in accordance with Appendix A, “STANDARD DRAWINGS” and tested for continuity between the main and the valve.

4.02 FIRE HYDRANTS

- A. Fire hydrants will be tested for smooth operation. Inspected for absence of leakage from any ports, joints and or fittings in the hydrant assembly to the main. Inspected to confirm that hydrants are painted the correct colors as stated in Section 3210, “Water Pipes, Valves and Appurtenances”, installed as shown in the STANDARD DRAWINGS and located per the RECORD DRAWINGS.

4.03 VALVES

- A. Valves will be operated to verify smooth and correct operation and direction of opening. Inspected to confirm the location per the RECORD DRAWINGS and installed per the STANDARD DRAWINGS.

4.04 VALVE BOXES

- A. Valve boxes will be inspected to ensure they are clear of debris, centered over the operating nut and installed with a collar as shown in the STANDARD DRAWINGS. The depth of the operating nut will be measured to finished grade to confirm that a riser is installed or not required. Valve boxes shall meet the material standards listed in Appendix D, “List of Approved Products”.

4.05 SERVICE LINES

- A. Service lines shall be properly identified, free from conflicts with any structure, installed as shown in the STANDARD DRAWINGS and the number location and size is as shown on the RECORD DRAWINGS to serve all intended properties. The materials shall be as listed in Appendix D, “List of Approved Products”.

4.06 BLOW OFF VALVE ASSEMBLIES

- A. Blow off valve assemblies shall be free from any conflicts with any structures, installed per the STANDARD DRAWINGS, located as shown in the RECORD DRAWINGS and tested to ensure correct operation. The materials shall be as listed in the STANDARD DRAWINGS and Appendix D, “List of Approved Products”.

4.07 AIR RELEASE VALVE ASSEMBLIES

- A. Air release valve assemblies shall be free from any conflicts with any structures, installed per the STANDARD DRAWINGS, located as shown on the RECORD DRAWINGS tested to ensure correct operation and confirm materials as listed in Appendix D, “List of Approved Products”.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4310: Testing & Inspection for Acceptance of Wastewater Collection and Transmission Systems

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. These specifications cover the testing and inspection for acceptance of wastewater collection and transmission systems.
- B. Requests for testing and acceptance of wastewater collection and transmission systems shall be executed in accordance with Section 4110, “General Inspection Requirements”.
- C. Gravity Mains and Manholes:
 1. Shall be inspected with CCTV for alignment, grade variations, separated pipes, leaks, deflection, cracked, broken or otherwise defective pipe to ensure overall pipe integrity. An approved CCTV inspection contractor that is listed on the Orange County website at time of inspection shall perform the CCTV inspection(s) and submit the report(s) to UTILITIES as required.
 2. At the discretion of the UTILITIES additional CCTV of laterals, mains, manholes, cleanouts and existing facilities may be required including but not limited: to existing COUNTY systems, proposed private systems and existing private to private systems.
 3. System connections to existing infrastructure shall be CCTV inspected and documented by the CONTRACTOR prior to connection and the same condition and shall be maintained throughout the maintenance warranty period. The documented inspection shall be submitted to UTILITIES.
- D. Pressure Mains:
 1. Hydrostatic tests shall be conducted for pressure pipes, joints and valves for allowable limits of pressure and leakage. Air testing of pressure pipes will not be permitted under any circumstance.

PART 2 PRODUCTS

2.01 APPROVED LIST OF CCTV CONTRACTORS

- A. The current “List of Approved CCTV Inspection Contractors for Wastewater Gravity Systems” can be found on our website at <http://www.orangecountyfl.net/PlanningDevelopment/UtilitiesPlanningandConstruction>. For more information, please contact a Standards Committee representative at 407-254-9798.
- B. CCTV contractors that desire to be added to the “Orange County Utilities List of Approved CCTV Inspection Contractors for Wastewater Gravity Systems” shall submit a request to the Standards Committee by e-mailing their submittal to standards.committee@ocfl.net. The submittal shall contain all of the qualification information requested. Once the submittal is complete, the Standards Committee will evaluate the CCTV contractor. The contractor’s work product and an on-site field evaluation may

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4310: Testing & Inspection for Acceptance of Wastewater Collection and Transmission Systems

October 10, 2021

be requested. Procedures for testing or evaluating in the field shall be as agreed upon between the Standards Committee and the contractor. Results will become a part of the product file and will be made available to the contractor upon request.

- C. The Approval and Removal Process for CCTV and Inspection Contractors for Wastewater Gravity Systems and the CCTV Inspection Contractor Qualification Form can be found on our website at <http://www.orangecountyfl.net/PlanningDevelopment/UtilitiesPlanningandConstruction>
- D. The COUNTY shall not review or accept any submittals conducted by CCTV contractors that are not on the current approved list posted on the Orange County website at time of CCTV inspection.

2.02 CCTV INSPECTION EQUIPMENT

A. Closed Circuit Television Camera:

1. The television camera used for the inspection shall be one specifically designed and constructed for sanitary sewer inspection. Lighting for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe. The camera shall be operative in 100% humidity/submerged conditions.
2. The CCTV camera equipment will provide a view of the pipe ahead of the equipment and of features to the side of the equipment through turning and rotation of the lens. The camera shall be capable of tilting at right angles along the axis of the pipe while panning the camera lens through a full circle about the circumference of the pipe. The lights on the camera shall also be capable of panning 90-degrees to the axis of the pipe.
3. If the equipment proves to be unsatisfactory, it shall be replaced with adequate equipment. The camera unit shall have sufficient quantities of line and video cable to inspect two (2) complete, consecutive sewer reaches with access approximately 750 feet apart.
4. The camera, television monitor, and other components of the video system shall be capable of producing picture quality to the satisfaction of UTILITIES. The television camera, electronic systems and monitor shall provide an image that meets the following specifications, or approved equal.
 - a. The gray scale shall show equal changes in brightness ranging from black to white with a minimum of five (5) stages.
 - b. With the monitor control correctly adjusted, the six (6) colors - Yellow, Cyan, Green, Magenta, Red, and Blue, plus black and white shall be clearly resolved with the primary colors in order of decreasing luminance. The gray scale shall appear in contrasting shades of gray with no color tint.
 - c. The picture shall show no convergence or divergence over the whole of the picture. The monitor shall be at least 13 inches diagonally across the picture tube.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4310: Testing & Inspection for Acceptance of Wastewater Collection and Transmission Systems

October 10, 2021

- d. The live picture on the CCTV monitor shall be capable of registering a minimum of 470 lines horizontal resolution and be a clear, stable image with no interference.
 - e. High intensity LED lighting shall be remote controlled and shall be adjusted to minimize reflective glare. Lighting and camera quality shall provide a clear, in-focus picture of the entire inside periphery of the sewers and laterals for all conditions except submergence. Under ideal conditions (no fog in the sewer) the camera lighting shall allow a clear picture up to five (5) pipe diameter lengths away for the entire periphery of the sewer. The lighting shall provide uniform light free from shadows or hot spots.
 - f. Camera focal distance shall be remotely adjustable through a range of 6 inches to infinity.
 - g. The monitor and software shall also be able to capture and save screen images of typical sewer details and all defects. Screen images shall be embedded into the pipe inspection report document submitted with the inspection video. The video camera shall be capable of displaying on screen data.
- B. Lateral Video Camera:
1. Lateral cameras may be push type or launched from the sewer main line. Lateral cameras shall be color, shall be self-leveling, and equipped with a footage counter to provide on screen display of footage measurement. Monitor resolution shall be as specified above.
- C. Video Capture System:
1. The video recordings of the sewer inspections shall be made using digital video equipment. A video enhancer may be used in conjunction with, but not in lieu of, the required equipment. The digital recording equipment shall capture sewer inspection with each sewer reach inspection recorded as an individual movie file (.MP4, .MPG, or .WMV) or approved equal.
 - a. The video file names will be referenced in the inspection database and in an inspection report generated in PDF format. The pipeline collection and real time video capture and data acquisition systems shall be provided.
 - b. The system shall use the most current PACP compliant application software and shall be fully object oriented or as approved by UTILTIES. It shall be capable of printing pipeline inspection reports with captured images of defects or other related significant visual information on a standard color printer.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4310: Testing & Inspection for Acceptance of Wastewater Collection and Transmission Systems

October 10, 2021

- c. The imaging capture system shall store digitized color picture images and be saved in digital format on a portable USB hard/flash drive or approved equal. Also, this system shall have the capability to supply UTILITIES with inspection data reports for each line segment.
- d. The CONTRACTOR shall have the ability to store the compressed video files in an approved UTILITIES format and be transferable with the PACP compliant inspection database.
- e. The CONTRACTOR'S equipment shall have the ability to "Link". "Linking" is defined as storing the video time frame code with each observation or defect with the ability to navigate from/to any previously recorded observation or defect instantaneously.
- f. The system shall be able to produce data reports to include, at a minimum, all observation points and pertinent data. All data reports shall match the defect severity codes in accordance with PACP naming conventions
- g. The data-sorting program shall be capable of sorting all data stored using generic sort key and user defined sort fields.
- h. Camera footage, date & COUNTY assigned manhole numbers shall be maintained in real time and shall be displayed on the video monitor as well as the video character generators illuminated footage display at the control console.
- i. Depth gauge: The camera shall have a depth gauge or approved method to measure deflection in the pipe and joint separation approved by the UTILITIES. Gauge shall be numerically labeled in 1/4 inch increments from 1/4 through 2 inches. Gauge shall be no less than 1-1/2 inches and no more than 2 inches. The gauge shall be set in front of the camera to provide an in-focus picture of all gauge markings, inside periphery of the sewers and laterals for all conditions.

2.03 GRAVITY MAIN INSPECTION CCTV DATA

- A. CCTV data shall be recorded and saved in a UTILITIES approved format.
- B. CCTV inspections shall use unique identification numbers established and provided by UTILITIES in pipe segment reference, upstream manhole number and the downstream manhole number fields.
- C. The video files will be named in accordance with UTILITIES file naming convention: UpstreamMHID_DownstreamMHID_InspectionDate YYYY_MM_DD)."extension"
Example: F39540008_F39540007_2021_08_05)."extension"
- D. Reports shall be submitted in an electronic version (.pdf) generated by the computer software shall be consistent with PACP requirements, observation report with any UTILITIES requested still images; and CCTV inspection results.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4310: Testing & Inspection for Acceptance of Wastewater Collection and Transmission Systems

October 10, 2021

1. PACP export pipe inspection database; saved on portable USB hard/flash drives or COUNTY approved delivery method, in format as required by UTILITIES.
2. Inspection digital photographs; in JPEG format saved on portable USB hard/flash drives or COUNTY approved delivery method.
3. CCTV inspection video files; saved on portable USB hard/flash drives or COUNTY approved delivery method, in format as required by UTILITIES.
4. QA/QC report; saved on portable USB hard/flash drives or COUNTY approved delivery method, in format as required by UTILITIES.

PART 3 EXECUTION

3.01 LEAKAGE TESTING OF GRAVITY MAINS

- A. The CONTRACTOR, with UTILITIES' representation present, shall perform the leakage testing. The CONTRACTOR shall be responsible for furnishing all necessary labor and equipment to conduct such testing.
1. Leakage tests shall be by a low pressure air test.
 2. Each test section shall not exceed 400 feet in length and shall be tested between adjacent manholes.
 3. Leakage testing shall be conducted in accordance with the procedure for "Recommended Practice for Low Pressure Air Testing of Installed Sewer Pipe" as established by the Uni Bell PVC Pipe Association.
 4. The pipe shall pass the current most stringent UNI-B-6 Uni Bell standards for testing gravity sewers and shall have no evidence of leaks in the pipe or connections.

3.02 TESTING AND INSPECTION OF MANHOLES

A. Leakage Test:

1. There shall be no visible leakage through the walls or pipe connections.
2. Manholes that develop a leak prior to COC or during the one (1) year warranty period shall be rejected.
3. The defective portion shall be removed and replaced with new material at no cost to the COUNTY.
4. Unapproved methods of repair include but are not limited to: pressure grouting, patching, chemical grouting, crack injection, coating or lining.

B. Vacuum Test:

1. All manholes shall be required to meet the requirements of the vacuum test as per the current ASTM C 1244 "Standard Test Method for Concrete Sewer Manholes by the negative Air Pressure (Vacuum) Test" prior to COC.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4310: Testing & Inspection for Acceptance of Wastewater Collection and Transmission Systems

October 10, 2021

2. Manholes that fail the vacuum test prior to COC shall be rejected, removed and replaced with new material at no cost to the COUNTY. No field repair shall be approved.
3. Unapproved methods of repair include but are not limited to: pressure grouting, patching, chemical grouting, crack injection, coating or lining.

C. Manhole Inspections (visual):

1. The quality of all materials, the process of manufacture, and the finished sections shall be subject to inspection and approval by UTILITIES. Such inspection may be made at the place of manufacture and/or at the site after delivery, or at both places.
 - a. The sections shall be subject to rejection at any time due to failure to meet any of the specification requirements; even though sample sections may have been accepted as satisfactory at the place of manufacture.
 - b. Sections rejected after delivery to the job shall be marked for identification and shall be immediately removed from the job.
 - c. All sections or joints, which have been damaged, will be rejected, removed from the site and replaced with new material.
 - d. If already installed, any rejected section shall be removed and replaced entirely at the CONTRACTOR's expense.
 - e. Unapproved methods of repair include but are not limited to: pressure grouting, patching, chemical grouting, crack injection, coating or lining.
2. At the time of inspection, the sections will be examined for compliance with the specified ASTM C 478 "Standard Specification for Precast Reinforced Concrete Manhole Sections", and with the approved manufacturer's drawings.
 - a. All sections shall be inspected for general appearance, dimension, bug holes, honey combing, cracks, roughness, soundness, etc.
 - b. The surface shall be dense and close textured.
 - c. Installed manholes shall be inspected for proper filling and coating of the lifting holes and proper installation of any liner, coating or shrink-wrap.
3. Concrete structures with inconsistent colorant of crystalline waterproofing admix during field inspection shall be rejected.

D. Manhole Coating and Liner Testing:

1. All manhole surfaces with lining shall be tested with an acceptable electrical holiday or flaw detector, if applicable, after installation and any imperfections discovered shall be repaired by a method approved by UTILITIES. The CONTRACTOR shall provide all necessary equipment and material for testing.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4310: Testing & Inspection for Acceptance of Wastewater Collection and Transmission Systems

October 10, 2021

Coating and liners shall be tested in accordance with Section 3119, “Coatings and Linings” of this MANUAL.

2. A report for each manhole coating or liner test shall be provided to UTILITIES prior to acceptance.

3.03 GRAVITY MAIN REQUIREMENTS BEFORE CCTV INSPECTION

- A. All manhole flow channels and benching per specifications shall be constructed and coated (if applicable) prior to CCTV inspection.
- B. Air testing and vacuum testing shall be completed prior to CCTV inspection. CCTV inspection shall be rejected and returned without review if the aforementioned testing is not completed.
- C. The Contractor shall submit a cleaning and CCTV schedule to the INSPECTOR to coordinate dates of activities. CCTV televising shall be rejected and required to be re-televised if written coordination of CCTV activities is not provided to the INSPECTOR or if the CONTRACTOR deviates from the provided schedule without proper notification to the COUNTY.
- D. The CONTRACTOR shall jet clean each pipe segment of gravity mains to remove debris and stains from the pipe prior to televising. Cleaning shall be required for each gravity run regardless of cleanliness of installed pipeline. Flushing water or debris will not be allowed to enter pump station wet wells. Water will be pumped from the sewer system during flushing to a UTILITIES approved discharge location. A visual inspection shall be made and all obstructions removed.
- E. Gravity Mains/Pipes that are dirty (dirty walls and/or debris in the inverts) shall be re-jetted and cleaned before rescheduling a CCTV inspection. If necessary, swabbing may be required of specific sections of pipe.
- F. CCTV inspections shall be conducted after installation of road base and the manhole frame and cover. CCTV inspections shall be received by the INSPECTOR, reviewed and approved by UTILITIES prior to installation of final lift of asphalt.
- G. The CONTRACTOR shall pass a mandrel through the PVC pipe to confirm ring deflection in excess of 5%. The base inside diameter shall be used to determine mandrel size as per ASTM D 3034.
- H. Dewatering system shall not be operated within forty-eight (48) hours prior to CCTV inspection.
- I. Backfill from the gravity main to the subgrade shall be compacted, stabilized, and base material shall be installed prior to CCTV.
- J. The CONTRACTOR shall install watertight connections and bench work to meet current standards on phase line manholes as directed by UTILITIES.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4310: Testing & Inspection for Acceptance of Wastewater Collection and Transmission Systems

October 10, 2021

3.04 NOTIFICATION

- A. Contractor shall notify the UTILITIES a minimum of forty-eight (48) hours prior to performing any CCTV gravity main inspection work.

3.05 TELEVISIONING OF GRAVITY MAINS

- A. Wherever possible, gravity mains shall be televised in the downstream direction.
- B. Sufficient water shall be run through each section of main until water runs through each downstream manhole no more than twenty-four (24) hours prior to televising each line segment. Line segments not televised within the same work day or line segments re-televised shall be required to provide sufficient water no more than twenty-four (24) hours prior to the televising. Lines that are dry or that enough water has not run through to reach the downstream manhole shall not be televised and shall be rejected.
- C. No jet cleaning shall be permitted after water is run through the system. No cleaning shall be permitted during CCTV of the sanitary sewer system.
- D. Gravity mains shall be televised from manhole to manhole utilizing a 360-degree pan and tilt color camera driven through at a moderate rate of speed not more than 30 feet per min. The camera shall be of the self-propelled tractor type with a measuring device mounted to the front capable of being read as the tractor moves and capable of accurately measuring depth of standing water up to, and including, three (3) inches.
 1. Video recording shall begin at the top of the manhole to see the condition of the manhole, all joints, and any pipe that is connected to the manhole.
 - a. Record verification of the depth gauge increments and mandrel sizing.
 - b. Record going down into the manhole all the way to the preset footage with continuous recording until the downstream manhole.
 - c. At downstream manhole pan up to see the condition of the manhole, all joints, and any pipe that is connected to the manhole.
 - d. The CONTRACTOR shall continue recording as they pull back the camera and pass a mandrel through the PVC pipe.
 - e. During any time the recording is not continuous, the video shall be rejected.
 2. Prior to the camera entering the sanitary sewer main, the pipe diameter shall be verified on CCTV via a tape measure or other means for each line segment. The CONTRACTOR shall reset/preset the counter at the beginning of the pipe segment.
 3. Lighting shall be set to allow for clear visibility without excessive reflection and should allow realistic colors to be visible.
 4. The iris of the camera shall be adjusted to allow for a sharp focused image and the lens should be kept clean and free of obstructions.
 5. The operator should follow the manufacturer's instructions to achieve the

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4310: Testing & Inspection for Acceptance of Wastewater Collection and Transmission Systems

October 10, 2021

- proper color correction.
6. All notes or coded references shall have footages recorded with them
 7. The camera should be centered within the pipe.
 8. The distance between manhole centers shall be accurate within 0.5%.
 9. The camera shall be stopped at all laterals adjusted for a clear picture and an orbital scan of the lateral taken pausing at the invert at the service lateral to detect dirt or infiltration.
 10. The camera shall be stopped at all joints, adjusted for a clear picture and an orbital scan of the joint; pausing at any defects.
 11. All laterals shall be televised when reaching the lateral if a launch type camera is utilized.
 12. The camera shall also be stopped at any suspected or confirmed defects, the focus properly adjusted and a clear digital video taken.
 13. Areas suspected of leaking shall be paused long enough to determine if a leak exists currently or if deposits have occurred.
 14. A digital photo shall be taken of all confirmed or suspected defects.
 15. Manholes upstream and downstream shall be measured from rim to invert and the depth recorded on the inspection header in feet and inches.
 16. Manhole material and defects shall be noted.
- E. Manholes that have laterals tied into them shall have sufficient water ran through them and a CCTV inspection to the property line shall be conducted.
1. Water shall be dumped through laterals from the WYE cleanout at all terminal manholes. Water is to be poured until heavy flow is observed in the terminal manhole.
- F. Visible leakage, deflections, horizontal misalignment, significant bowing, pipe damage, non-constant slopes between manholes and sagging joints shall each be grounds for rejection of line segment.
- G. The CONTRACTOR shall notify the INSPECTOR to witness jet cleaning then dumping of water in gravity systems for all re-televising activities resulting from rejection of CCTV submittals for any reason.

3.06 CCTV QA/QC INSPECTION PROCEDURES AND CAUSES FOR REJECTION OF CCTV WORK

- A. The CONTRACTOR shall submit their Quality Assurance Plan and Quality Control procedures to UTILITIES. The CONTRACTOR shall ensure data quality and submit the results of the internal quality control checks performed on submitted data.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4310: Testing & Inspection for Acceptance of Wastewater Collection and Transmission Systems

October 10, 2021

- B. UTILITIES will perform quality control checks on submitted inspection data. Failure to meet the minimum accuracy noted below will be cause for rejection of submitted data. The following is the QC procedure to be employed by UTILITIES and serves as the minimum requirements for the CONTRACTOR.
1. The CONTRACTOR shall review of a minimum of 15% of the total inspections by each PACP certified operator entering the field CCTV data. The CONTRACTOR shall number the inspection reports in the order they were inspected.
 2. The CONTRACTOR shall number the inspection reports in the order they were inspected.
 3. Each inspection report that corresponds to the random numbers will be marked for review, the inspection report printed and the video copied to the QA/QC directory and submitted to UTILITIES.
 4. Each selected inspection report will be reviewed in detail against the inspection digital video.
 5. Each field that is populated and those that should have been populated will be counted to produce a “number of fields checked” for the required header information and detailed inspection information. The fields with errors, or missing data, regardless of the error will be totaled to determine the “error count”. The accuracy level will then be calculated as follows: $100 - ((\text{error count} / \text{number of fields checked}) * 100) = \text{accuracy percentage}$
 6. Utilities will review contractor’s quality control report and review an additional 5% or more inspections to insure contractor’s quality of work has been met.
 7. The accuracy of each PACP certified operator entering the field CCTV data shall meet or exceed 90%. Submittals where the accuracy level falls below 90% will be returned in their entirety for re-inspection and/or resubmittal.

3.07 GRAVITY MAIN INSPECTION CCTV REPORT

- A. The CONTRACTOR shall be required to submit the following deliverables as one (1) submittal, one (1) complete package.
1. Inspection reports to include:
 - a. Inspection session header information (see required fields above);
 - b. Defect log report including photo captures from CCTV video;
 - c. Schematic drawing of pipe showing defects; and
 - d. Format: Adobe Acrobat PDF files – 1 report PDF per pipe.

File name: <upstreamMHID>_<downstreamMHID>_<(YYYY_MM_DD)>.PDF

Example: F30060002_F30060001_2021_02_16.pdf

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4310: Testing & Inspection for Acceptance of Wastewater Collection and Transmission Systems

October 10, 2021

2. The CONTRACTOR shall submit quality control forms that include a hard copy print out of the inspection reports checked with errors and omissions clearly marked
 3. Inspection video files and transmittal sheets shall be labeled as follows: The typed index labels shall include the following information:
 - a. Content (CCTV);
 - b. Contractor name;
 - c. Purpose of survey;
 - d. Tributary pump station number;
 - e. Reaches included (from COUNTY manhole number to COUNTY manhole number);
 - f. Date of survey; and
 - g. Contract number / delivery order number (if applicable).
 4. Electronic inspection data stored and exported in a NASSCO Pipeline Assessment and Certification Program (PACP) compliant database as required by UTILITIES.
 5. Inspection photograph digital files (jpeg) indexed to NASSCO PACP compliant database.
- B. At the discretion of the UTILITIES partial CCTV submittals shall only be permitted through coordination with the INSPECTOR. Partial CCTV submittals shall clearly delineate the line segments to be provided in each package along with a UTILITIES approved schedule of CCTV inspections for all submittals.
- C. Submittals shall be saved and submitted on a portable USB hard/flash drives or COUNTY approved delivery method.

3.08 CAUSES FOR REJECTION OF GRAVITY MAINS

- A. The CONTRACTOR shall be required to replace the pipeline if the acceptance or year-end warranty CCTV inspection reveals cracked, broken or defective pipe, and/or in the case of PVC pipe a ring deflection in excess of 5%.
- B. Joint separation shall be no greater than 1-1/2 inches between the spigot and bell and shall not be tighter than the allowable homing permits.
- C. No evidence of leakage will be acceptable for public or private gravity mains connecting to UTILITIES' collection system.
- D. The following NASSCO PACP codes or notes shall be cause for rejection of gravity sewer systems:
 1. PACP coding of "Line" (L) shall be accompanied by a measurement of the line, grade or angular deviation. A PACP coding of MWLS with a percentage

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4310: Testing & Inspection for Acceptance of Wastewater Collection and Transmission Systems

October 10, 2021

- that exceeds or is equal to one (1) inch sag on the pipe will be corrected by excavation and repair. A “sag” is defined as any water holding depth which is equal or greater than one (1) inch.
2. PACP coding of “Infiltration” (I) for pipe joints shall be replaced or the pipe joint shall be resealed at the joint. Grouting shall not be considered a method of repair and will not be accepted. Replace the leaking gravity main segment if there is visible infiltration at any point other than the pipe joint.
 3. Any PACP coding in the category of “Structural Family”.
 4. PVC pipe having ID tears will be rejected and pipe shall be replaced.
 5. PACP condition grading of “OB” (obstruction) in pipe shall be rejected, the obstruction shall be removed and the line cleaned and re-televised.
- E. A “dip” is defined as any water holding depth which is equal or greater than the minimum depth of 1/2 inches and maximum depth of one (1) inch. There shall not be any more than one (1) dip per 135 linear feet of wastewater pipe installed (1 minimum). The defective pipe section(s), or those “dip”/section(s) over the allowable limit, shall be removed and replaced at no cost to the COUNTY. Each run of pipe, between two (2) manholes, shall be evaluated independently for compliance. Any dip which is greater than or equal to one (1) inch, is considered a sag, and is not acceptable and shall be removed and replaced at no cost to the COUNTY.

3.09 TESTING OF WASTEWATER FORCE MAINS

- A. The CONTRACTOR shall thoroughly clean the new pipe lines by flushing with water or other means to remove all dirt, stones or other material which may have entered the line during the construction period.
1. Preliminary flush shall be performed with a 2 inch jumper off water or reclaimed water main to achieve thorough cleaning. Flushing shall be allowed for pipes less than or equal to 8 inch.
 2. Swabbing:
 - a. In lieu of flushing, new force mains may be hydraulically or pneumatically cleaned with a polypropylene swabbing device to remove dirt, sand and debris from main.
 - b. Swabbing shall be required for 12 inch mains and greater.
 - c. If swabbing access and egress points are not provided in the design drawings, it will be the responsibility of the CONTRACTOR to provide temporary access and egress points for the cleaning, as required.
 - d. Passage of cleaning poly swabs through the system shall be constantly monitored, controlled and all poly swabs entered into the system shall be individually marked and identified so that the exiting of the poly swabs from the system can be confirmed.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4310: Testing & Inspection for Acceptance of Wastewater Collection and Transmission Systems

October 10, 2021

- e. Cleaning of the system shall be done in conjunction with the initial filling of the system for its hydrostatic test. After initial slow-fill, pipe shall sit full for twenty-four (24) hours to facilitate cleaning and collection of debris from interior of pipe.
 - f. The CONTRACTOR shall insert flexible polyurethane foam swabs (minimum 2 pounds per cubic foot density) complete with rear polyurethane drive seal, into the first section of pipe. The swabs shall remain there until the pipeline construction is completed.
 - g. Locate and open all new in-line valves beyond the point of connection on the pipeline to be cleaned during the swabbing operation.
 - h. At the receiver or exit point for the poly swab, the CONTRACTOR is responsible for creating a safe environment for collection of debris, water and the swab. Considerations shall be made for protecting surrounding personnel and property and safe retrieval of the swab.
 - i. Cleaning and flushing shall be accomplished by propelling the swab down the pipeline to the exit point with potable or reclaimed water from a jumper only. Flushing shall continue until the water is completely clear and swab is retrieved.
 - j. Re-apply a series of individual swabs in varying diameters and/or densities as required, to attain proper cleanliness of pipeline.
 - k. Swabbing speed shall range between 2 and 5 feet per second.
 - l. After the swabbing process, pressure and leakage testing of the pipe shall be completed in accordance with this MANUAL.
- B. Hydrostatic Pressure Testing:
1. Hydrostatic tests shall consist of pressure and leakage tests. Air testing of pressure pipes will not be permitted under any circumstance.
 2. Testing shall be performed from in-line valve to in-line valve with a depressurized section behind each valve.
 3. The CONTRACTOR shall pressure test against both sides of the valve.
 4. The CONTRACTOR shall furnish all necessary testing material and equipment to perform this test. UTILITIES will monitor and approve a satisfactory test.
 5. Multiple sections may be tested simultaneously providing there are dead or zero (0) pressure sections in between each pressure tested section.
 6. All pipe sections to be pressure tested shall be subjected to a hydrostatic pressure of 150 psi. The duration of each pressure test shall be for a period of two (2) hours. If during the test, the integrity of the tested line is in question, UTILITIES may require a six (6) hour pressure test. The basic provisions of AWWA C600 shall be applicable.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4310: Testing & Inspection for Acceptance of Wastewater Collection and Transmission Systems

October 10, 2021

7. Procedure for Pressure Test:
 - a. Each section of pipe, inclusive of all appurtenances to be tested, as determined by UTILITIES, shall be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the pipe in a satisfactory manner.
 - b. Before applying the specified test pressure, all air shall be expelled from the pipe. To accomplish this, taps shall be made and appropriate valves installed to ensure bleeding of all air from the main.
 - c. If defective pipes, fittings or valves are discovered during this pressure test, all such items shall be removed and replaced by the CONTRACTOR with sound material and the test shall be repeated until satisfactory results are obtained. Provisions of the current AWWA C600, where applicable, shall apply.

C. Hydrostatic Leakage Testing:

1. Procedure for Leakage Test:
 - a. After completion of the pressure test, a leakage test shall be conducted to determine the quantity of water lost by leakage under the specified test pressure. Applicable provisions of AWWA C600 shall apply.
 - b. Allowable leakage in gallons per hour for pipeline shall not be greater than that determined by the formula:

$$L = \frac{SD(P)^{0.5}}{148,000}$$

Note:

- L - Allowable leakage in gallons per hour.**
- S - Length of pipe tested, in feet.**
- D - Nominal diameter of the pipe in inches.**
- P - Average test pressure during leakage test in pounds per square inch gauge.**

2. Leakage is defined as the quantity of water to be supplied in the installed pipe or any valve section under test, which is necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled. Should any test of pipe installed disclose leakage greater than that allowed, the CONTRACTOR shall locate and replace or repair the defective joints, pipe or valve until subsequent testing is within the specified leakage allowance.
3. Reasons for rejection of the hydrostatic testing are listed below and shall require retesting.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4310: Testing & Inspection for Acceptance of Wastewater Collection and Transmission Systems

October 10, 2021

- a. Pressure drops below 150 psi during any part of the testing period;
- b. Pressure drop exceeds 5 psi at any point during the testing period;
- c. Measured amount of make-up water pumped into main to return the pressure to the testing start psi exceeds the allowable leakage in gallons as calculated per the above formula;
- d. Equipment failure or improper equipment during testing;
- e. All gauges shall zero (0) out after testing; and
- f. Site conditions or reasons as determined by UTILITIES for rejection of the testing, including but not limited to: fluctuation of pressure, tampering, increase in pressure, and weather.

3.10 ACCEPTANCE

A. Tracing Wire System:

1. All wastewater force mains shall be installed with a continuous green insulated copper wire. Locating wire installed as per STANDARD DRAWINGS shall pass a continuity check with an approved tracing system before acceptance by UTILITIES. The CONTRACTOR shall conduct a preliminary wire check scheduled with the INSPECTOR, prior to the installation of road base and shall be responsible for continuity throughout the warranty period.

B. Inspection of Wastewater Air Release Valves:

1. After completion of the pressure test the ARV shutoff valve shall be opened and UTILITIES shall test the ARV for proper connection and operation.

C. Inspection of Plug Valves and Valve Boxes:

1. Valves shall be opened wide, then tightly closed and the various nut and bolts shall be tested for tightness. Any valve that does not operate correctly shall be replaced. Valve boxes shall be properly marked and checked for installation as per the STANDARD DRAWINGS. Operating nuts, extensions and upper guides shall not interfere with valve operation. Before acceptance by UTILITIES valve boxes shall be adjusted to finished grade with the operating nut properly centered and shall have a "V" notched in the curb or street in the absence of a curb directly opposite the valve box.

D. Project Acceptance:

1. Successful passage of the leakage test, pressure tests, and CCTV inspection as applicable is required before acceptance by UTILITIES.
2. Prior to repair or replacement of failed sewer pipe, the method of repair or replacement shall be submitted to UTILITIES for approval.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

**Section 4310: Testing & Inspection for Acceptance of Wastewater
Collection and Transmission Systems**

October 10, 2021

- a. Including but are not limited to: pressure grouting, patching, chemical grouting, crack injection, coating or lining of pipe or manholes shall not be considered as an acceptable method of repair.
- b. Vibrating or re-rounding of the pipe shall not be considered as an acceptable method of repair.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4410: Testing & Inspection for Acceptance of Pump Stations

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. These specifications cover the testing and inspection for acceptance of wastewater pump stations.
- B. Requests for testing and acceptance of wastewater pump stations shall be executed in accordance with Section 4110, “General Inspection Requirements”.
- C. The startup and final check out shall demonstrate and ensure to UTILITIES the complete operating pump station system.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PREPARATION AND COORDINATION FOR TESTING

- A. The CONTRACTOR shall notify UTILITIES at least three (3) NORMAL WORKING DAYS prior to performing any testing.
- B. The CONTRACTOR shall install sufficient monitoring wells in the representative areas of the gravity system, acceptable to UTILITIES, to determine the groundwater elevations. Monitoring wells shall be installed a minimum twenty-four (24) hours prior to testing.

3.02 TESTING AND INSPECTION OF WETWELLS

- A. Base compaction shall be compacted to a minimum density of 95% of the maximum dry density as determined by AASHTO T-180.
- B. Leakage Test:
 1. There shall be no visible leakage through the walls or pipe connections. Any wetwell that leaks shall be rejected and replaced with new material at no cost to the COUNTY. No field repair shall be approved.
- C. Visual Inspection:
 1. All sections or joints, which have been damaged, will be rejected, removed from the site and replaced with new material. If already installed, rejected section shall be removed and replaced entirely at no cost to the COUNTY.
- D. Wetwell Liner Testing:
 1. All wetwell surfaces with lining shall be tested with an acceptable electrical holiday or flaw detector, if applicable, after installation and any imperfections discovered shall be repaired by a method approved by UTILITIES. The CONTRACTOR shall provide all necessary equipment and material for testing. Liners shall be tested in accordance with Section 3119, “Coatings and Linings” of this MANUAL.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4410: Testing & Inspection for Acceptance of Pump Stations

October 10, 2021

2. A report for each wetwell liner test shall be provided to UTILITIES prior to acceptance.

3.03 PUMP STATION START-UP TESTING AND INSPECTION

- A. The following shall have been successfully met prior to pump station start-up:
 1. All gravity infrastructure walk through and testing completed and accepted;
 2. CCTV inspections completed and accepted;
 3. CONTRACTOR wire checks completed and accepted;
 4. The CONTRACTOR shall conduct testing of all equipment and appurtenances prior to start-up testing and make all changes, adjustments and replacements as required;
 5. FDEP Water Clearance received;
 6. FDEP placard for fuel tank must be submitted to UTILITIES, if applicable;
 7. Permanent power and water meter installed onsite;
 8. Prior to scheduling the pump station start-up, the final RECORD DOCUMENTS including the BOUNDARY SURVEY with improvements must be submitted to and approved by UTILITIES, in accordance with Section 3111, "Project Record Documents"; and
 9. A laminated copy of the pump manufacturer's pump curve with the design engineer's high head and low head operating points marked on the curve shall be onsite.
- B. The intent of the start-up testing is for the CONTRACTOR to demonstrate to UTILITIES that the WORK will function as a complete and operable system under normal as well as emergency operating conditions and the pump station is ready for acceptance.
- C. The CONTRACTOR shall furnish all labor, fuel, energy, lubrication, water and all other materials, equipment, tools, and instruments necessary for pump station start-up testing and inspection.
- D. All material used shall be listed on the Appendix D, "List of Approved Products".
- E. All required permits, certification letters, current certified BOUNDARY SURVEY, spare parts and supplies shall be provided to UTILITIES.
- F. The pump station startup testing and inspection shall demonstrate that all applicable items of this MANUAL and the approved construction documents have been met. Listed below is a partial checklist of requirements to be met:
 1. The CONTRACTOR shall coordinate startup activities with UTILITIES, the manufacturer's representatives and subcontractors. A factory representative knowledgeable in the mechanical and electrical equipment furnished shall inspect and supervise a start-up of their respective equipment. A minimum of

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4410: Testing & Inspection for Acceptance of Pump Stations

October 10, 2021

one (1) full business day shall be provided for the testing. Additional time may be necessary due to faulty or incomplete WORK. Upon satisfactory completion of the equipment testing and inspection, the factory representative(s) shall issue the required manufacturer's warranty certificates.

2. Initiate startup of each system in accordance with the operation and maintenance manual. Demonstrate that all of the components of a system are operating under their own controls as designated without overheating or overloading any parts and without objectionable vibration as determined by UTILITIES.
3. Observe the system operation and make adjustments as necessary to optimize the system performance. Coordinate with UTILITIES for any adjustments desired or operational problems requiring debugging.
4. All functions of the pump station mechanical and electrical equipment shall be tested and inspected for operation and workmanship. All equipment shall be properly installed and meet the design performance requirements.
5. The pumps shall be flow tested at the pump station startup to verify their performance meets the design requirements and the manufacturer's pump curve.
6. The liner shall meet the testing requirements of the MANUAL and a letter or form signed by the UTILITIES' representative that testing was witnessed and approved.
7. A current BOUNDARY SURVEY shall be approved by UTILITIES prior to scheduling the pump station startup test and inspection. **The DEVELOPER shall bear the entire expense of rectifying WORK improperly installed due to the construction of improvements not totally within the site dedicated to UTILITIES.** An electronic version and one (1) hard copy of the certified BOUNDARY SURVEY shall be required with the RECORD DOCUMENT submittal.
8. Furnish one (1) electronic copy in Acrobat "pdf" format of the Operation and Maintenance Manual for the pump station to UTILITIES.
9. The DEVELOPER shall bear the entire expense of rectifying WORK installed outside the pump station property.

G. Re-testing:

1. If the start-up testing does not meet the requirements of this MANUAL, the deficiencies shall be corrected and the testing procedure will begin again in accordance with Section 4110, "General Inspection Requirements".

H. Fuel tank:

1. When a generator fuel tank is required, CONTRACTOR shall submit documentation that the facility has passed a FDEP fuel tank compliance inspection and assure installation is in accordance with 62-761 & 62-762, F.A.C., and Section 3412: Wastewater Pump Station Electrical Power & Control System.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4410: Testing & Inspection for Acceptance of Pump Stations

October 10, 2021

2. The “Storage Tank Facility Registration Form” will be completed by COUNTY Risk Management and submitted to the Florida Departmental of Environmental Protection and with all applicable fees.
3. When a generator fuel tank capacity is greater than 550 gallons, the placard shall be provided to UTILITIES.

I. Acceptance:

1. The pump station will be accepted based on the pump station functioning as a complete and operable system under normal as well as emergency operating conditions, applicable specifications of this MANUAL, the approved construction documents have been met, and any deficiencies that were observed and noted have been corrected.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4510: Testing & Inspection for Acceptance of Reclaimed Water Systems

October 10, 2021

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Shall meet section 4210, Part 1 “Testing & Acceptance of Water Systems”.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 TESTS

- A. Shall meet section 4210, Part 3 “Testing & Acceptance of Water Systems” with the following exceptions:
1. If the source of the flushing water is reclaimed water, the following disposal procedures shall be followed
 - a. If a wastewater gravity main, with sufficient capacity, is located within 100 feet of the flushing valve, the primary disposal option for disposing the flushing water into the wastewater gravity main. UTILITIES will determine if the wastewater gravity system has sufficient capacity.
 - b. In the event that a sanitary sewer with sufficient capacity is not within 100 feet of the connection, the alternative disposal option for the flushing water would be to discharge to grade.
 - i. Procure written permission to discharge the reclaimed water on the proposed property from the property owner.
 - ii. Prevent runoff or direct discharge from the property site by installing temporary containment facilities. This would include sandbagging any storm sewers that would intercept runoff from the site and if needed temporarily blocking outfall structures in storm water management pond.
 - c. In the event an overflow should occur, the following steps will be followed.
 - i. Close the flushing valve immediately.
 - ii. Notify the following agencies that a point source discharge of reclaimed water is occurring or has occurred:
 1. FDEP Central District office at 407-894-7555;
 2. Orange County Environmental Protection Division 407-836-1424;
 3. State Warning Point (if off-site discharge is over 1,000 gallons) 1-800-320-0519;
 4. UTILITIES Inspector; and
 5. UTILITIES Dispatch at 407-836-2777.

CHAPTER 4 FIELD TESTING AND INSPECTION PROCEDURES

Section 4510: Testing & Inspection for Acceptance of Reclaimed Water Systems October 10, 2021

- iii. Minimum information required to be given to these agencies and offices is as follows:
 - 1. Time of flushing;
 - 2. Location of flushing;
 - 3. Name, address, and telephone number of contractor performing flushing;
 - 4. Estimated volume of reclaimed water released off-site;
 - 5. Assessment of immediate impacts including; and
 - a. Potential for runoff into surface water bodies (lakes, rivers, streams, storm water retention ponds);
 - b. Potential for runoff into storm sewers;
 - c. Potential for runoff onto adjacent property not authorized to receive the flushing water (if applicable); and
 - d. Potential to cause erosion or channel formation on adjacent property not authorized to receive the flushing water.
 - 6. Corrective action taken or to be taken.
- B. Disinfection:
 - 1. Disinfection is not required for reclaimed water mains.

PART 4 ACCEPTANCE

4.01 WIRE CHECK

- A. Shall meet section 4210, Part 4, 4.01 “Testing & Acceptance of Water Systems”.

4.02 FIRE HYDRANTS (NOT APPLICABLE)

4.03 VALVES

- A. Shall meet section 4210, Part 4, 4.03 “Testing & Acceptance of Water Systems”.

4.04 VALVE BOXES

- A. Shall meet section 4210, Part 4, 4.04 “Testing & Acceptance of Water Systems”.

4.05 SERVICE LINES

- A. Shall meet section 4210, Part 4, 4.05 “Testing & Acceptance of Water Systems”.

4.06 BLOW OFF VALVE ASSEMBLIES

- A. Shall meet section 4210, Part 4, 4.06 “Testing & Acceptance of Water Systems”.

4.07 AIR RELEASE VALVE ASSEMBLIES

- A. Shall meet section 4210, Part 4, 4.07 “Testing & Acceptance of Water Systems”.

APPENDIX A STANDARD DRAWINGS

Table of Contents – Numeric Sort

October 10, 2021

GENERAL

OCU General Notes	GN
Bedding and Trenching - Type A	A101
Bedding and Trenching - Type B	A102
Canal or Drainage Ditch Crossing	A103
Restrained Horizontal Pipe Table - Water, Wastewater Force, & Reclaimed Water Mains (150 psi) ..	A104-1
Restrained Vertical Pipe Table - Water, Wastewater Force, & Reclaimed Water Mains (150 psi)	A104-2
Restrained Pipe Table - Reducers - Water, Wastewater Force, & Reclaimed Water Mains (150 psi) ...	A104-3
Thrust Collar - Water, Wastewater Force, & Reclaimed Water Mains (150 psi)	A106
Jack & Bore - Detail A	A107-1
Jack & Bore - Detail B	A107-2
Gate Valve & Box - Water & Reclaimed Water Mains	A108-1
Gate Valve & Box - Minimum Pipe Depth at Valve Per Manufacturer	A108-2
Butterfly Valve & Box - Water & Reclaimed Water Mains	A109
Plug Valve & Box - Wastewater	A110
Typical Valve Box & Cover	A111
Valve Box Pad	A112
Utility Main Marker	A113
Pipe Locating Wire	A114
Air or Combination Air/Vacuum Release Valve For Water & Reclaimed Water	A115-1
Combination Air Release Valve For Wastewater - 2” Dia	A115-2
Combination Air Release Valve For Wastewater (Offset) - 4” Dia & Greater	A115-3
Combination Air Release Valve For Wastewater (Above) - 4” Dia & Greater	A115-4
Horizontal Pipeline Separation Requirements	A116-1
Vertical Pipeline Separation Requirements	A116-2
Residential Service Locations With Reclaimed Water	A118-1
Residential Service Locations Without Reclaimed Water	A118-2
Single Family Residential Cul-De-Sac Utility Plan With Reclaimed Water	A119-1
Single Family Residential Cul-De-Sac Utility Plan Without Reclaimed Water	A119-2
Water & Reclaimed Water Services (Typical)	A120
MJ Tapping Sleeve & Gate Valve Assembly For Water & Reclaimed Water	A121-1
MJ Tapping Sleeve & Gate Valve with Plug Valve For Wastewater	A121-2
Permanent Blow Off Valve - Water & Reclaimed Water	A122-1
Temporary Blow Off Valve - Water & Reclaimed Water	A122-2
Blow Off Valve, Automatic - Water	A122-3
Directional Drill	A123
Standard Roadway Open-cut Detail	A124
Meter Installation Detail - 1 1/2” & 2”	A130
Meter Banks - Mains Greater Than 7.5-FT from R.O.W.	A131-1
Meter Banks - Short Service, Mains Greater Than 7.5-FT from R.O.W.	A131-2
Meter Banks - Mains Less Than 7.5-FT from R.O.W.	A132-1
Meter Banks - Short Service, Mains Less Than 7.5-FT from R.O.W.	A132-2
Meter Banks - Long Service	A133

APPENDIX A **STANDARD DRAWINGS**

Table of Contents – Numeric Sort

October 10, 2021

WATER DISTRIBUTION

Water Sample Station	A201-1
Temporary Sample Tap	A201-2
Double Detector Check Valve Assembly	A202
Fire Hydrant Assembly (Standard Configuration)	A203-1
Fire Hydrant Assembly (Limited Space Configuration)	A203-2
Fire Line Master Meter Assembly	A204
Swabbing Access Points	A205

WASTEWATER COLLECTION

Precast Concrete Manhole	A301
Gravity Manhole Connection	A302-1
Gravity Manhole Connection - Outside Drop	A302-2
Gravity Manhole Flow Channels	A303
Manhole in Non-Paved Area	A304
Standard Manhole Frame & Cover	A305
Service Lateral	A306-1
Service Lateral - Pipe Conflict	A306-2
Force Main to Gravity Sewer Connection	A307
Grease Interceptor	A308-1
Lint Trap	A308-2
Trash Compactor Drainage	A309

APPENDIX A **STANDARD DRAWINGS**

Table of Contents – Numeric Sort

October 10, 2021

WASTEWATER PUMP STATIONS

Pump Station General Notes	A401
Duplex Pump Station Design Specifications	A402-1
Duplex Pump Station Section	A402-2
Duplex Pump Station Plan	A402-3
Duplex Pump Station Access Hatch	A402-4
Duplex Pump Station Site Plan	A402-5
Triplex Pump Station Design Specifications	A403-1
Triplex Pump Station Section	A403-2
Triplex Pump Station Plan	A403-3
Triplex Pump Station Access Hatch	A403-4
Triplex Pump Station Site Plan	A403-5
Quadplex (Plus) Pump Station Design Specifications	A404-1
Quadplex (Plus) Pump Station Sections	A404-2
Quadplex (Plus) Pump Station Plan	A404-3
Quadplex (Plus) Pump Station 3D Perspectives	A404-4
Quadplex (Plus) Pump Station Site Plan	A404-5
Wet Well Riser Pipe Support Assembly (Four or More Pumps)	A404-6
Pump Base Plate	A405
Chain Link Fence	A406-1
Rolling Slide Gate on Chain Link Fence	A406-2
Pump Station Block Wall	A407-1
Rolling Slide Gate on Block Wall	A407-2
Yard Hydrant / Hose Bibb at Pump Station	A408
OCU Water Pressure Gauge & Reduced Pressure Backflow Preventer, 2”	A409-1
Reduced Pressure Backflow Preventer, 2” & Smaller	A409-2
Pump Station Pressure Sensor & Transmitter Assembly	A410
Concrete Pipe Support	A411
Duplex Pump Station Control Panel Front & Plan View (240V)	A413
Duplex Pump Station Control Panel Front & Plan View (480V) (Pumps < 25HP)	A414-1
Duplex Pump Station Control Panel Front & Plan View (480V) (Pumps ≥ 25HP)	A414-2
Duplex Pump Station Control Panel Rear View (240V & 480V) (Pumps < 25HP)	A415-1
Duplex Pump Station Control Panel Rear View (240V & 480V) (Pumps ≥ 25HP)	A415-2
Triplex Pump Station Control Panel Front View (480V)	A416
Triplex Pump Station Control Panel Rear View (480V)	A417
SPD Installation	A418
Pump Station Grounding (Typical)	A419-1
Cover & Door Grounding	A419-2
Ground Test Well	A419-3
Private Pump Station Sign	A420
Pump Station SCADA Panel Field Wiring Diagram	A432-1
Pump Station SCADA Panel Installation Details	A432-2
Pump Station Driveway, Slab Slope, & Expansion Joints	A450

APPENDIX A **STANDARD DRAWINGS**

Table of Contents – Numeric Sort

October 10, 2021

RECLAIMED WATER DISTRIBUTION

Reclaimed Water Signage “Do Not Drink Water”	A501
Reclaimed Water Signage “Do Not Swim”	A502
Reclaimed Water Master Meter Assembly, (County Use Agreement Required), 4” & Larger	A503
Single Reclaimed Water Master Meter Assembly, (3” Meter)	A504
Double Reclaimed Water Master Meter Assembly, (3” Meter)	A505

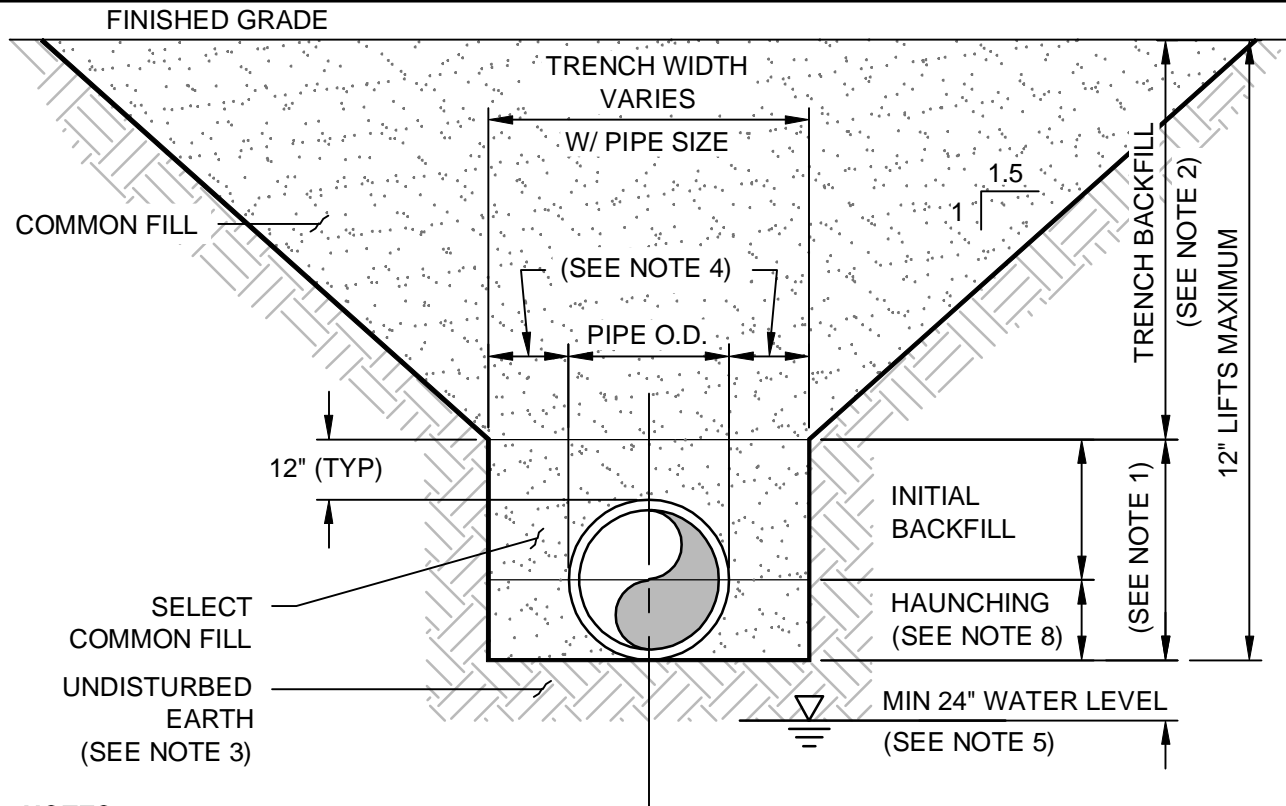
ROADWAY AND UTILITIES CORRIDOR GUIDES

38-FT Clear Zone (26-FT Minimum Private Alley)	A910
50-FT Clear Zone (50-FT Minimum Public R.O.W., 0-FT Setback)	A920
60-FT Clear Zone (50-FT Minimum Public R.O.W., 10-FT Setback) (Residential < 30 mph)	A921
70-FT Clear Zone (50-FT Minimum Public R.O.W., 15-FT Setback) (Residential < 30 mph)	A930
70-FT Clear Zone (50-FT Minimum Public R.O.W., 2-Lane Street W/Parking) (Residential)	A931
70-FT Clear Zone (70-FT Minimum Public R.O.W., 2-Lane Street W/Parking)	A932
80-FT Clear Zone (60-FT Minimum Public R.O.W., 2-Lane Street W/Bike Lanes) (Residential)	A940-1
80-FT Clear Zone (60-FT Minimum Public R.O.W., 2-Lane Street W/Bike Lanes) (Residential)	A940-2
80-FT Clear Zone (60-FT Minimum Public R.O.W., 2-Lane Street W/Bike Lanes & Parking) (Residential).....	A942
90-FT Clear Zone (70-FT Minimum Public R.O.W., 2-Lane Street W/Bike Lanes & Parking) (Residential).....	A950
90-FT Clear Zone (70-FT Minimum Public R.O.W., 2-Lane Divided St/Ave W/Parking) (Residential).....	A951

OCU GENERAL NOTES

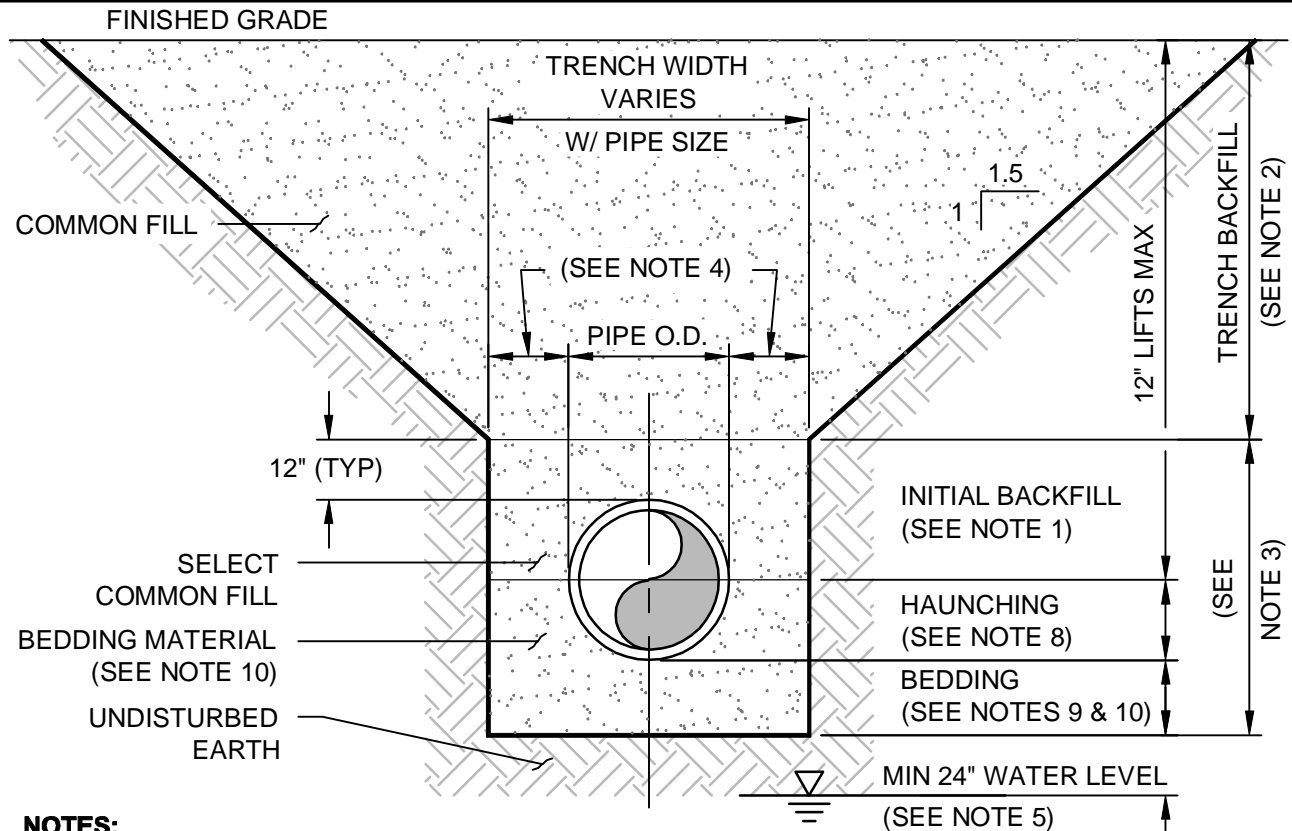
1. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION WHEN EXCAVATING IN PROXIMITY OF INCLUDING, BUT NOT LIMITED TO; WATER MAINS, WASTEWATER FORCE MAINS, GRAVITY MAINS, RECLAIMED WATER MAINS, ELECTRIC, GAS, CABLE TV, TELECOMMUNICATIONS, STORM WATER, FIBER OPTIC AND OTHER UNDERGROUND FACILITIES. MAIN LOCATIONS SHOWN ON PLANS MAY NOT BE EXACT. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING EXISTING UTILITY LOCATIONS.
2. SHOULD A PIPE EMERGENCY OCCUR, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OCU DISPATCH OPERATOR (407-836-2777) AND THE OCU INSPECTOR.
3. THE CONTRACTOR SHALL NOTIFY THE OCU CONSTRUCTION INSPECTION SECTION, FIELD SERVICES DIVISION AT LEAST 10 CALENDAR DAYS PRIOR TO COMMENCEMENT OF THE CONSTRUCTION PROJECT BY CALLING (407) 254-9798.
4. THE CONTRACTOR SHALL NOTIFY THE OCU CONSTRUCTION INSPECTOR IN ACCORDANCE WITH TABLE 4110-1 "UTILITIES' SCHEDULE OF NOTIFICATIONS IN THIS MANUAL.
5. THE MATERIALS, PRODUCTS, AND CONSTRUCTION OF ALL UTILITIES CONNECTING TO THE OCU SYSTEM SHALL BE IN CONFORMANCE WITH THE STANDARDS, CONSTRUCTION SPECIFICATIONS, AND APPENDIX D IN THIS MANUAL.
6. ALL EXISTING UTILITIES INCLUDING BUT NOT LIMITED TO; WATER MAINS, FORCE MAINS, RECLAIMED WATER MAIN, SANITARY GRAVITY PIPES, STORM WATER PIPES, ELECTRIC, TELEPHONE, GAS, POLES AND STAYS, CABLE TV AND OTHER UTILITY FACILITIES WITHIN THE LIMITS OF THE PROJECT WILL BE SUPPORTED AND PROTECTED AGAINST DAMAGE DURING CONSTRUCTION.
7. THE CONTRACTOR SHALL ADJUST ALL EXISTING OCU MAINS AND FACILITIES IN CONFLICT WITH NEW GRADE, NEW OR ALTERED ROADWAYS, SIDEWALKS, DRIVEWAYS, CURBS, OR STORM WATER IMPROVEMENTS. OCU FACILITIES TO BE ADJUSTED INCLUDE, BUT ARE NOT LIMITED TO; PIPELINES, PUMP STATIONS, VALVE BOXES, AIR RELEASE VALVES, FIRE HYDRANTS, MANHOLE COVERS, AND METERS. ALL ADJUSTMENTS SHALL BE MADE TO CURRENT STANDARDS.
8. ONLY OCU PERSONNEL SHALL OPERATE EXISTING OCU WATER, WASTEWATER, AND RECLAIMED WATER VALVES. THE CONTRACTOR IS RESPONSIBLE FOR OPERATING ANY NEWLY INSTALLED VALVE THAT HAS NOT BEEN CLEARED FOR USAGE BY FDEP AND OCU. THE CONTRACTOR SHALL COORDINATE VALVE OPERATION WITH THE OCU INSPECTOR. FOR OPERATION OF MAINS NOT OWNED BY OCU, IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH THE APPROPRIATE UTILITY REPRESENTATIVE.
9. CONSTRUCTION ACTIVITIES SHALL NOT CAUSE INTERRUPTIONS IN WATER, WASTEWATER, OR RECLAIMED WATER SERVICE. THE CONTRACTOR SHALL COORDINATE PRE-APPROVED INTERRUPTIONS OF SERVICE WITH THE OCU INSPECTOR 7 WORKING DAYS IN ADVANCE AND WRITTEN NOTICE SHALL BE GIVEN TO AFFECTED CUSTOMERS AT LEAST 4 WORKING DAYS IN ADVANCE.
10. THE CONTRACTOR SHALL PROVIDE FOR BYPASSING AND / OR HAULING OF WASTEWATER DURING APPROVED INTERRUPTIONS OF WASTEWATER FLOWS AND CONNECTIONS. THE CONTRACTOR SHALL SUBMIT A BYPASS OR HAUL PLAN, REVIEWED AND APPROVED BY A PROFESSIONAL ENGINEER TO OCU DEVELOPMENT ENGINEERING AND TO THE INSPECTOR FOR APPROVAL PRIOR TO IMPLEMENTATION BY CONTRACTOR.
11. ALL VALVES INSTALLED AS PART OF THIS CONSTRUCTION PROJECT SHALL REMAIN CLOSED DURING CONSTRUCTION. KEEP VALVES ON ALL WET TAPS CLOSED UNTIL CLEARED BY FDEP. DO NOT CONNECT NEWLY CONSTRUCTED WATER MAINS TO ANY EXISTING WATER MAINS UNLESS CLEARED BY FDEP AND OCU.
12. THE CONTRACTOR SHALL PROVIDE A JUMPER ASSEMBLY WITH AN APPROVED BACKFLOW PREVENTER FOR MAKING TEMPORARY CONNECTIONS TO AN EXISTING POTABLE WATER SOURCE IN ORDER TO CHLORINATE AND FLUSH NEW WATER MAINS WITH POTABLE WATER. ANY TEMPORARY POTABLE WATER CONNECTIONS TO RECLAIMED WATER OR FORCE MAIN SHALL ALSO BE EQUIPPED WITH AN APPROVED BACKFLOW PREVENTER.
13. FOR PVC PIPE, NO JOINT DEFLECTION OR PIPE BENDING IS ALLOWED. ALIGNMENT CHANGE SHALL BE MADE ONLY WITH FITTINGS.
14. FOR DIP PIPE, LONG RADIUS CURVES, EITHER HORIZONTAL OR VERTICAL, MAY BE INSTALLED WITH STANDARD PIPE BY DEFLECTIONS AT THE JOINTS. MAXIMUM DEFLECTIONS AT PIPE JOINTS, FITTINGS AND LAYING RADIUS FOR THE VARIOUS PIPE LENGTHS SHALL NOT EXCEED 75 PERCENT OF THE PIPE MANUFACTURER'S RECOMMENDATION.
15. FOR APPROVED PVC OR HDPE PIPE USED IN A HORIZONTAL DIRECTIONAL DRILL INSTALLATION, THE CURVATURE AND/OR DEFLECTION SHALL NOT EXCEED THE PARAMETERS ESTABLISHED IN THIS MANUAL.
16. ALL DAMAGE TO ORANGE COUNTY INFRASTRUCTURE, PIPELINES, AND ASSETS SHALL BE REPAIRED IMMEDIATELY BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE WITH AN APPROVED METHOD BY THE COUNTY. IF THE REPAIR IS NOT PERFORMED IN A TIMELY MANNER, AS DETERMINED BY THE ORANGE COUNTY UTILITY INSPECTOR, ORANGE COUNTY MAY PERFORM REPAIRS AND THE CONTRACTOR WILL BE CHARGED FOR ALL EXPENSES ASSOCIATED WITH THE REPAIR.
17. THE CONTRACTOR SHALL BE LIABLE FOR ANY AND ALL SANITARY SEWER OVERFLOWS (SSO) ASSOCIATED WITH THE WORK, REGARDLESS OF FAULT. THE CONTRACTOR WILL BE ASSESSED PENALTIES FOR ANY AND EACH SSO AS SPECIFIED IN SECTION 3110, GENERAL CONSTRUCTION REQUIREMENTS.

BEDDING & TRENCHING - TYPE A

**NOTES:**

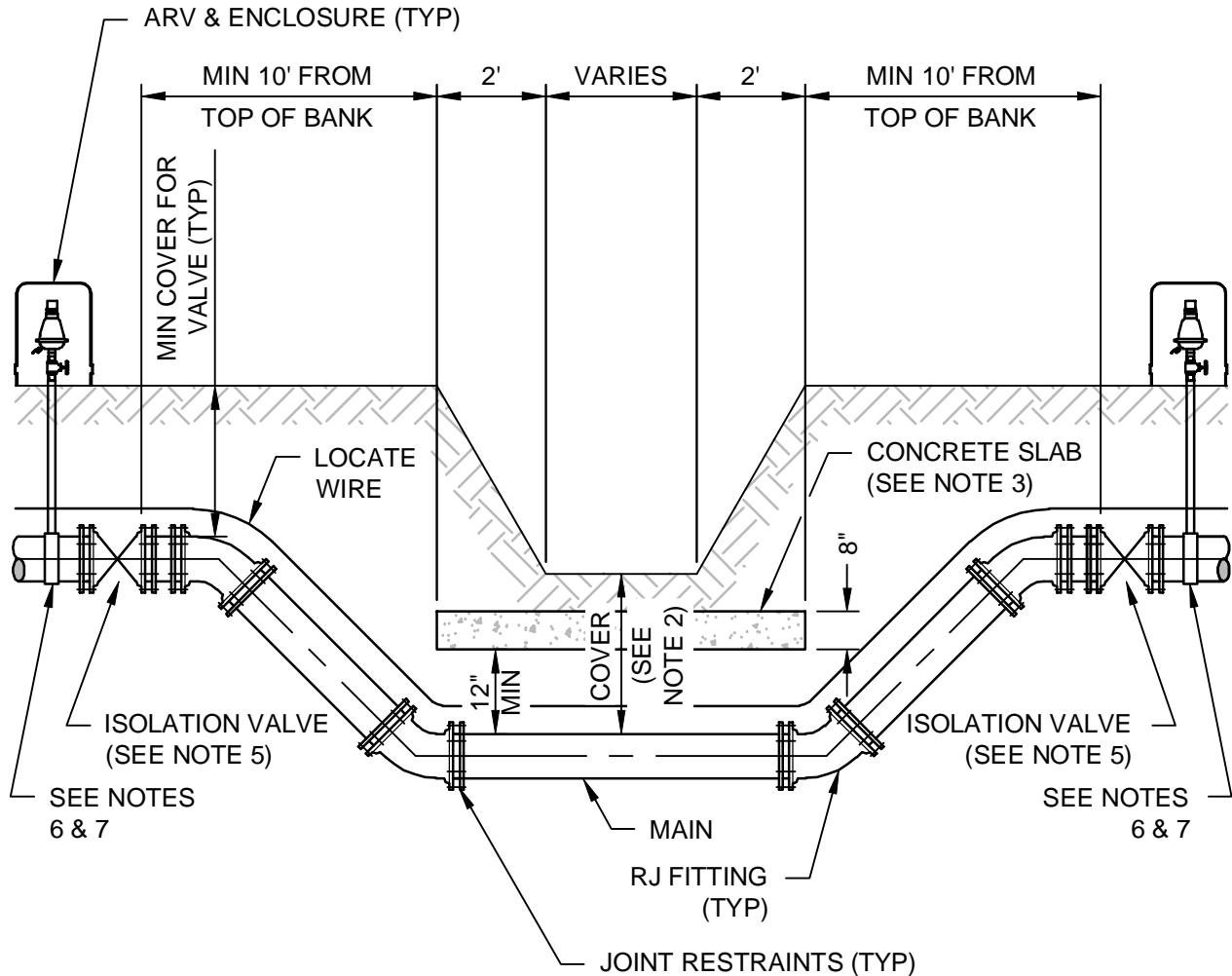
1. INITIAL BACKFILL AND HAUNCHING: SELECT COMMON FILL COMPACTED TO MIN 95% (98% UNDER PAVEMENT OR FUTURE PAVEMENT) OF THE MAXIMUM DENSITY AS PER AASHTO T-180.
2. TRENCH BACKFILL: COMMON FILL COMPACTED TO MIN 95% (98% UNDER PAVEMENT OR FUTURE PAVEMENT) OF THE MAXIMUM DENSITY AS PER AASHTO T-180.
3. PIPE BEDDING UTILIZING SELECT COMMON FILL IN ACCORDANCE WITH "TYPE B" BEDDING AND TRENCHING DETAIL MAY BE REQUIRED AS DIRECTED BY UTILITIES.
4. 15-IN MAX. (12-IN MIN.) FOR PIPE DIAMETER LESS THAN 24-IN AND 24-IN MAX (12-IN MIN) FOR PIPE DIAMETER 24-IN AND LARGER.
5. WATER SHALL NOT BE PERMITTED IN THE TRENCH DURING CONSTRUCTION. DEWATERING AS REQUIRED.
6. ALL PIPE SHALL 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 ORANGE COUNTY RIGHT-OF-WAY SHALL COMPLY WITH REQUIREMENTS OF RIGHT-OF-WAY UTILIZATION REGULATIONS AND ROAD CONSTRUCTION SPECIFICATIONS.
8. FOR GRAVITY SEWER, THE FIRST LIFT SHALL BE PLACED TO THE SPRING LINE OF THE PIPE AND COMPACTED BY HAND TAMP.
9. CONTRACTOR SHALL USE BEDDING AND TRENCHING - TYPE B DETAIL FOR OVER EXCAVATION AND WHEN UNSUITABLE MATERIALS ARE ENCOUNTERED IN THE EXCAVATION.

BEDDING & TRENCHING - TYPE B

**NOTES:**

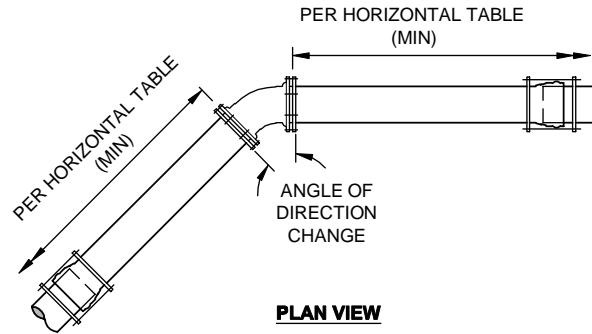
1. INITIAL BACKFILL: SELECT COMMON FILL COMPACTED TO MIN 95% (98% UNDER PAVEMENT OR FUTURE PAVEMENT) OF THE MAXIMUM DENSITY AS PER AASHTO T-180.
2. TRENCH BACKFILL: COMMON FILL COMPACTED TO MIN 95% (98% UNDER PAVEMENT OR FUTURE PAVEMENT) OF THE MAXIMUM DENSITY AS PER AASHTO T-180.
3. PIPE BEDDING UTILIZING SELECT COMMON FILL IN ACCORDANCE WITH "TYPE B" BEDDING AND TRENCHING DETAIL MAY BE REQUIRED AS DIRECTED BY UTILITIES.
4. 15-IN MAX. (12-IN MIN.) FOR PIPE DIAMETER LESS THAN 24-IN AND 24-IN MAX (12-IN MIN) FOR PIPE DIAMETER 24-IN AND LARGER.
5. WATER SHALL NOT BE PERMITTED IN THE TRENCH DURING CONSTRUCTION. DEWATERING AS REQUIRED.
6. ALL PIPE SHALL 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 ORANGE COUNTY RIGHT-OF-WAY SHALL COMPLY WITH REQUIREMENTS OF R/W UTILIZATION REGULATIONS AND ROAD CONSTRUCTION SPECIFICATIONS.
8. FOR GRAVITY SEWER, THE FIRST LIFT SHALL BE PLACED TO THE SPRING LINE OF THE PIPE AND COMPACTED BY HAND TAMP.
9. BEDDING DEPTH SHALL BE 4-IN MINIMUM FOR PIPE DIAMETER UP TO 12-IN AND 6-IN MINIMUM FOR PIPE DIAMETER 16-IN AND LARGER.
10. DEPTH FOR REMOVAL OF UNSUITABLE MATERIAL SHALL GOVERN DEPTH OF REQUIRED BEDDING MATERIAL BELOW THE PIPE. UTILITIES SHALL DETERMINE REMOVAL OF UNSUITABLE MATERIAL TO REACH SUITABLE FOUNDATION IN THE FIELD.

CANAL OR DRAINAGE DITCH CROSSING

**NOTES:**

1. MAIN SHALL BE INSTALLED WITH MINIMUM NUMBER OF JOINTS WITHIN THE CANAL OR DITCH. ALL JOINTS WITHIN THE CANAL OR DITCH SHALL BE RESTRAINED.
2. CONCRETE IS REQUIRED WHEN COVER IS LESS THAN 5-FT FOR DRY AND WET CROSSINGS. COVER WITH SLAB SHALL NOT BE LESS THAN 3-FT.
3. CONCRETE SLAB SHALL BE A MINIMUM OF 8-IN THICK AND 10-FT WIDER THAN THE PIPE O.D.
4. CONCRETE SHALL BE MINIMUM 2,500 PSI COMPRESSIVE STRENGTH.
5. ISOLATION VALVES REQUIRED ADJACENT TO CANAL/DITCH FOR WET CROSSINGS.
6. AIR RELEASE VALVES ARE REQUIRED IN ACCORDANCE WITH THE MANUAL SPECIFICATIONS FOR ELEVATION CHANGES.
7. SEPARATION REQUIREMENTS BASED ON CONNECTION METHOD AND PIPE MATERIAL. SEE SECTION 3117 AND DETAIL SERIES A115.
8. ADDITIONAL TAPS MAY BE REQUIRED ON WATER MAINS CROSSING SURFACE WATER PER RECOMMENDED STANDARDS FOR WATER WORKS (RSWW PART 8.9).

RESTRAINED HORIZONTAL PIPE - WATER, WASTEWATER FORCE, & RECLAIMED WATER MAINS (150 PSI)

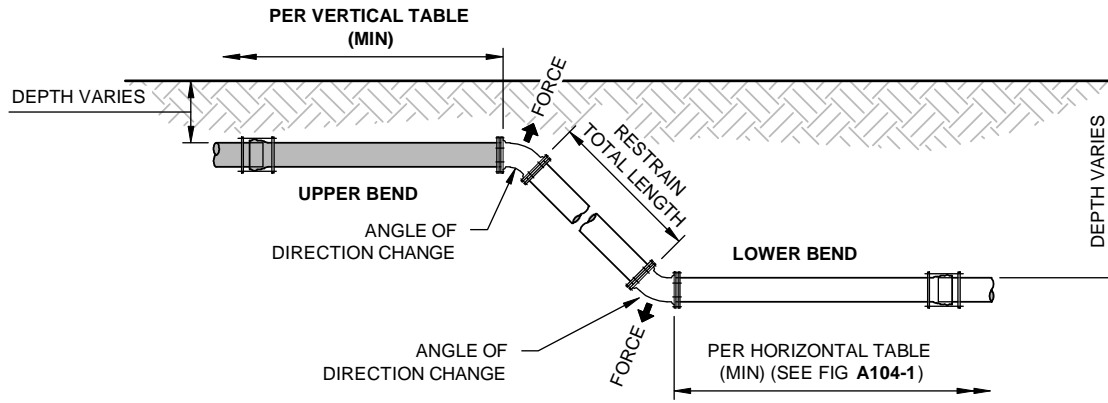


MINIMUM LENGTH (FT) TO BE RESTRAINED ON EACH SIDE OF FITTING(S)		PVC AND DUCTILE IRON PIPE SIZE (IN)													
	TYPE	4	6	8	12	16	20	24	30	36	42	48	54	60	64
		HORIZONTAL	90° BEND	21	29	37	52	65	78	104	122	143	154	167	180
45° BEND	9		12	16	22	27	33	43	51	60	64	70	75	78	81
22-1/2° BEND	5		6	8	11	13	16	21	25	29	31	34	36	38	39
11-1/4° BEND	2		3	4	6	7	8	11	12	15	16	17	18	19	20
5 5/8° BEND OR MJ SLEEVE	1		2	2	3	4	4	6	6	8	8	9	9	10	10
PLUG OR BRANCH OF TEE OR DEAD END	43		59	78	109	139	167	277	330	415	424	465	506	529	551
VALVE OR LINE STOP	22		30	39	55	70	84	139	165	208	212	233	253	265	276
HDPE CONNECTION	19		26	34	49	62	75	125	151	174	203	223			

NOTES:

- FITTINGS SHALL HAVE RESTRAINED JOINTS UNLESS OTHERWISE INDICATED.
- INSTALL FULL LENGTH JOINTS WITH TOTAL LENGTH EQUAL TO OR GREATER THAN LENGTH SHOWN IN THE TABLE.
- WHERE TWO OR MORE FITTINGS ARE IN SERIES, SELECT FITTING RESTRAINT LENGTH THAT YIELDS THE LONGEST RESTRAINT DISTANCE.
- ALL INLINE VALVES SHALL BE RESTRAINED.
- WHERE INTERNAL RESTRAINED JOINTS ARE USED, THE ENTIRE BELL SHALL BE PAINTED RED.
- LENGTHS SHOWN IN THE TABLE WERE CALCULATED IN ACCORDANCE WITH PROCEDURES OUTLINED IN "THRUST RESTRAINT DESIGN FOR DUCTILE IRON PIPE" GUIDELINES PUBLISHED BY DIPRA, USING THE ASSUMPTIONS SHOWN BELOW:
 WORKING PRESSURE: **150 PSI**
 SOIL DESIGNATION: **SM (SAND SILT)**
 LAYING CONDITIONS: **3**
 DEPTH OF COVER: **3-FT**
 SAFETY FACTOR: **1.5**
 THE DESIGN ENGINEER SHALL INCREASE THE VALUES IN THE TABLE AS WARRANTED BY SITE-SPECIFIC PARAMETERS, SUCH AS SOIL DESIGNATIONS AND LAYING CONDITIONS.
- 90° BENDS ON VERTICAL PIPE ARE SUBJECT TO REVIEW AND APPROVAL OF UTILITIES.
- IF 4-IN THRU 20-IN PIPE IS POLYETHYLENE ENCASED, USE 1.25 MULTIPLIER ON RESTRAINT LENGTH.
- RESTRAINING REQUIREMENTS APPLY TO BOTH EXISTING AND PROPOSED MAINS.

RESTRAINED VERTICAL PIPE - WATER, WASTEWATER FORCE, & RECLAIMED WATER MAINS (150 PSI)



PROFILE VIEW

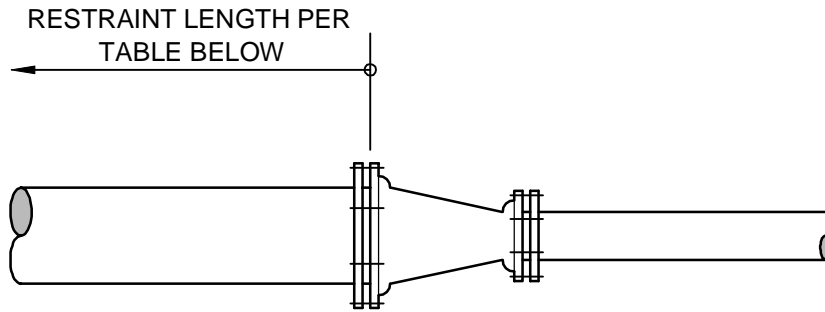
NOTES:

1. FITTINGS SHALL HAVE RESTRAINED JOINTS UNLESS OTHERWISE INDICATED.
2. INSTALL FULL LENGTH JOINTS WITH TOTAL LENGTH EQUAL TO OR GREATER THAN LENGTH SHOWN IN THE TABLE.
3. WHERE TWO OR MORE FITTINGS ARE IN SERIES, SELECT FITTING RESTRAINT LENGTH THAT YIELDS THE LONGEST RESTRAINT DISTANCE.
4. ALL INLINE VALVES SHALL BE RESTRAINED.
5. WHERE INTERNAL RESTRAINED JOINTS ARE USED, THE ENTIRE BELL SHALL BE PAINTED RED.
6. LENGTHS SHOWN IN THE TABLE WERE CALCULATED IN ACCORDANCE WITH PROCEDURES OUTLINED IN "THRUST RESTRAINT DESIGN FOR DUCTILE IRON PIPE" GUIDELINES PUBLISHED BY DIPRA, USING THE ASSUMPTIONS SHOWN BELOW:
 WORKING PRESSURE: **150 PSI**
 SOIL DESIGNATION: **SM (SAND SILT)**
 LAYING CONDITIONS: **3**
 DEPTH OF COVER: **3-FT**
 SAFETY FACTOR: **1.5**
 THE DESIGN ENGINEER SHALL INCREASE THE VALUES IN THE TABLE AS WARRANTED BY SITE-SPECIFIC PARAMETERS, SUCH AS SOIL DESIGNATIONS AND LAYING CONDITIONS.
7. 90° BENDS ON VERTICAL PIPE ARE SUBJECT TO REVIEW AND APPROVAL OF UTILITIES.
8. IF 4-IN THRU 20-IN PIPE IS POLYETHYLENE ENCASED, USE 1.25 MULTIPLIER ON RESTRAINT LENGTH.
9. RESTRAINING REQUIREMENTS APPLY TO BOTH EXISTING AND PROPOSED MAINS.

MINIMUM LENGTH (FT) TO BE RESTRAINED ON EACH SIDE OF FITTING(S)

	TYPE	PVC AND DUCTILE IRON PIPE SIZE (IN)													
		4	6	8	12	16	20	24	30	36	42	48	54	60	64
VERTICAL (UPPER)	90° BEND	43	59	78	109	139	167	277	330	415	424	465	506	529	551
	45° BEND	18	25	32	45	58	69	115	137	172	176	193	210	219	229
	22-1/2° BEND	9	12	16	22	28	34	56	66	83	85	93	101	106	110
	11-1/4° BEND	5	6	8	11	14	17	28	33	41	42	46	50	53	55
	5 5/8° BEND OR MJ SLEEVE	3	3	4	6	7	9	14	17	21	21	23	25	26	28

RESTRAINED PIPE TABLE - REDUCERS - WATER, WASTEWATER FORCE, & RECLAIMED WATER MAINS (150 PSI)



MINIMUM LENGTH (FEET) TO BE RESTRAINED ON LARGE SIDE OF REDUCER

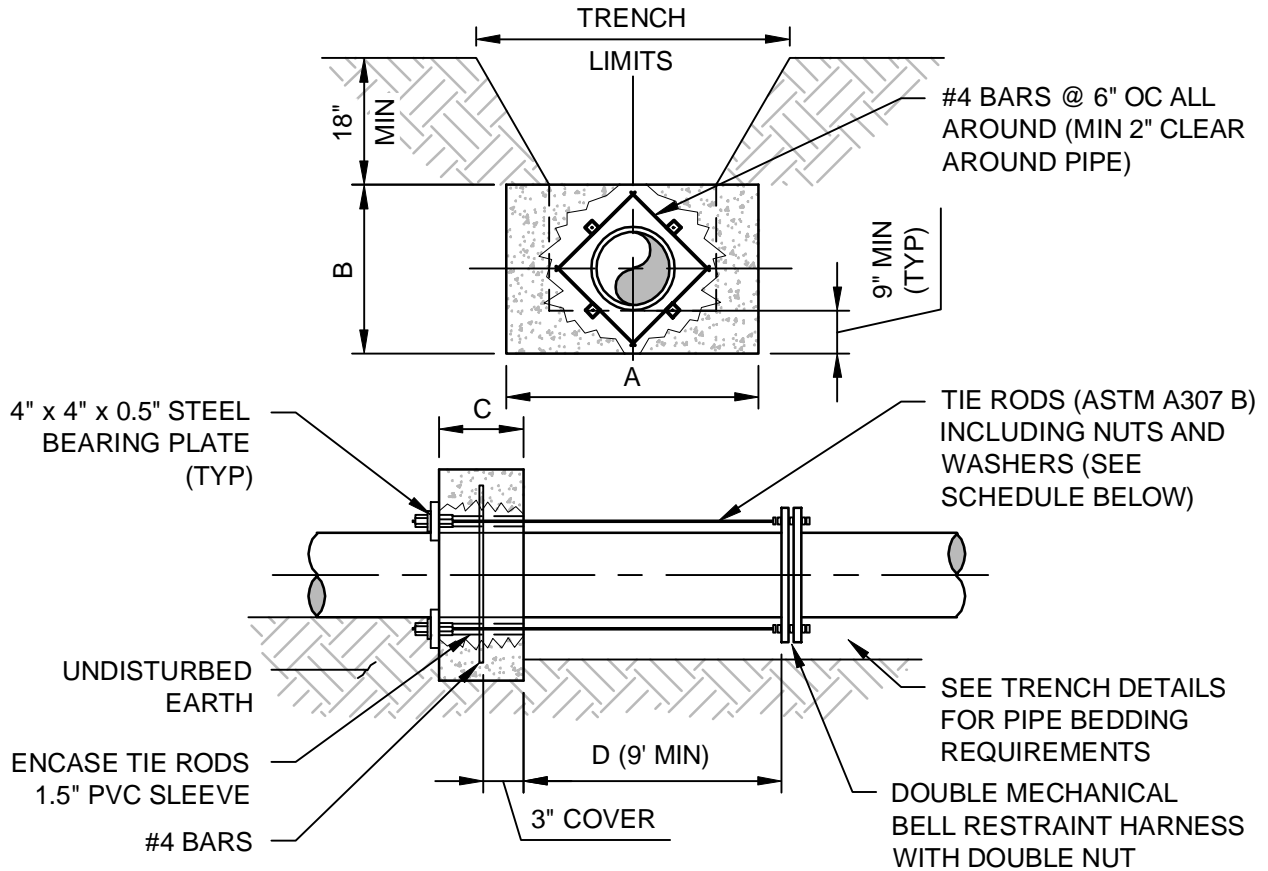
PVC & DI PIPE DIA (INCH)	REDUCER SMALL SIZE (IN)										
	4	6	8	12	16	20	24	30	36	42	48
6	31										
8	56	33									
12		79	58								
16			101	59							
20				105	59						
24				205	151	83					
30					233	180	116				
36						259	208	115			
42							281	205	110		
48								281	201	109	
54									282	204	112
60										253	170
64											222

* BASED ON WORKING PRESSURE 150 PSI

NOTES:

1. LENGTHS SHOWN IN THE TABLE WERE CALCULATED IN ACCORDANCE WITH THE PROCEDURES IN "THRUST RESTRAINT DESIGN FOR DUCTILE IRON PIPE", GUIDELINES PUBLISHED BY DIPRA AND AWWA M23 "PVC PIPE - DESIGN AND INSTALLATION.
2. THE DESIGN ENGINEER SHALL INCREASE THE VALUES IN THE TABLE AS WARRANTED BY SITE-SPECIFIC PARAMETERS, SUCH AS SOIL DESIGNATED AND LAYING CONDITIONS.
3. WHERE TWO OR MORE FITTINGS ARE IN SERIES, SELECT FITTING RESTRAINT LENGTH THAT YIELDS THE LONGEST RESTRAINT DISTANCE.
4. RESTRAINING REQUIREMENTS APPLY TO BOTH EXISTING AND PROPOSED MAINS.

THRUST COLLAR - WATER, WASTEWATER FORCE, & RECLAIMED WATER MAINS (150 PSI)



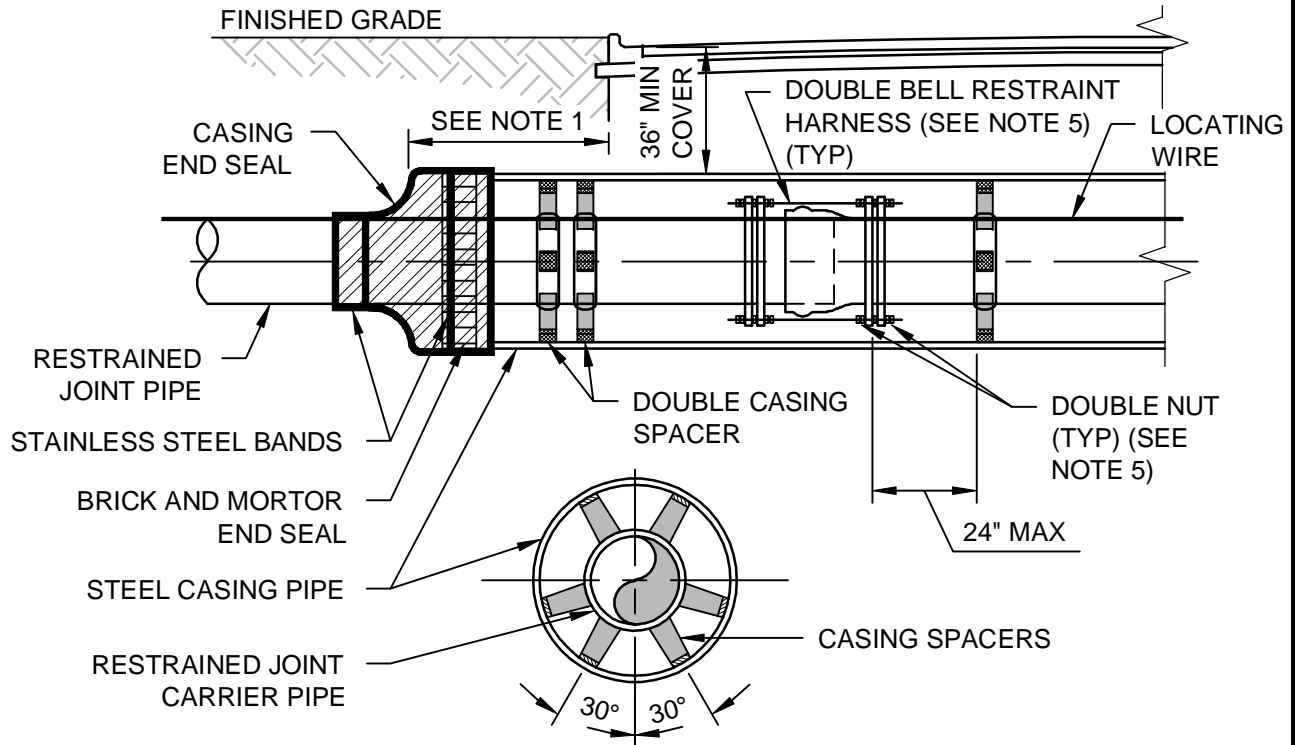
NOTES:

1. ADDITIONAL REINFORCEMENTS SHALL BE AS SPECIFIED BY THE ENGINEER.
2. MINIMUM COMPRESSIVE STRENGTH FOR CONCRETE SHALL BE 3,000 PSI.
3. BEDDING, BACKFILL AND COMPACTION SHALL BE AS SPECIFIED ELSEWHERE IN THE STANDARD DRAWINGS.
4. ALL FORM BOARDS SHALL BE REMOVED PRIOR TO BACKFILL.
5. NO ALLOWANCE SHALL BE MADE FOR FRICTION BETWEEN THE PIPE WALL AND THE THRUST COLLAR.
6. DESIGN PRESSURE: **150 PSI**.
7. REQUIRED FOR LINE STOPS IF RESTRAINT TABLE REQUIREMENTS CANNOT BE MET.

SCHEDULE OF DIMENSIONS AND MATERIALS						
PIPE SIZE (IN)	PIPE SIZE				TIE RODS REQ'D	
	DIMENSIONS (FT)				DIA	NO.
	A	B	C	D		
6	2.0	2.0	1.0		0.75	2
8	2.5	2.5	1.0		0.75	2
10	3.5	3.0	1.0		0.75	4
12	5.0	3.0	1.0		0.75	4
16	6.0	4.0	1.5		0.75	4
20	8.0	5.0	1.5		0.75	6
24	9.0	6.0	1.5		0.75	10
30	12.0	7.0	1.5		1.0	10
36	15.0	8.0	1.5		1.0	14
42	16.0	9.0	2		1.0	16
48	19.0	10.0	2		1.0	20
54	22.0	10.0	3		1.0	24
60	27.0	10.0	3		1.125	24
64	31.0	10.0	3		1.25	20

NOTE: THRUST COLLAR AREAS TO BE COMPUTED ON BASIS OF 2000 LBS/SF SOIL RESTRAINT BEARING.

JACK & BORE - DETAIL A

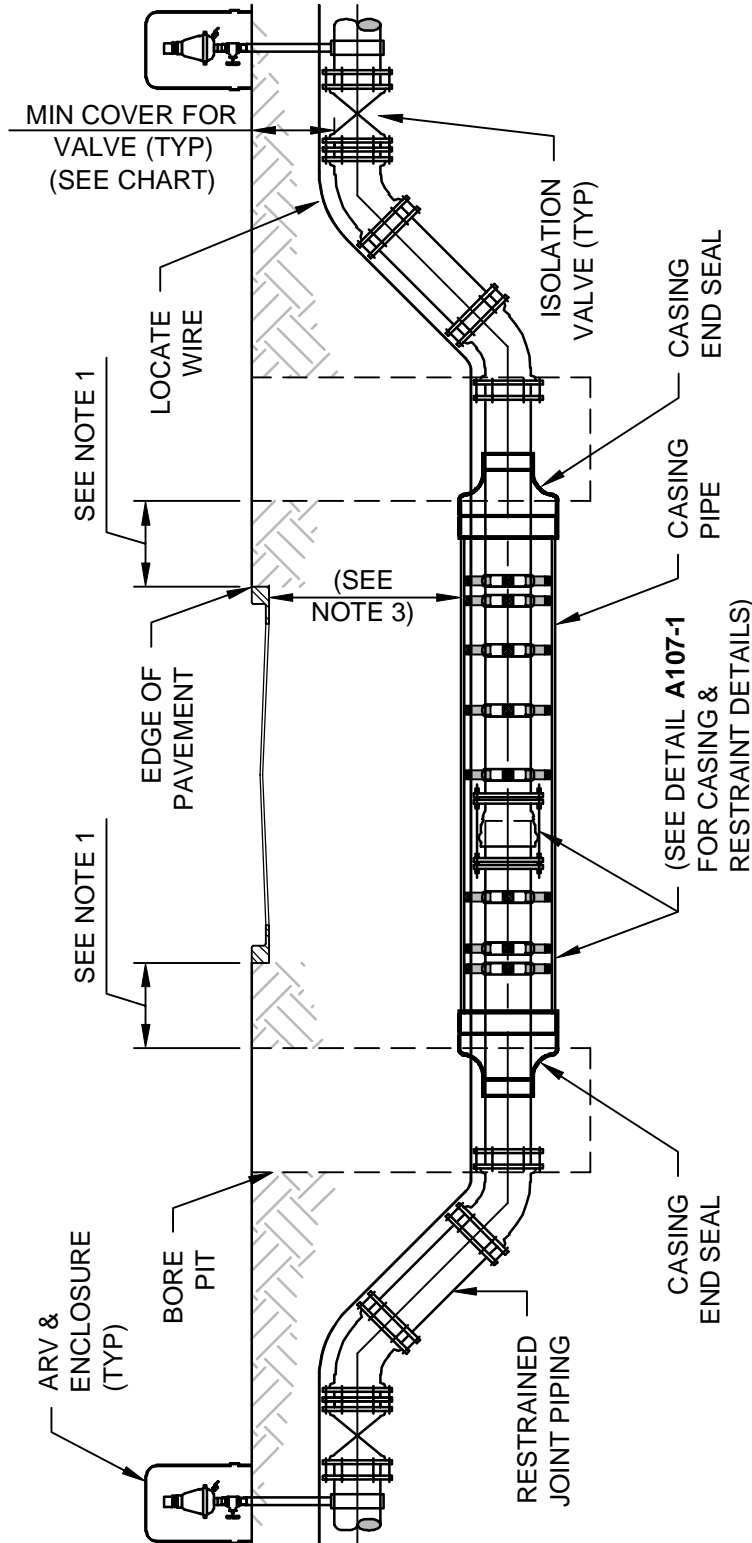


CARRIER PIPE NOMINAL DIAMETER (IN)	4	6	8	10	12	16	20	24	30	36	42
MINIMUM CASING OUTSIDE DIAMETER (IN)	16	16	18	20	24	30	36	42	48	54	60
MINIMUM CASING WALL THICKNESS (IN)	0.25	0.25	0.25	0.25	0.25	0.31	0.38	0.50	0.50	0.50	0.50

NOTES:

1. CASING SHALL EXTEND A MINIMUM OF 10-FT BEYOND THE EDGE OF PAVEMENT OR MEET FDOT REQUIREMENTS, WHICHEVER IS GREATER.
2. REQUIREMENTS OF OTHER JURISDICTIONS SHALL BE MET. WHEN CONSTRUCTION IS WITHIN FDOT JURISDICTION, ADDITIONAL REQUIREMENTS OF THE "FDOT UTILITY ACCOMMODATION GUIDE" SHALL BE MET.
3. DISTANCE BETWEEN SPACERS TO BE PER MANUFACTURER'S SPECIFICATIONS, OR MAX OF 6.5-FT, WHICHEVER IS MORE STRINGENT.
4. USE OF FLOWABLE FILL IN THE ANNULAR SPACE BETWEEN THE CASING AND CARRIER PIPE IS PROHIBITED.
5. PVC PIPE IN CASING SHALL HAVE A DOUBLE MECHANICAL BELL RESTRAINT HARNESS PER JOINT WHERE RODS ARE DOUBLE NUTTED TO PRECLUDE OVER-HOMING THE JOINT DURING INSTALLATION. BELL RESTRAINT PAIRS INSTALLED FACE TO FACE ON EACH SIDE OF BELL TO ALLOW FOR PROPER NUT INSTALLATION AND PREVENT BOTH OVER-HOMING AND BELL SEPARATION.
6. DI PIPE SHALL BE INTERNAL PUSH-ON RESTRAINED.
7. SEE DETAIL **A107-2** FOR FULL JACK AND BORE SECTION.

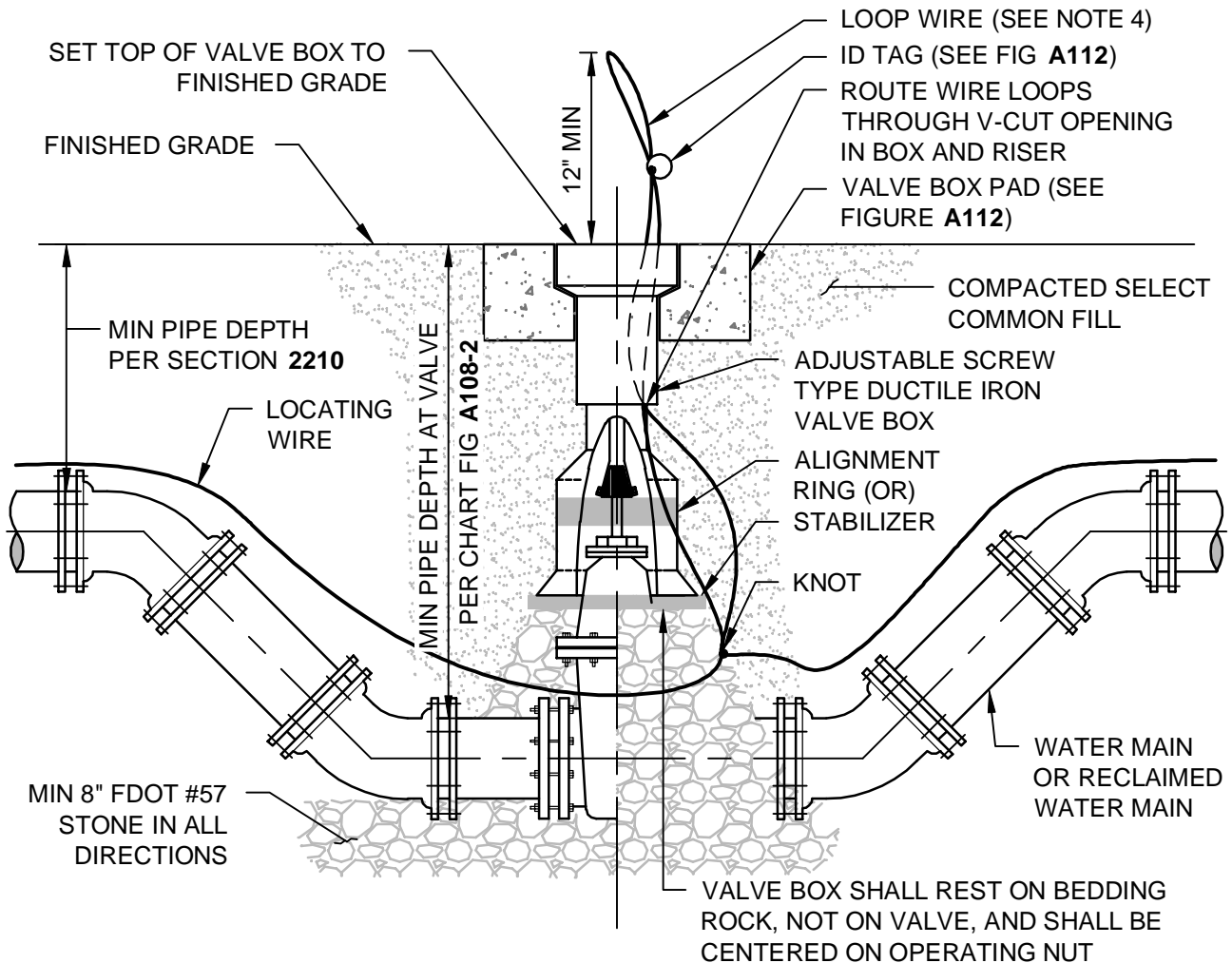
JACK & BORE - DETAIL B



NOTES:

1. CASING, BRICK AND MORTAR SHALL EXTEND A MINIMUM OF 10-FT BEYOND THE EDGE OF PAVEMENT OR MEET FDOT REQUIREMENTS, WHICHEVER IS GREATER.
2. REQUIREMENTS OF OTHER JURISDICTIONS SHALL BE MET. WHEN CONSTRUCTION IS WITHIN FDOT JURISDICTION, ADDITIONAL REQUIREMENTS OF THE "FDOT UTILITY ACCOMMODATION GUIDE" SHALL BE MET.
3. CASING MINIMUM DEPTH SHALL BE 48-IN OF COVER OR AS REQUIRED BY FDOT, OTHER JURISDICTION, OR AS SHOWN ON PLANS, WHICHEVER IS GREATER.
4. ADDITIONAL TAPS MAY BE REQUIRED ON WATER MAINS CROSSING SURFACE WATER PER RECOMMENDED STANDARDS FOR WATER WORKS (RSWW PART 8.9).

GATE VALVE & BOX - WATER & RECLAIMED WATER MAINS

**NOTES:**

1. PVC PIPE OR DUCTILE IRON PIPE SHALL NOT BE USED AS VALVE BOX.
2. THE VALVE ACTUATING NUT SHALL BE EXTENDED TO BE WITHIN 3-FT OF FINISHED GRADE.
3. PROVIDE A STABILIZER OR PLASTIC DEBRIS SHIELD / ALIGNMENT RING WHICH INSTALLS BELOW THE VALVE ACTUATING NUT. THE DEVICE SHALL CENTER THE RISER VALVE BOX OVER THE ACTUATING NUT AND MINIMIZE DEBRIS.
4. LOCATING WIRE SHALL BE CONTINUOUS WITH NO SPLICES AND SHALL EXTEND 12-IN ABOVE TOP OF COLLAR. WIRE SHALL BE COLOR CODED TO MATCH THE UTILITY INSTALLED. WIRE SHALL BE COILED BACK INTO BOX AWAY FROM VALVE STEM.
5. FOR NEW CONSTRUCTION, THE VALVE BOX SHALL BE ADJUSTED TO MIDRANGE TO ALLOW FOR FUTURE BOX ADJUSTMENTS.
6. REFER TO FIGURE A111 FOR INSTALLATIONS WHERE THE OPERATING NUT IS DEEPER THAN 36-IN BELOW FINISHED GRADE.
7. DRILL HOLE IN ID TAG AND INSTALL ON TRACING WIRE.

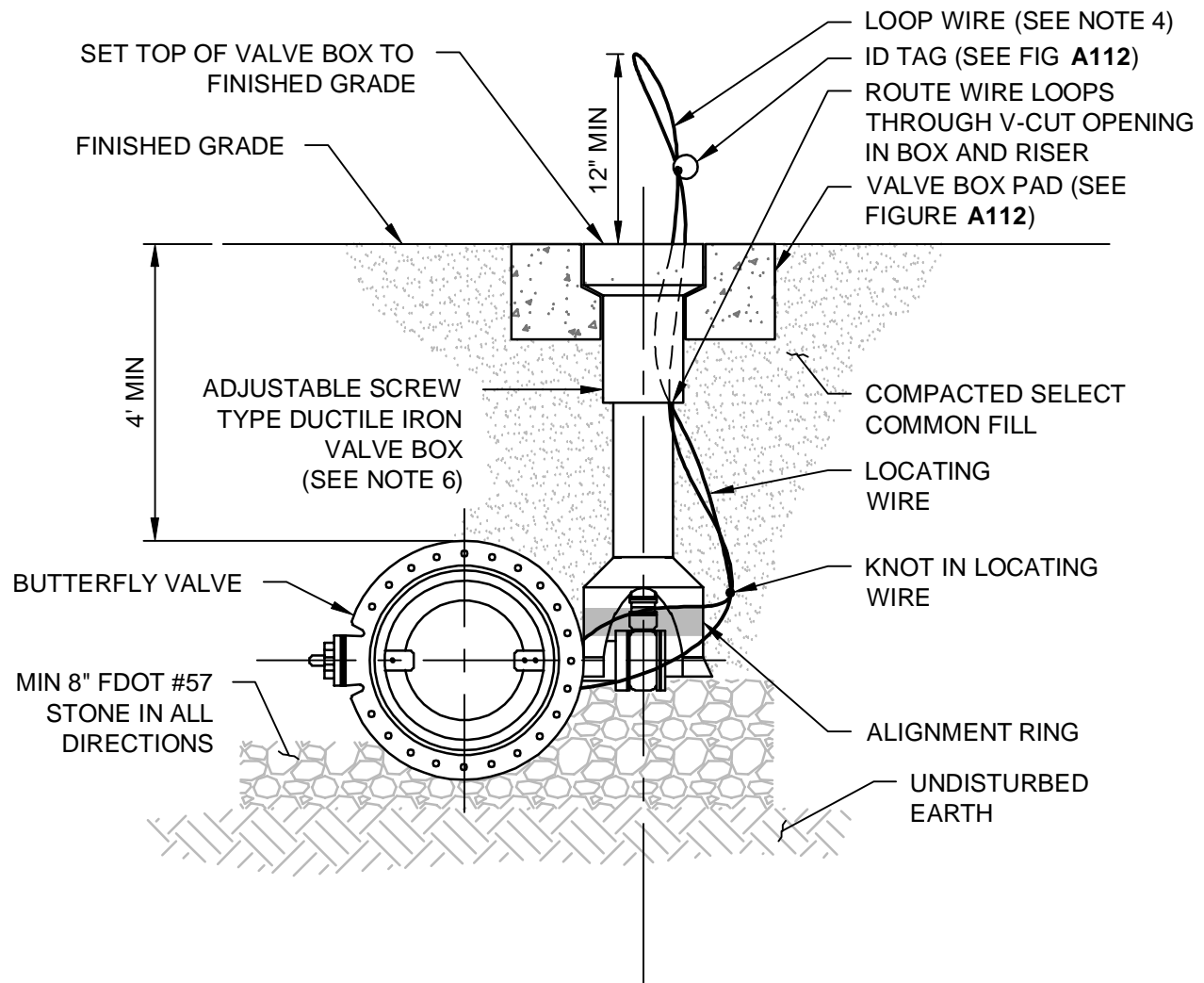
GATE VALVE & BOX - MINIMUM PIPE DEPTH AT VALVE PER MANUFACTURER

APPROVED APPENDIX D PRODUCTS VALVE SIZE (INCHES)	AMERICAN FLOW CONTROL	CLOW COMPANY	MUELLER COMPANY
	MIN COVER TO TOP OF PIPE (INCHES)	MIN COVER TO TOP OF PIPE (INCHES)	MIN COVER TO TOP OF PIPE (INCHES)
16	53	54	54
20	57	72	62
24	63	75	66
30	80	81	80
36	89	88	89
42	102	102	101
48	109	102	110
54	106		
60	122		
66	119		

NOTES:

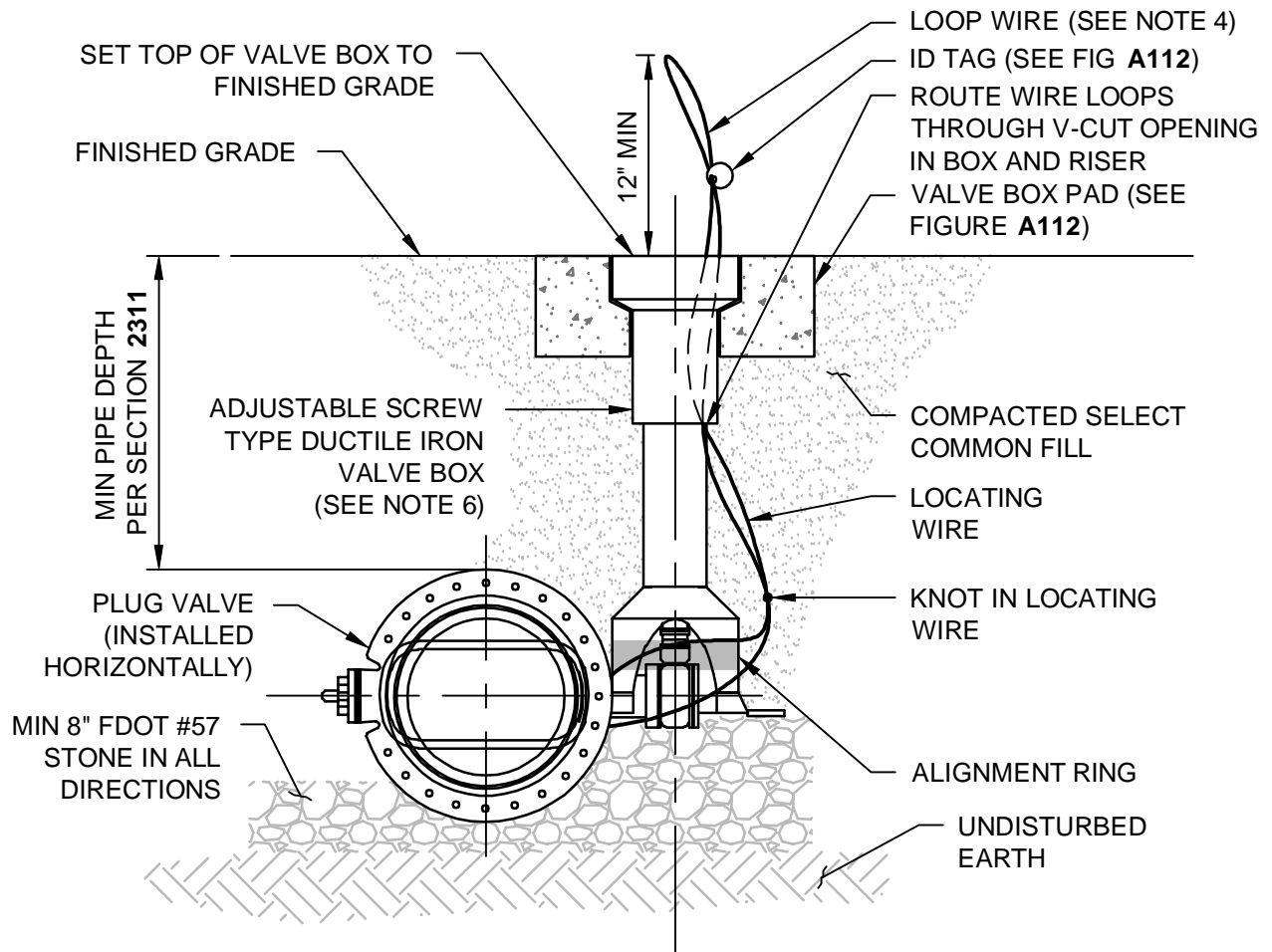
1. MINIMUM COVER OVER PIPE IS CALCULATED BASED ON INSTALLATION OF THE GATE VALVE OPERATING NUT AT 24-IN BELOW GRADE.
2. ADDITIONAL DEPTH MAY BE REQUIRED BASED ON SITE CONDITIONS OR ROAD DESIGN.
3. REFERENCE FIGURE **A108-1** FOR TYPICAL GATE VALVE STANDARD DRAWING.

BUTTERFLY VALVE & BOX - WATER & RECLAIMED WATER MAINS

**NOTES:**

1. PVC PIPE OR DUCTILE IRON PIPE SHALL NOT BE USED AS VALVE BOX.
2. THE VALVE ACTUATING NUT SHALL BE EXTENDED TO BE WITHIN 3-FT OF FINISHED GRADE.
3. PROVIDE A STABILIZER OR PLASTIC DEBRIS SHIELD / ALIGNMENT RING WHICH INSTALLS BELOW THE VALVE ACTUATING NUT. THE DEVICE SHALL CENTER THE RISER VALVE BOX OVER THE ACTUATING NUT AND MINIMIZE DEBRIS.
4. LOCATING WIRE SHALL BE CONTINUOUS WITH NO SPLICES AND SHALL EXTEND 12-IN ABOVE TOP OF COLLAR. WIRE SHALL BE COLOR CODED TO MATCH THE UTILITY INSTALLED. WIRE SHALL BE COILED BACK INTO BOX AWAY FROM VALVE STEM.
5. FOR NEW CONSTRUCTION, THE VALVE BOX SHALL BE ADJUSTED TO MIDRANGE TO ALLOW FOR FUTURE BOX ADJUSTMENTS.
6. REFER TO FIGURE A111 FOR INSTALLATIONS WHERE THE OPERATING NUT IS DEEPER THAN 36-IN BELOW FINISHED GRADE.
7. DRILL HOLE IN ID TAG AND INSTALL ON TRACING WIRE.

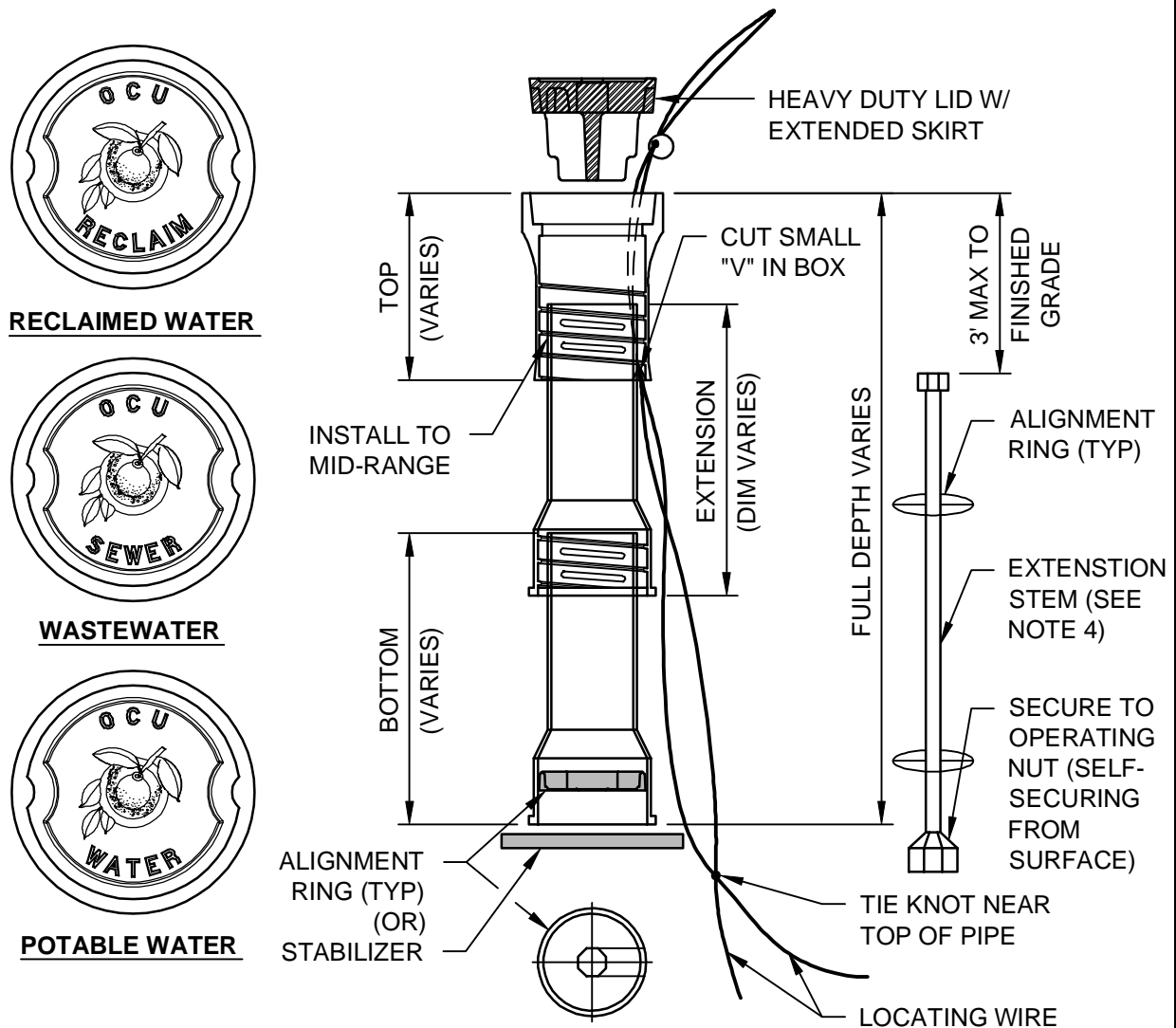
PLUG VALVE & BOX - WASTEWATER



NOTES:

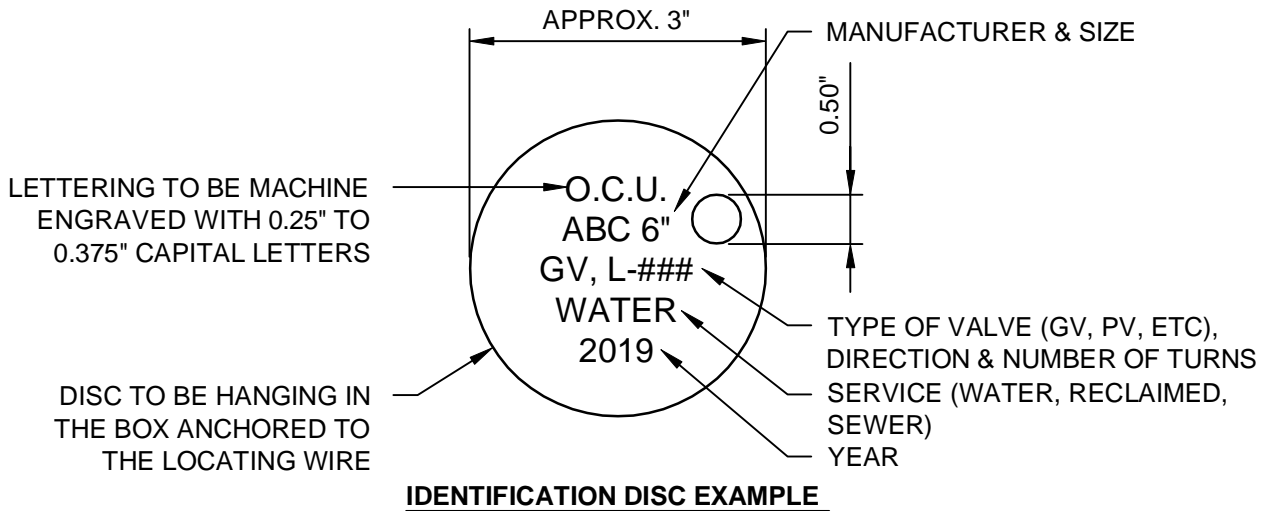
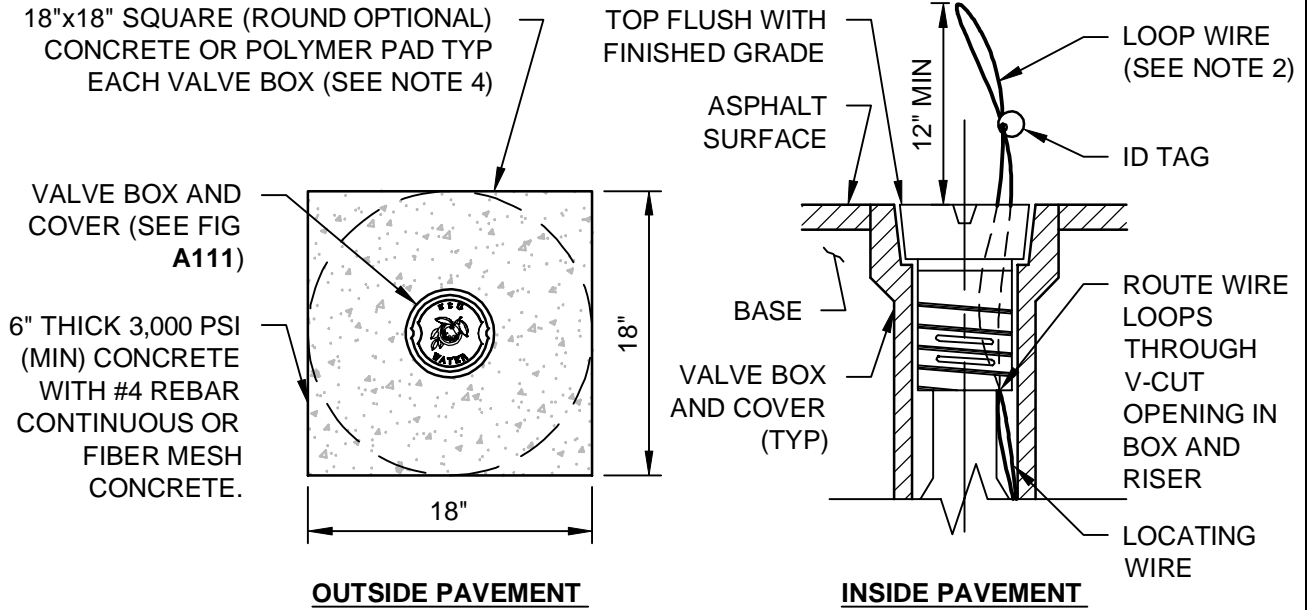
1. PVC PIPE OR DUCTILE IRON PIPE SHALL NOT BE USED AS VALVE BOX.
2. THE VALVE ACTUATING NUT SHALL BE EXTENDED TO BE WITHIN 3-FT OF FINISHED GRADE.
3. PROVIDE A STABILIZER OR PLASTIC DEBRIS SHIELD / ALIGNMENT RING WHICH INSTALLS BELOW THE VALVE ACTUATING NUT. THE DEVICE SHALL CENTER THE RISER VALVE BOX OVER THE ACTUATING NUT AND MINIMIZE DEBRIS.
4. LOCATING WIRE SHALL BE CONTINUOUS WITH NO SPLICES AND SHALL EXTEND 12-IN ABOVE TOP OF COLLAR. WIRE SHALL BE COLOR CODED TO MATCH THE UTILITY INSTALLED. WIRE SHALL BE COILED BACK INTO BOX AWAY FROM VALVE STEM.
5. FOR NEW CONSTRUCTION, THE VALVE BOX SHALL BE ADJUSTED TO MIDRANGE TO ALLOW FOR FUTURE BOX ADJUSTMENTS.
6. REFER TO FIGURE A111 FOR INSTALLATIONS WHERE THE OPERATING NUT IS DEEPER THAN 36-IN BELOW FINISHED GRADE.
7. DRILL HOLE IN ID TAG AND INSTALL ON TRACING WIRE.

TYPICAL VALVE BOX & COVER

**NOTES:**

1. HEAVY DUTY VALVE BOX LIDS ARE REQUIRED FOR ALL VALVE BOXES.
2. TOP SECTION SHALL BE INSTALLED AT MID-RANGE FOR FUTURE ADJUSTMENT.
3. HEAVY DUTY VALVE BOX LID SHALL HAVE A 5-IN MIN DEPTH AND WEIGH A MINIMUM OF 22-LBS. LID SHALL HAVE POWDER COATING PAINT AT A MIN OF 3 MILL.
4. EXTENSION STEMS AND ALIGNMENT RING/WALL BRACKETS SHALL BE PROVIDED ON ALL BURIED VALVES SO THAT THE OPERATING NUT SHALL BE NO MORE THAN 36-IN BELOW FINISHED GRADE. MATERIAL SHALL BE MINIMUM 304 SST.
5. ADD ADD'L SCREW EXTENSION AS REQUIRED AFTER SCREW EXTENSION EXCEEDS 24-IN.
6. STACKING OF VALVE BOX BOTTOM SECTIONS IS NOT PERMITTED.
7. VALVE BOX SHALL REST ON BEDDING ROCK, NOT ON VALVE, AND SHALL BE CENTERED ON OPERATING NUT.

VALVE BOX PAD

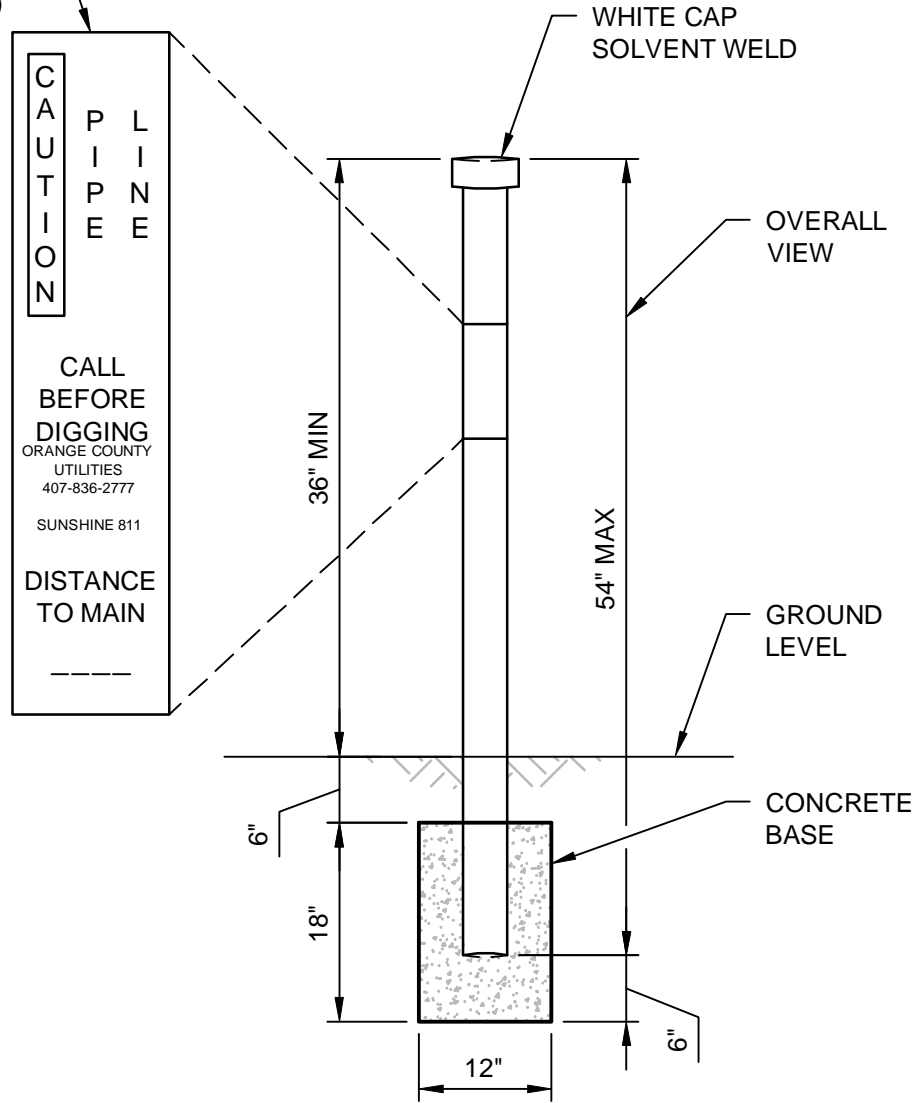


NOTES:

1. BRONZE, BRASS, OR STAINLESS STEEL IDENTIFICATION DISC SHALL BE REQUIRED FOR ALL VALVES.
2. LOCATING WIRE SHALL BE CONTINUOUS WITH NO SPLICES AND SHALL EXTEND 12-IN ABOVE TOP COLLAR. WIRE SHALL BE COLOR CODED TO MATCH THE UTILITY INSTALLED. WIRE SHALL BE COILED BACK INTO BOX AWAY FROM VALVE STEM.
3. NO VALVE SHALL BE DESIGNED OR INSTALLED WITHIN THE CURB.
4. ROUND OR SQUARE VALVE PAD TO BE UNIFORM PER PROJECT.

UTILITY MAIN MARKER

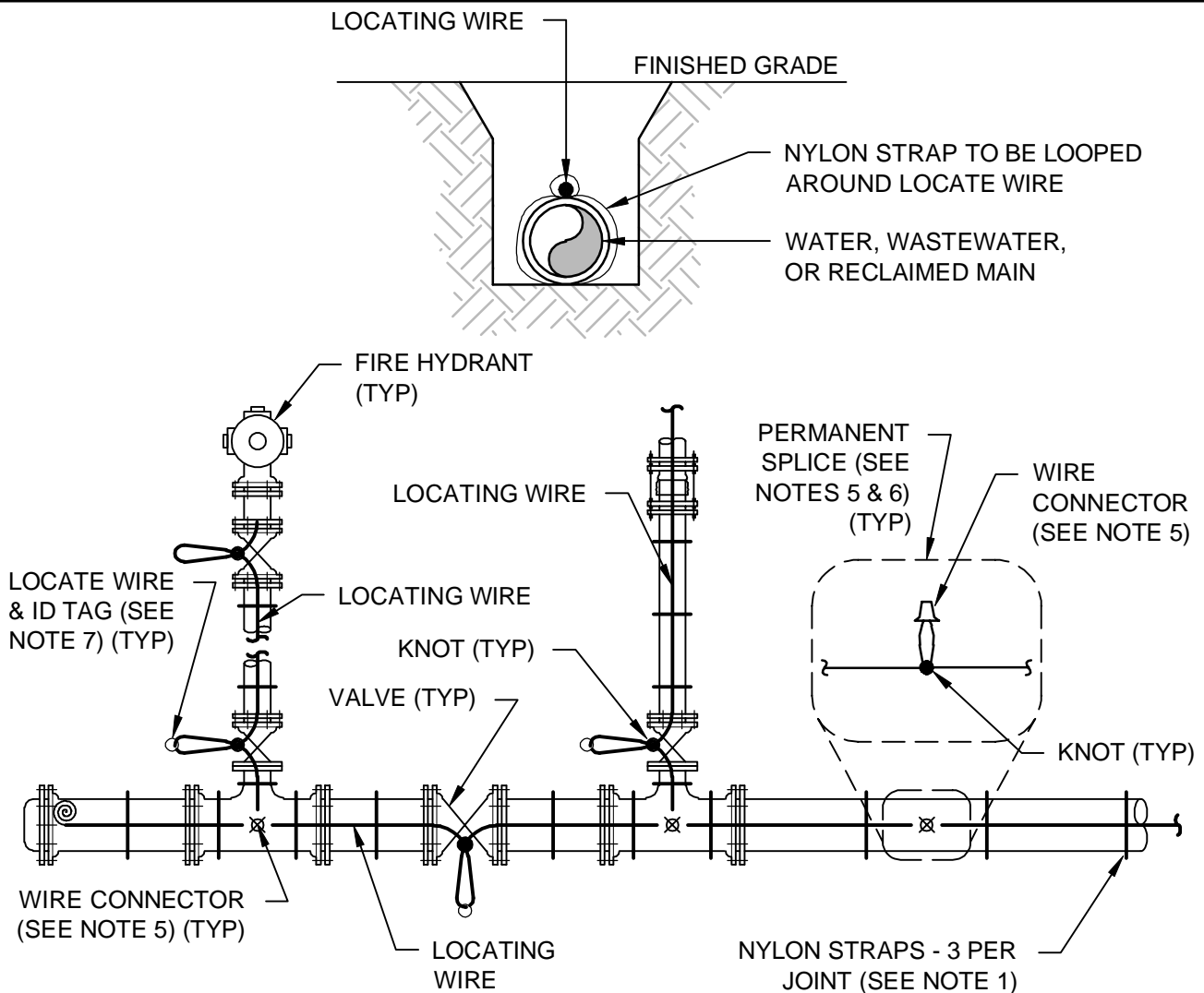
COLORS FOR DECALS SHALL MATCH THE MARKER COLOR (SEE NOTE 2)



NOTES:

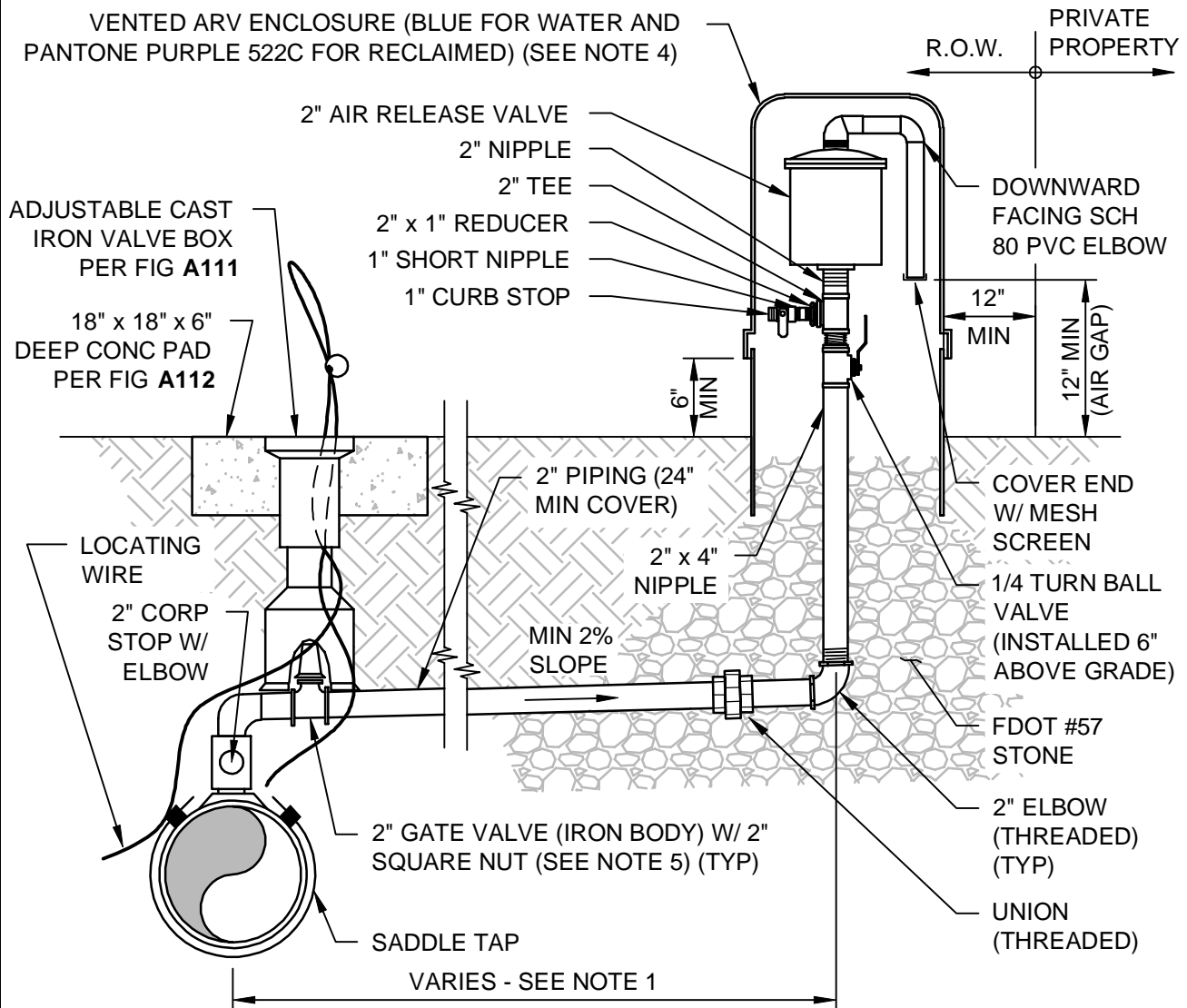
1. MARKERS ARE REQUIRED WHEN UTILITY MAIN IS LOCATED OVER 30-FT FROM EDGE OF PAVEMENT OR IN AN EASEMENT NOT ADJACENT TO THE RIGHT OF WAY.
2. MARKERS SHALL BE 4-IN DIAMETER SCH 80 OR DR18 PVC: BLUE FOR WATER; GREEN FOR WASTEWATER; AND PANTONE PURPLE 522C FOR RECLAIMED WATER.
3. MARKERS SHALL BE PLACED AT ALL DIRECTIONAL CHANGES AND AT ALL VALVES EXCEPT WATER VALVES NEAR FIRE HYDRANTS. ADDITIONAL MARKERS SHALL BE INSTALLED AS NEEDED SO THAT THE DISTANCE BETWEEN MARKERS DOES NOT EXCEED 500-FT.

PIPE LOCATING WIRE

**NOTES:**

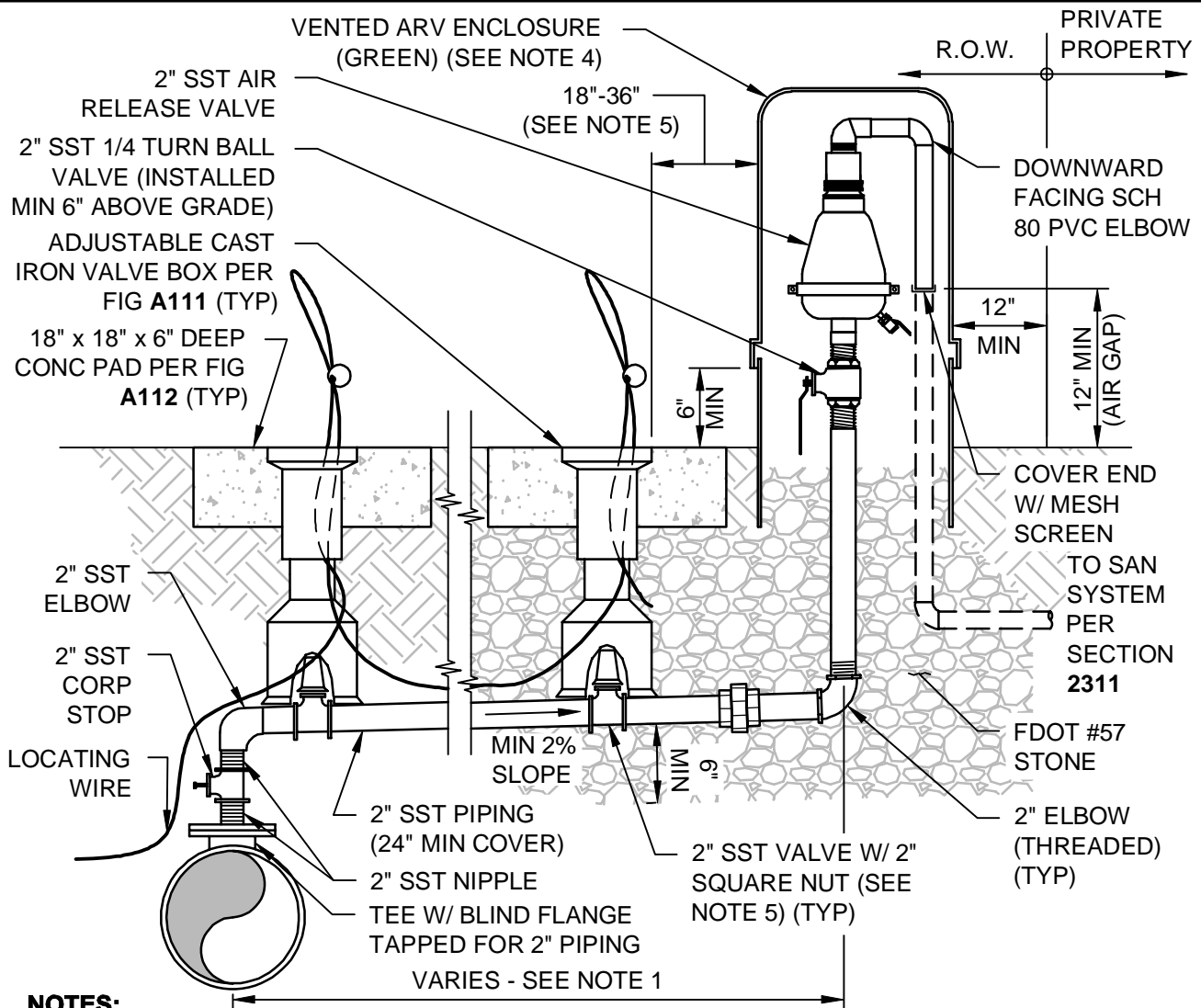
1. ALL PIPE SHALL REQUIRE INSULATED LOCATING WIRE (10 GAUGE SOLID COPPER) CAPABLE OF DETECTION BY A CABLE LOCATOR AND SHALL BE WRAPPED WITH NYLON STRAPS, LOOPED AND SECURED TO TOP CENTERLINE OF THE PIPE.
2. LOCATING WIRE SHALL BE CONTINUOUS INSIDE VALVE BOXES AND SHALL EXTEND 12-IN ABOVE TOP OF COLLAR.
3. WIRE INSULATION SHALL BE COLOR CODED FOR THE TYPE OF PIPE BEING INSTALLED.
4. WIRE SHALL BE CONTINUOUS AND CONNECTED FOR LOCATING IN ALL DIRECTIONS.
5. PERMANENT SPLICES MUST BE MADE IN THE LENGTH OF THE WIRE USING WIRE CONNECTORS SPECIFICALLY DESIGNED FOR DIRECT BURIAL, DIELECTRIC SILICONE GEL OR MOISTURE-RESISTANT GREASE FILLED.
6. AT ALL TRACING WIRE SPLICES, TEES, AND VALVE COLLARS, A KNOT IN THE WIRE SHALL BE MADE TO PREVENT THE WIRE FROM COMING APART.
7. REFER TO VALVE DETAILS FOR LOCATE WIRE UP AND IN VALVE BOX.

AIR OR COMBINATION AIR/VACUUM RELEASE VALVE FOR WATER & RECLAIMED WATER

**NOTES:**

1. OFFSET DISTANCE TO BE FIELD DETERMINED AND AS CLOSE TO THE RIGHT OF WAY AS POSSIBLE AND CLEAR OF PEDESTRIAN WALKWAYS. IF PIPE IS AT RIGHT OF WAY LINE, NO OFFSET IS REQUIRED.
2. ABOVE DETAIL APPLIES TO A 2-IN ARV. IF A LARGER ARV IS REQUIRED, THIS SHALL BE SUBMITTED AND APPROVED BY UTILITIES PRIOR TO INSTALLATION.
3. ALL PIPING AND FITTINGS SHALL BE SCH 40 BRASS OR 316 SST. ALL VALVES AND APPURTENANCES SHALL BE BRASS OR 316 SST.
4. THE ENCLOSURE VENTS MUST BE CAPABLE OF ALLOWING AT LEAST THE SAME AMOUNT OF AIRFLOW AS THE VALVE.
5. VALVES SHALL BE INSTALLED WITHIN 18-IN FROM 90° AT TAP AT MAIN.

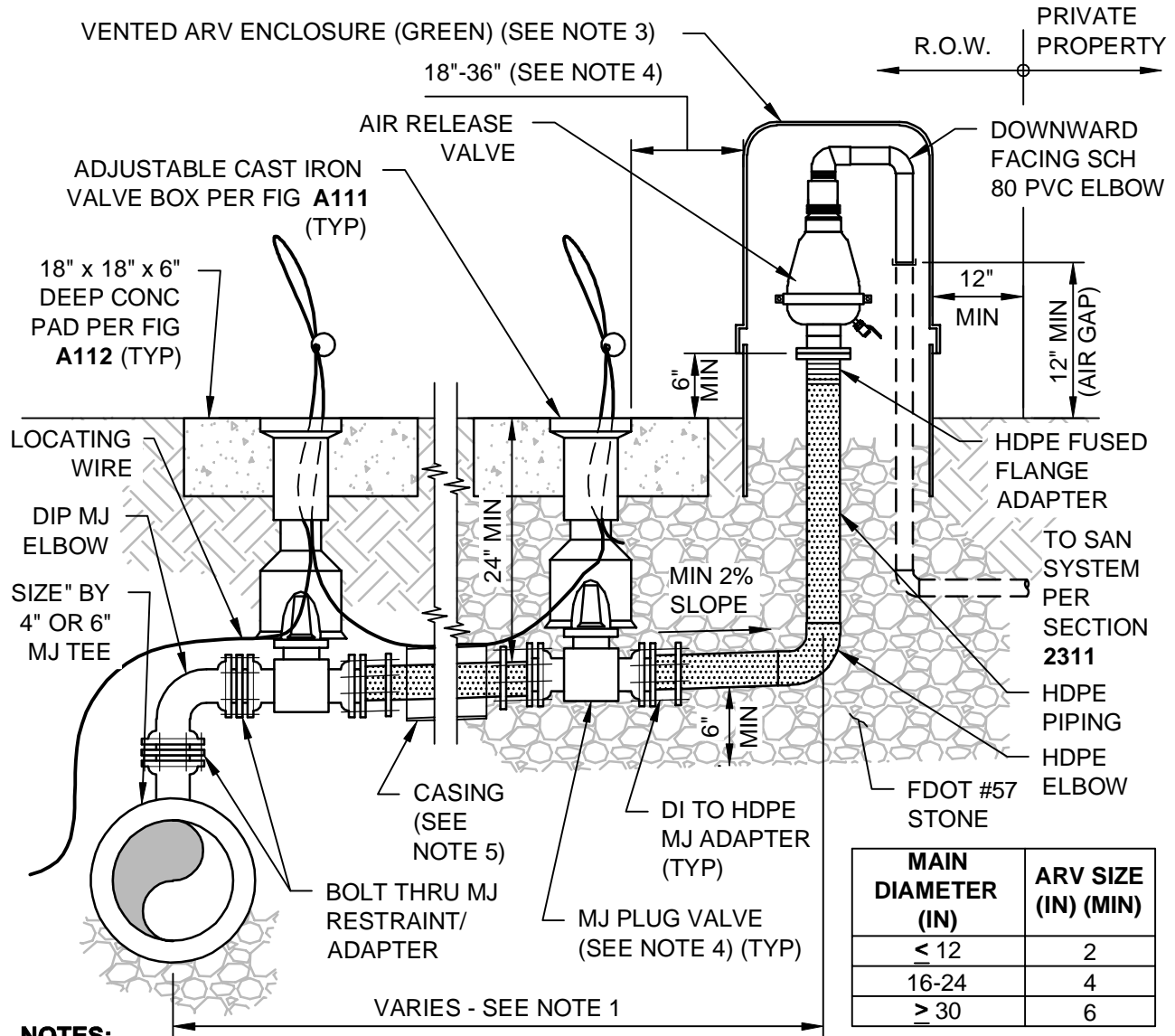
COMBINATION AIR RELEASE VALVE FOR WASTEWATER - 2" DIA



NOTES:

1. OFFSET DISTANCE TO BE FIELD DETERMINED AND AS CLOSE TO THE RIGHT OF WAY AS POSSIBLE AND CLEAR OF PEDESTRIAN WALKWAYS. IF PIPE IS AT RIGHT OF WAY LINE, NO OFFSET IS REQUIRED.
2. ABOVE DETAIL APPLIES TO A 2-IN ARV. FOR LARGER ARVS, PIPE DIAMETER AND VALVES SHALL BE EQUAL TO THE SIZE OF THE ARV. FOR LARGER DIAMETER REFER TO FIGURE A115-3.
3. ALL PIPING, VALVES AND APPURTENANCES TO BE 316 SST EXCEPT WHERE SPECIFIED OTHERWISE.
4. THE ENCLOSURE VENTS MUST BE CAPABLE OF ALLOWING AT LEAST THE SAME AMOUNT OF AIRFLOW AS THE VALVE.
5. VALVES SHALL BE INSTALLED WITHIN 18-IN FROM 90° AT MAIN. AN ADDITIONAL VALVE IS REQUIRED IF THE VALVE IS IN THE ROAD OR IF THE ARV IS FURTHER THAN 10-FT FROM VALVE.

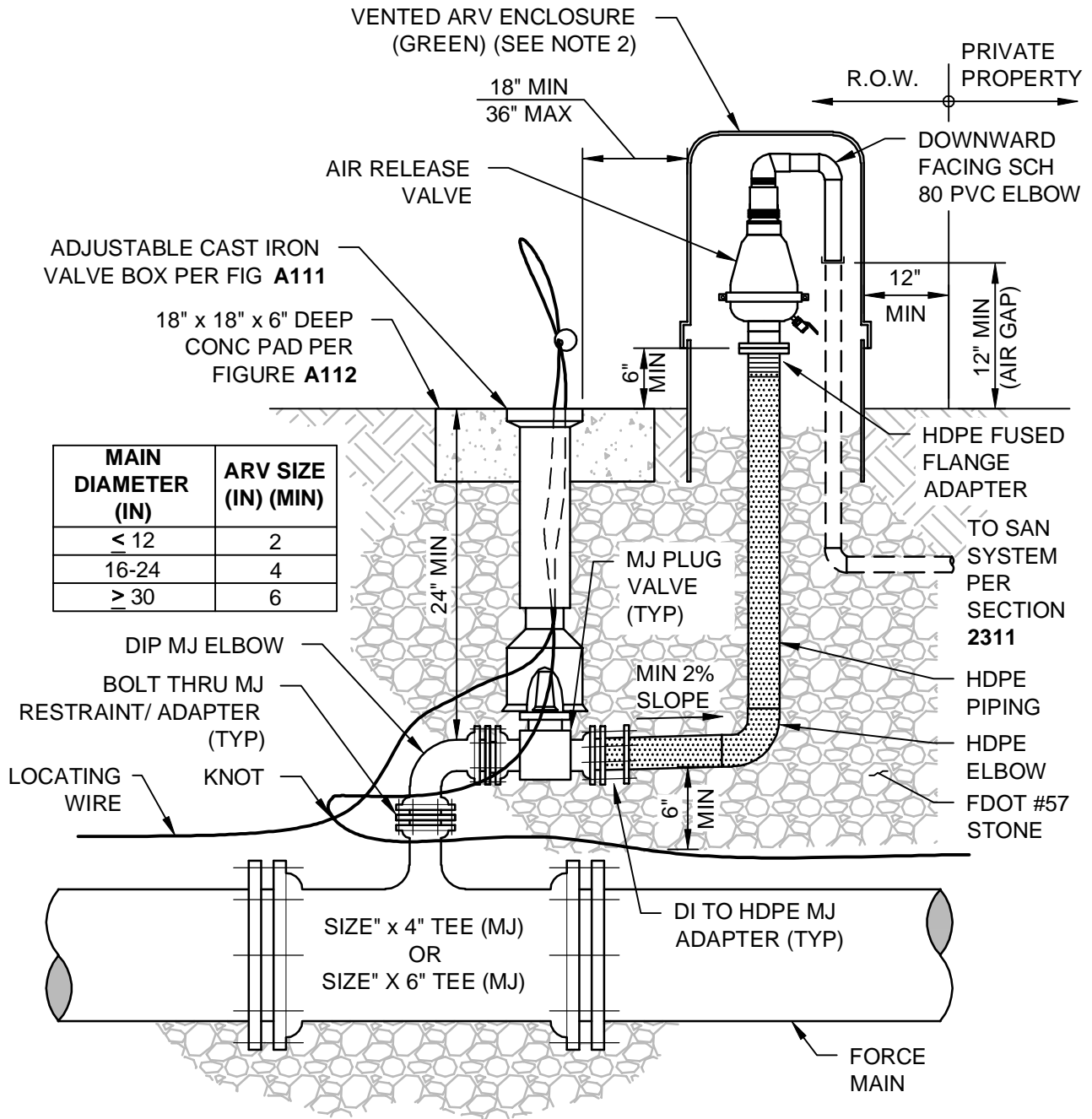
COMBINATION AIR RELEASE VALVE FOR WASTEWATER (OFFSET) - 4" DIA & GREATER



NOTES:

1. OFFSET DISTANCE TO BE FIELD DETERMINED AND AS CLOSE TO THE RIGHT OF WAY AS POSSIBLE AND CLEAR OF PEDESTRIAN WALKWAYS. IF PIPE IS AT RIGHT OF WAY LINE, REFER TO DETAIL A115-4.
2. ALL PIPING, VALVES AND APPURTENANCES TO BE AS SPECIFIED.
3. THE ENCLOSURE VENTS MUST BE CAPABLE OF ALLOWING AT LEAST THE SAME AMOUNT OF AIRFLOW AS THE VALVE.
4. VALVES SHALL BE INSTALLED WITHIN 18-IN FROM 90° AT TEE AT MAIN. AN ADDITIONAL VALVE IS REQUIRED IF THE VALVE IS IN THE ROAD OR IF THE ARV IS FURTHER THAN 10-FT FROM VALVE.
5. A CONCRETE OR METAL CASING IS REQUIRED ON ALL OFFSETS BETWEEN PLUG VALVES.

COMBINATION AIR RELEASE VALVE FOR WASTEWATER (ABOVE) - 4" DIA & GREATER



NOTES:

1. ALL PIPING, VALVES AND APPURTENANCES TO BE AS SPECIFIED.
2. THE ENCLOSURE VENTS MUST BE CAPABLE OF ALLOWING AT LEAST THE SAME AMOUNT OF AIRFLOW AS THE VALVE.

HORIZONTAL PIPELINE SEPARATION REQUIREMENTS

HORIZONTAL SEPARATION REQUIREMENTS (NOTES 1 & 2)

PROPOSED UTILITY		POTABLE WATER (NOTE 3)		RECLAIMED WATER MAIN (SEE NOTE 7)		WASTEWATER FORCEMAIN		SANITARY SEWER	STORM SEWER	STRUCTURAL FOUNDATION, WALLS, ETC. (SEE NOTE 8)
		4"-12"	16"-UP	4"-12"	16"-UP	4"-12"	16"-UP	ALL SIZES	ALL SIZES	ALL SIZES
POTABLE WATER (NOTE 3)	4"-12"	3'	5'	3'	5'	6'	6'	6'	3'	10'
	16"-UP	5'	5'	5'	5'	6'	6'	6'	5'	15' (NOTE 5)
RECLAIMED WATER MAIN (SEE NOTE 7)	4"-12"	3'	5'	3'	5'	3'	5'	3'	3'	10'
	16"-UP	5'	5'	5'	5'	5'	5'	5'	5'	15' (NOTE 5)
WASTEWATER FORCEMAIN	4"-12"	6'	6'	3'	5'	3'	5'	3'	3'	10'
	16"-UP	6'	6'	5'	5'	5'	5'	5'	5'	15' (NOTE 5)
SANITARY SEWER	ALL SIZES	6'	6'	3'	5'	3'	5'	3'	5'	VARIES PER DEPTH

NOTES:

1. DISTANCES GIVEN ARE FROM OUTSIDE OF PIPE TO OUTSIDE OF PIPE.
2. THIS SEPARATION REQUIREMENT IS TO PROVIDE ACCESSIBILITY FOR CONSTRUCTION AND MAINTENANCE. FOR PIPES INSTALLED AT GREATER DEPTHS THAN THE MINIMUM OCU DESIGN STANDARDS, PROVIDE AN ADDITIONAL FOOT OF SEPARATION FOR EACH ADDITIONAL FOOT OF DEPTH.
3. THIS SEPARATION REQUIREMENT COMPLIES WITH THE MINIMUM FDEP SEPARATION REQUIREMENTS OUTLINED IN 62-555.314, FAC. VARIANCES FROM THE FDEP REQUIREMENTS MUST COMPLY WITH 62-555.314(5), FAC AND MUST BE APPROVED INDIVIDUALLY BY BOTH FDEP AND UTILITIES PRIOR TO INSTALLATION.
4. NO WATER PIPE SHALL PASS THROUGH OR COME IN CONTACT WITH ANY PART OF SANITARY OR STORM WATER MANHOLE OR STRUCTURE.
5. PRESSURE MAINS 16-IN TO 24-IN MAY HAVE 10-FT SEPARATION FROM STRUCTURAL FOUNDATION, WALLS, ETC IF NEW MAINS ARE RESTRAINED FOR THE ENTIRE LENGTH.
6. REFERENCE FIGURE **A116-2** FOR VERTICAL PIPELINE SEPARATION REQUIREMENTS.
7. RECLAIMED WATER REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C.
8. ADDITIONAL SEPARATION SHALL BE REQUIRED BY UTILITIES FOR CONSTRUCTION OF, INCLUDING, BUT NOT LIMITED TO: LIVE LOADS, MULTI-STORY COMMERCIAL BUILDINGS, SUPERSTRUCTURES, EMBANKMENTS, RETAINING WALLS, BRIDGES, RAILROADS, HIGH VOLTAGE TRANSMISSION MAINS, GAS MAINS, ETC.

VERTICAL PIPELINE SEPARATION REQUIREMENTS

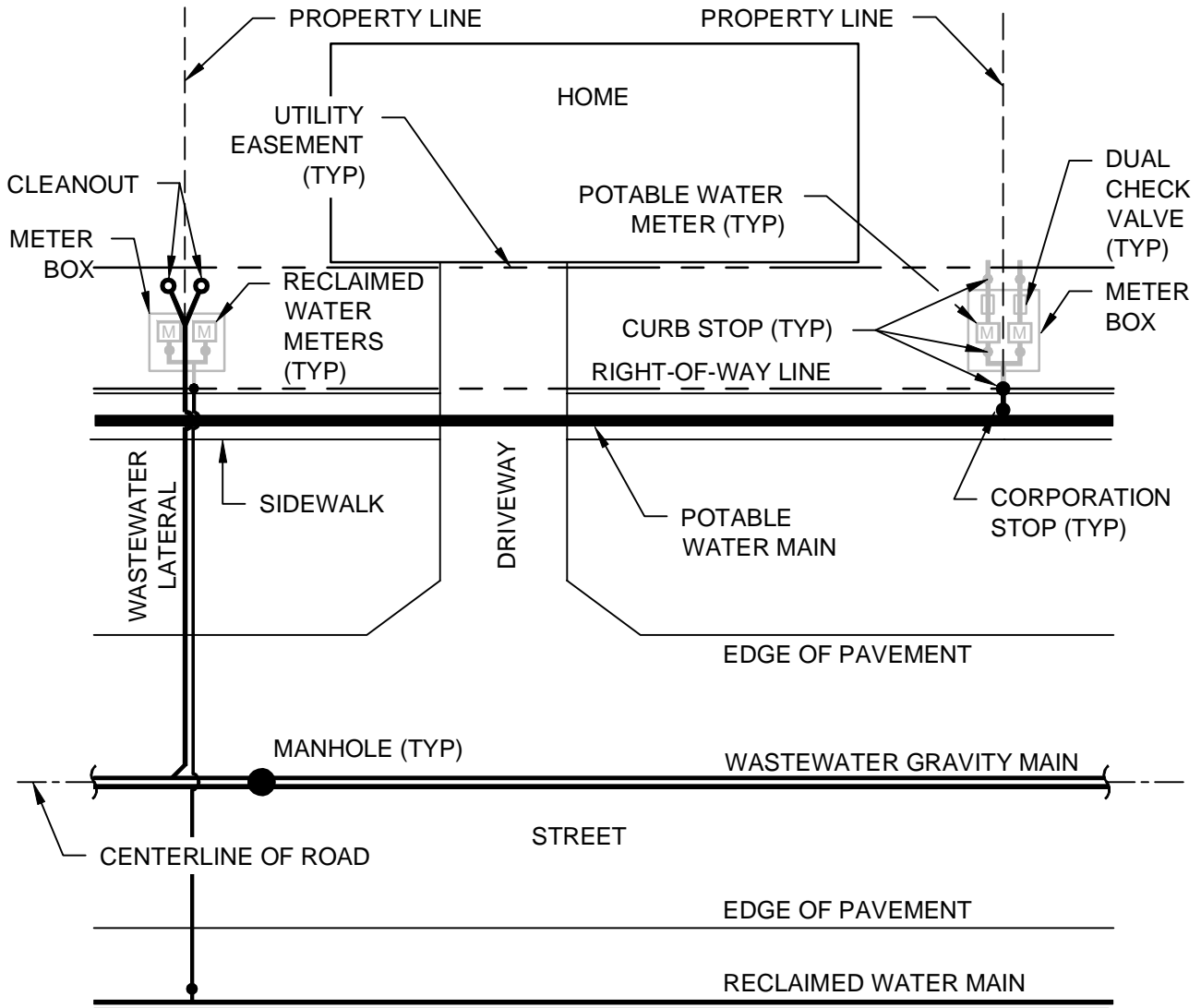
VERTICAL SEPARATION REQUIREMENTS (NOTES 1 & 2)

PROPOSED UTILITY	POTABLE WATER (NOTE 4)	RECLAIMED WATER MAIN	WASTEWATER FORCEMAIN	SANITARY SEWER	STORM SEWER (NOTE 3)
POTABLE WATER (NOTE 4)	12"	12"	12" / 18"	12" / 18"	12" / 18"
RECLAIMED WATER MAIN	12"	12"	12"	12"	12" / 18"
WASTEWATER FORCEMAIN	12"	12"	12"	12"	12" / 18"
SANITARY SEWER	12" / 18"	12"	12"	12"	12" / 18"

NOTES:

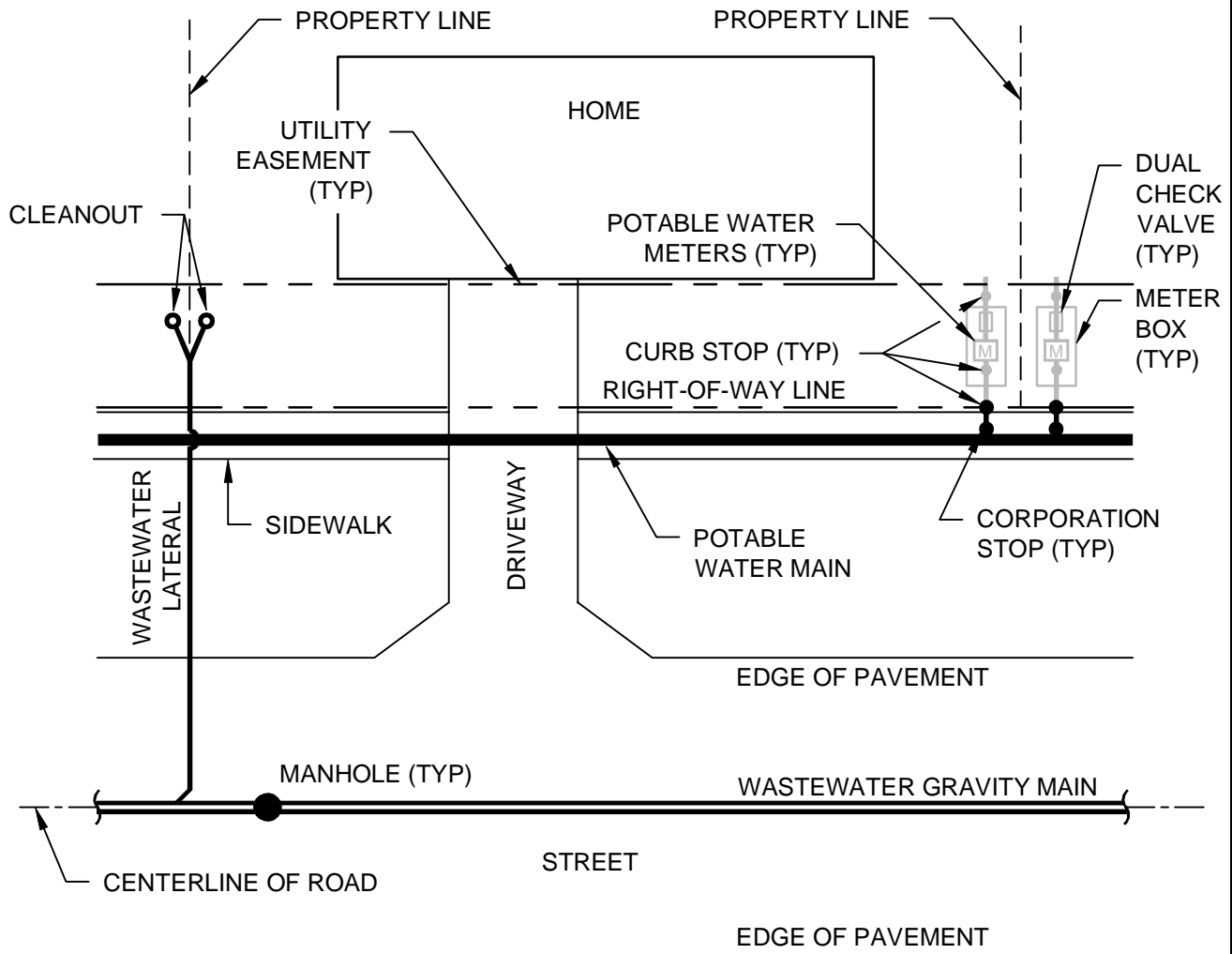
1. DISTANCES GIVEN ARE FROM OUTSIDE OF PIPE TO OUTSIDE OF PIPE.
2. THIS SEPARATION REQUIREMENT IS TO PROVIDE ACCESSIBILITY FOR CONSTRUCTION AND MAINTENANCE.
3. THE 18-IN SEPARATION REQUIREMENT APPLIES WHEN THE STORM PIPE OR SANITARY SEWER CROSSES ABOVE THE UTILITY MAIN, AND WHEN THE STORM PIPE HAS A DIAMETER EQUAL TO OR GREATER THAN 24-IN. OTHERWISE, THE REQUIRED SEPARATION IS 12-IN.
4. THIS SEPARATION REQUIREMENT COMPLIES WITH THE MINIMUM FDEP SEPARATION REQUIREMENTS OUTLINED IN 62-555.314, FAC. VARIANCES FROM THE FDEP REQUIREMENTS MUST COMPLY WITH 62-555.314(5), FAC AND MUST BE APPROVED INDIVIDUALLY BY BOTH FDEP AND UTILITIES.
5. NO WATER PIPE SHALL PASS THROUGH OR COME IN CONTACT WITH ANY PART OF SANITARY OR STORM WATER MANHOLE OR STRUCTURE.
6. REFERENCE FIGURE **A116-1** FOR HORIZONTAL PIPELINE SEPARATION REQUIREMENTS.
7. JOINT SPACING AT CROSSING SHALL COMPLY WITH THE MINIMUM FDEP SEPARATION REQUIREMENTS OUTLINED IN 62-555.314, F.A.C.

RESIDENTIAL SERVICE LOCATIONS WITH RECLAIMED WATER

**NOTES:**

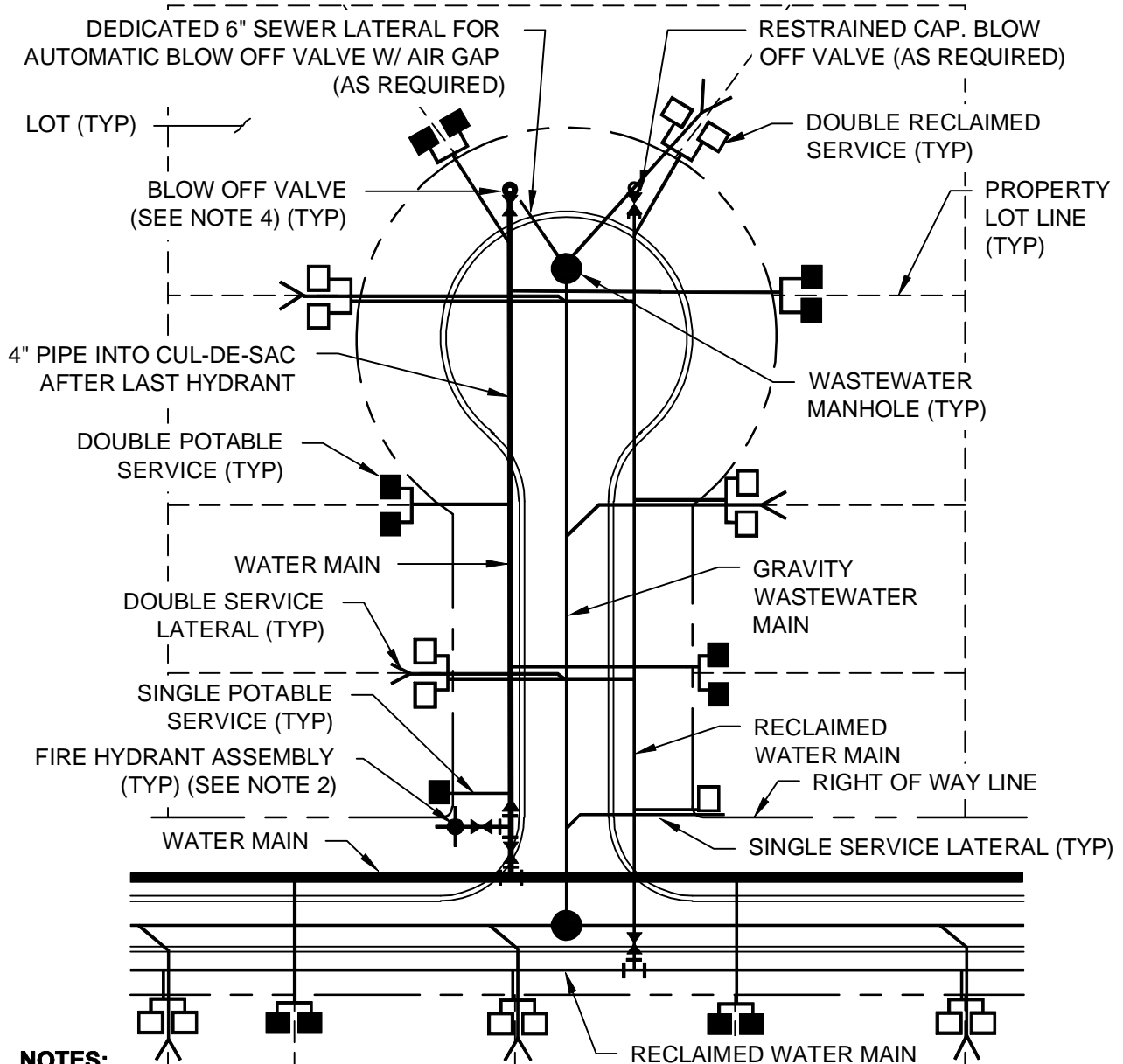
1. EACH POTABLE WATER SERVICE WILL SERVE TWO LOTS IF RECLAIMED WATER IS AVAILABLE.
2. SITWORK CONTRACTOR TO INSTALL WATER AND RECLAIMED WATER SERVICES PER DETAIL **A120** AND WASTEWATER LATERALS PER DETAIL **A306-1**.
3. METER, BOX, AND DUAL CHECK VALVE BACKFLOW PREVENTER TO BE INSTALLED BY OCU AFTER ALL APPLICABLE PERMITS AND FEES ARE FULFILLED.
4. WASTEWATER LATERAL CLEAN-OUTS TO BE INSTALLED BY DEVELOPMENT PLUMBING CONTRACTOR.
5. SERVICES SHALL BE INSTALLED AT 90° FROM MAIN TO PROPERTY LINE.
6. IF A CONFLICT AT THE PROPERTY LINE EXISTS, TWO SINGLE WATER, RECLAIM, OR SEWER SERVICES SHALL BE INSTALLED IN AN APPROVED LOCATION BY UTILITIES.

RESIDENTIAL SERVICE LOCATIONS WITHOUT RECLAIMED WATER

**NOTES:**

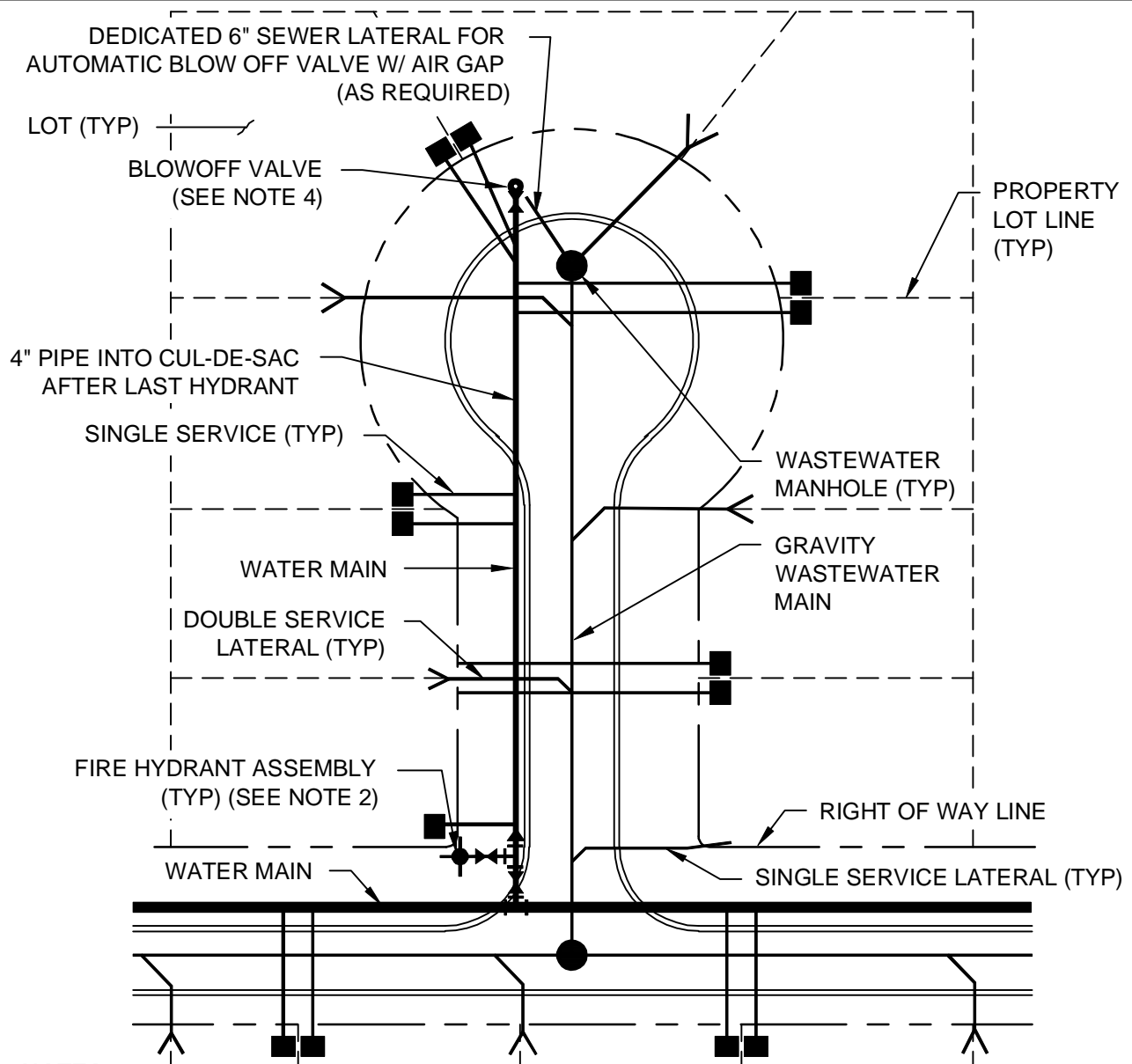
1. EACH POTABLE WATER SERVICE WILL SERVE ONE LOT IF RECLAIMED WATER IS UNAVAILABLE. BACKFLOW PREVENTERS ARE NOT REQUIRED UNLESS A HAZARD EXISTS.
2. SITWORK CONTRACTOR TO INSTALL WATER SERVICES PER DETAIL **A120** AND WASTEWATER LATERALS PER DETAIL **A306-1**.
3. METER, BOX, AND DUAL CHECK VALVE BACKFLOW PREVENTER TO BE INSTALLED BY OCU AFTER ALL APPLICABLE PERMITS AND FEES ARE FULFILLED.
4. WASTEWATER LATERAL CLEAN-OUTS TO BE INSTALLED BY DEVELOPMENT PLUMBING CONTRACTOR.
5. SERVICES SHALL BE INSTALLED AT 90° FROM MAIN AT PROPERTY LINE.
6. IF A CONFLICT AT THE PROPERTY LINE EXISTS, TWO SINGLE SEWER SERVICES SHALL BE INSTALLED IN AN APPROVED LOCATION BY UTILITIES.
7. IRRIGATION METERS ARE AVAILABLE FOR LOCATIONS WITHOUT RECLAIMED WATER. METER WILL BE INSTALLED IN A DOUBLE METER BOX.

SINGLE FAMILY RESIDENTIAL CUL-DE-SAC UTILITY PLAN WITH RECLAIMED WATER

**NOTES:**

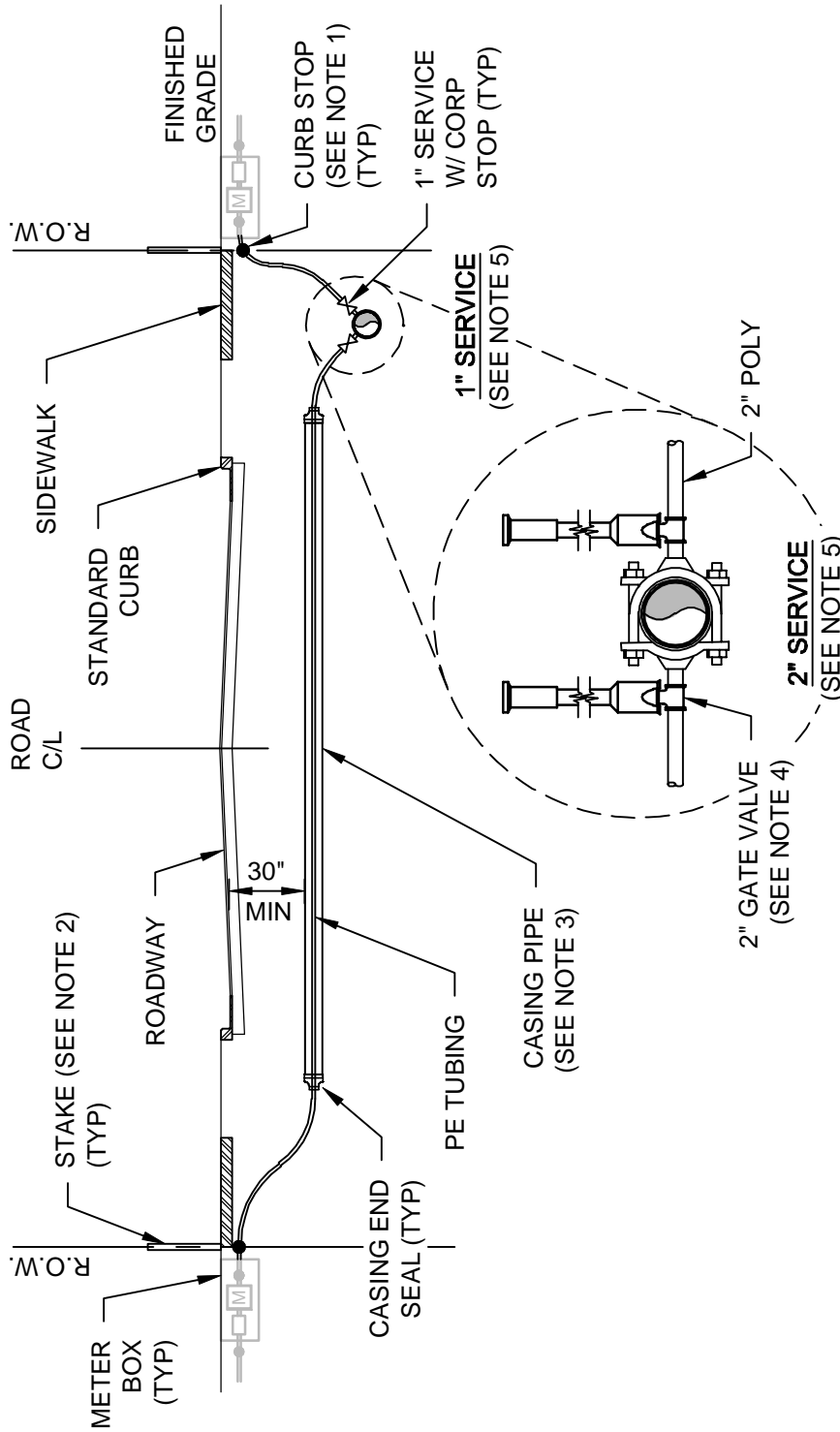
1. A MAXIMUM OF TWO WASTEWATER SERVICE LATERALS MAY CONNECT DIRECTLY TO A TERMINAL MANHOLE.
2. HYDRANT SHALL NOT BE PLACED AT THE END OF THE CUL-DE-SAC / DEAD END AND NO LESS THAN 500 FEET FROM THE LAST RESIDENT OR DEAD END. LAST HYDRANT SHALL BE LOCATED AS CLOSE TO THE INTERSECTION AS POSSIBLE WHILE MAINTAINING PROPER FIRE CODE.
3. RECLAIM SERVICE IS VERTICAL ON TOP OF SEWER SERVICE AT PROPERTY LINE. DRAWN SLIGHTLY OFFSET FOR CLARITY.
4. BLOW OFF VALVE SHALL BE LOCATED AT THE PROPERTY LOT LINE AND AVOID DRIVEWAY.

SINGLE FAMILY RESIDENTIAL CUL-DE-SAC UTILITY PLAN WITHOUT RECLAIMED WATER

**NOTES:**

1. A MAXIMUM OF TWO WASTEWATER SERVICE LATERALS MAY CONNECT DIRECTLY TO A TERMINAL MANHOLE.
2. HYDRANT SHALL NOT BE PLACED AT THE END OF THE CUL-DE-SAC / DEAD END AND NO LESS THAN 500-FT FROM THE LAST RESIDENT OR DEAD END. LAST HYDRANT SHALL BE LOCATED AS CLOSE TO INTERSECTION AS POSSIBLE WHILE MAINTAINING PROPER FIRE CODE.
3. IF IRRIGATING WITH POTABLE WATER, WELL, SURFACE WATER OR OTHER SOURCE OF WATER AN RPBA ASSC 101 IS REQUIRED.
4. BLOW OFF VALVE SHALL BE LOCATED AT THE PROPERTY LOT LINE AND AVOID DRIVEWAY.

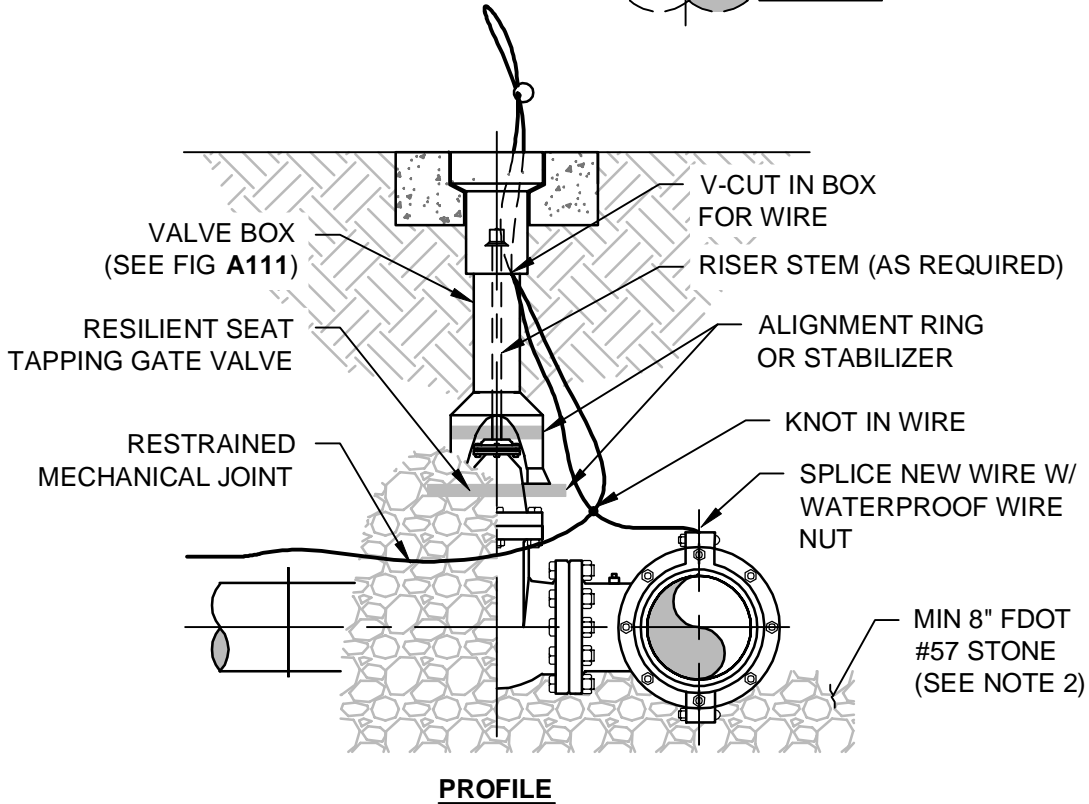
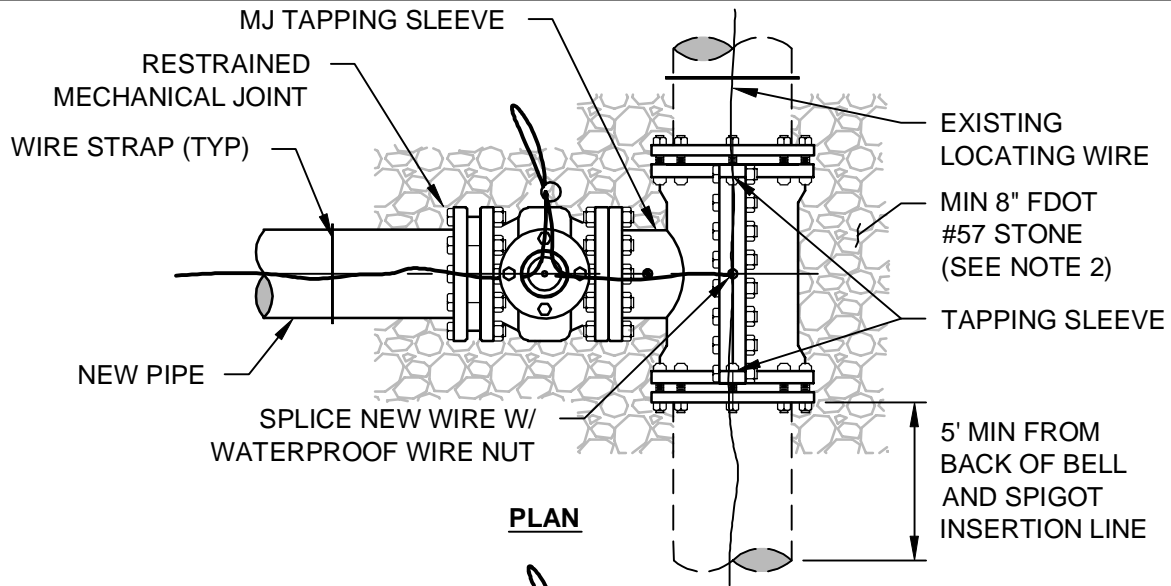
WATER & RECLAIMED WATER SERVICES (TYPICAL)



NOTES:

1. CURB STOP SHALL BE INSTALLED AT THE R.O.W. LINE.
2. CONTRACTOR TO LOCATE CURB STOP BY PLACING A 2-IN x 2-IN SQUARE STAKE RISING 24-IN ABOVE THE GROUND. TOP OF STAKE SHALL BE PAINTED THE COLOR OF THE UTILITY SERVICE AND LABELED WITH THE LOT NUMBER(S) IT SERVES.
3. CASING PIPE WITH END SEALS REQUIRED FOR SERVICES UNDER NON-LOCAL ROADS. CASING PIPE SHALL BE 2-IN PE FOR 1-IN SERVICE AND 4-IN HDPE FOR 2-IN SERVICE. EXTEND CASING A MINIMUM OF 24-IN BEYOND CURB. CASING PIPE NOT REQUIRED FOR LOCAL ROADS.
4. 2-IN SERVICE LINE REQUIRES 2-IN GATE VALVE W/ VALVE BOX TO FINISH GRADE.
5. 1-IN SERVICE, THE SADDLE AND CORPORATION STOP SHALL BE INSTALLED AT 10 OR 2 O'CLOCK FACING OUTWARDS TOWARDS THE SERVICE LOCATION. 2-IN SERVICE, THE SADDLE AND CORPORATION STOP SHALL BE INSTALLED AT 9 OR 3 O'CLOCK FACING OUTWARDS TOWARDS THE SERVICE LOCATION.

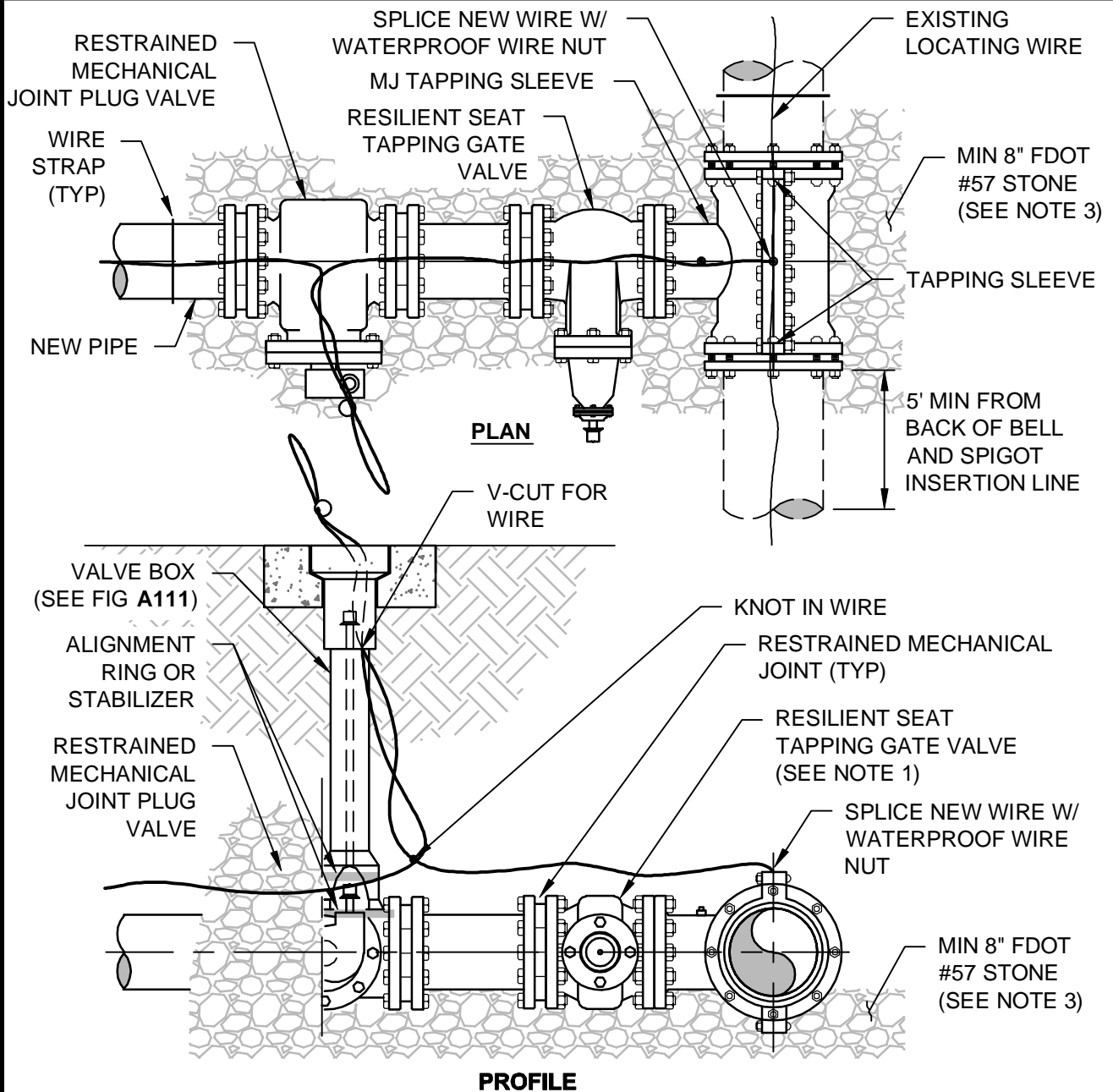
MJ TAPPING SLEEVE & GATE VALVE ASSEMBLY FOR WATER & RECLAIMED WATER



NOTES:

1. TAPPING SLEEVE INSTALLATION SHALL BE IN ACCORDANCE WITH SECTION 3117-SYSTEM CONNECTIONS.
2. BEDDING ROCK SHALL BE FULLY AND UNIFORMLY SUPPORTING THE TAPPING SLEEVE & VALVE AT A MIN OF 8-IN IN ALL DIRECTIONS.

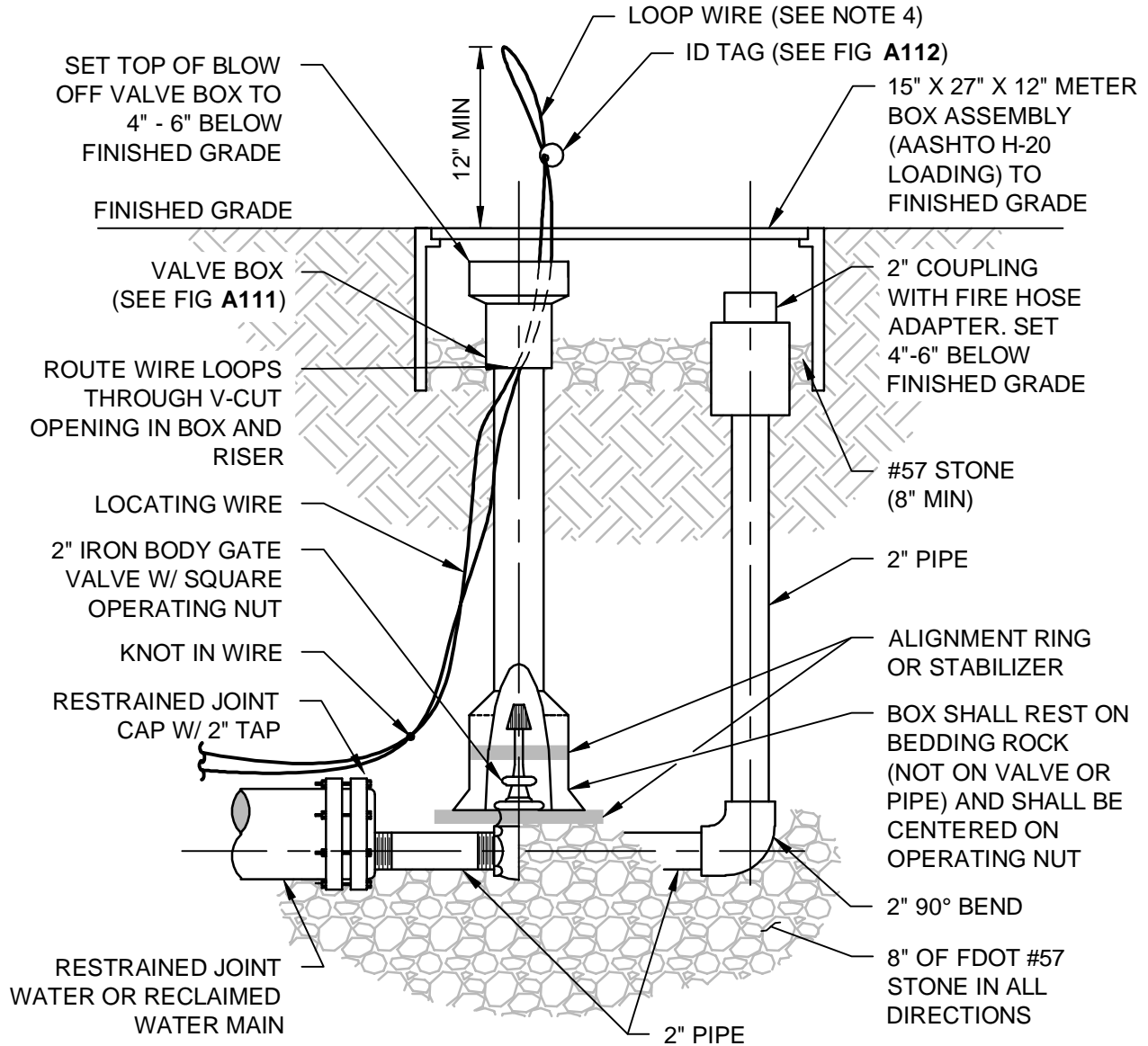
MJ TAPPING SLEEVE & GATE VALVE ASSEMBLY WITH PLUG VALVE FOR WASTEWATER



NOTES:

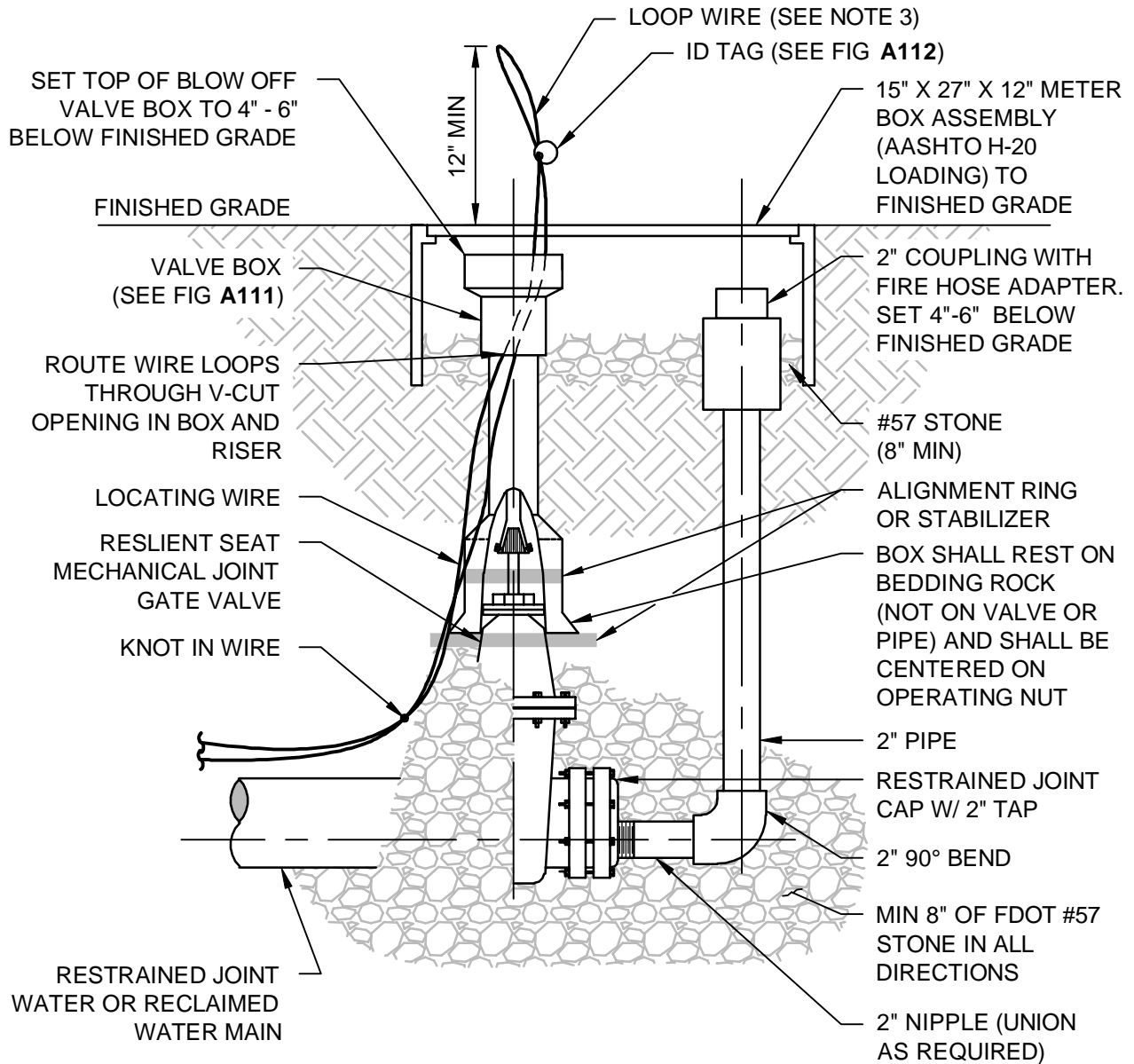
1. TAPPING GATE VALVE TO BE INSTALLED HORIZONTALLY AND ABANDONED IN THE OPEN POSITION.
2. TAPPING SLEEVE INSTALLATION SHALL BE IN ACCORDANCE WITH SECTION 3117-SYSTEM CONNECTIONS.
3. BEDDING ROCK SHALL BE FULLY AND UNIFORMLY SUPPORTING THE TAPPING SLEEVE & VALVE AT A MIN OF 8-IN IN ALL DIRECTIONS.

PERMANENT BLOW OFF VALVE - WATER & RECLAIMED WATER

**NOTES:**

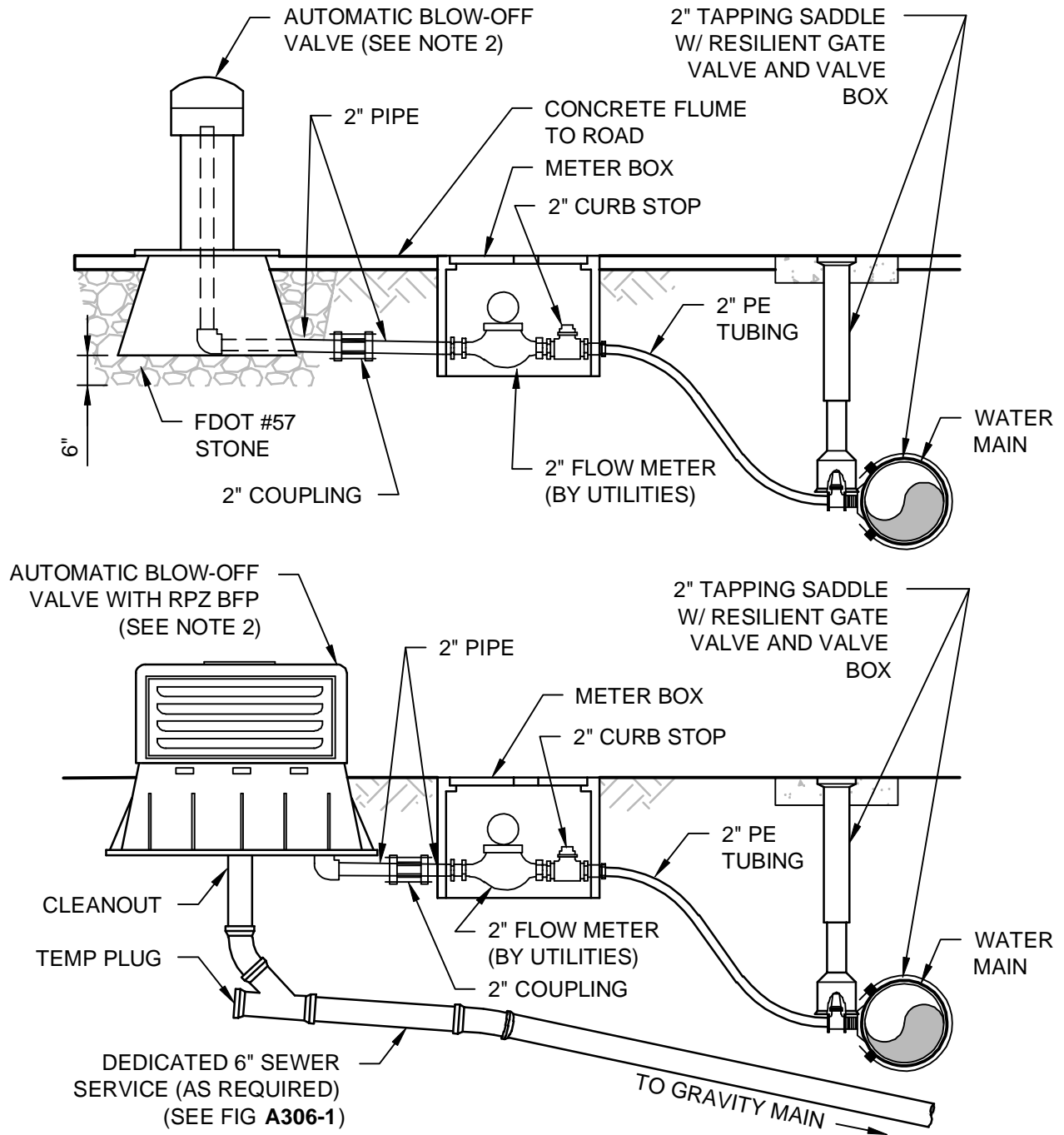
1. INSTALL MANUFACTURED BLOW OFF BOXES AS APPROVED IN APPENDIX D.
2. FOR USE AT PERMANENT WATER AND RECLAIMED WATER DEAD-ENDS, SUCH AS CUL-DE-SACS.
3. LOCATING WIRE SHALL BE CONTINUOUS INSIDE THE VALVE BOX AND SHALL EXTEND 12-IN ABOVE TOP OF COLLAR. WIRE SHALL BE COLOR CODED TO MATCH THE UTILITY INSTALLED.
4. DRILL HOLE IN ID TAG AND INSTALL ON TRACING WIRE.
5. SHALL NOT BE INSTALLED IN THE PAVEMENT, SIDEWALK, OR CURB.
6. ALL PIPE AND FITTINGS SHALL BE SCH 40 BRASS OR 316 SST.

TEMPORARY BLOW OFF VALVE - WATER & RECLAIMED WATER

**NOTES:**

1. FOR USE AT PHASE LINES OR TEMPORARY TERMINATION POINTS.
2. LOCATING WIRE SHALL BE CONTINUOUS INSIDE THE VALVE BOX AND SHALL EXTEND 12-IN ABOVE TOP OF COLLAR. WIRE SHALL BE COLOR CODED TO MATCH THE UTILITY INSTALLED.
3. DRILL HOLE IN ID TAG AND INSTALL ON TRACING WIRE.
4. ALL PIPE AND FITTINGS SHALL BE SCH 40 BRASS OR 316 SST.

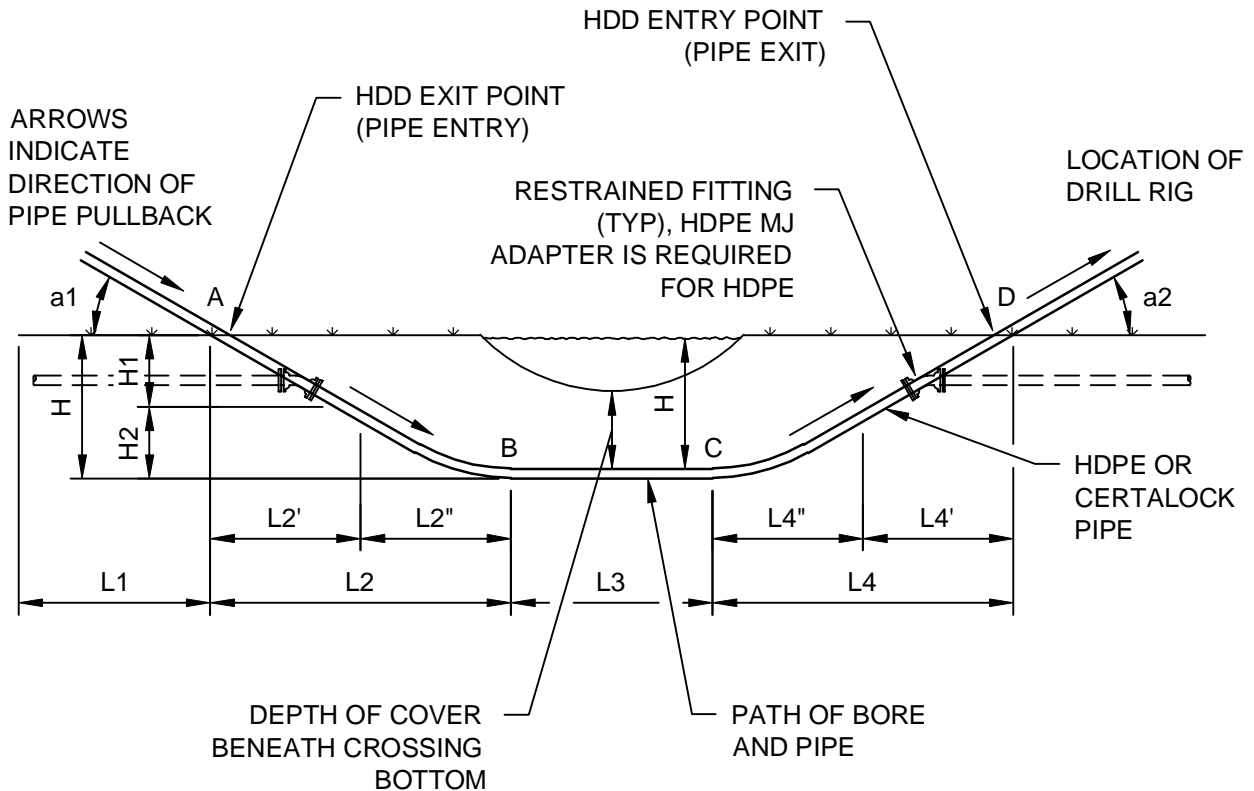
BLOW OFF VALVE, AUTOMATIC - WATER



NOTES:

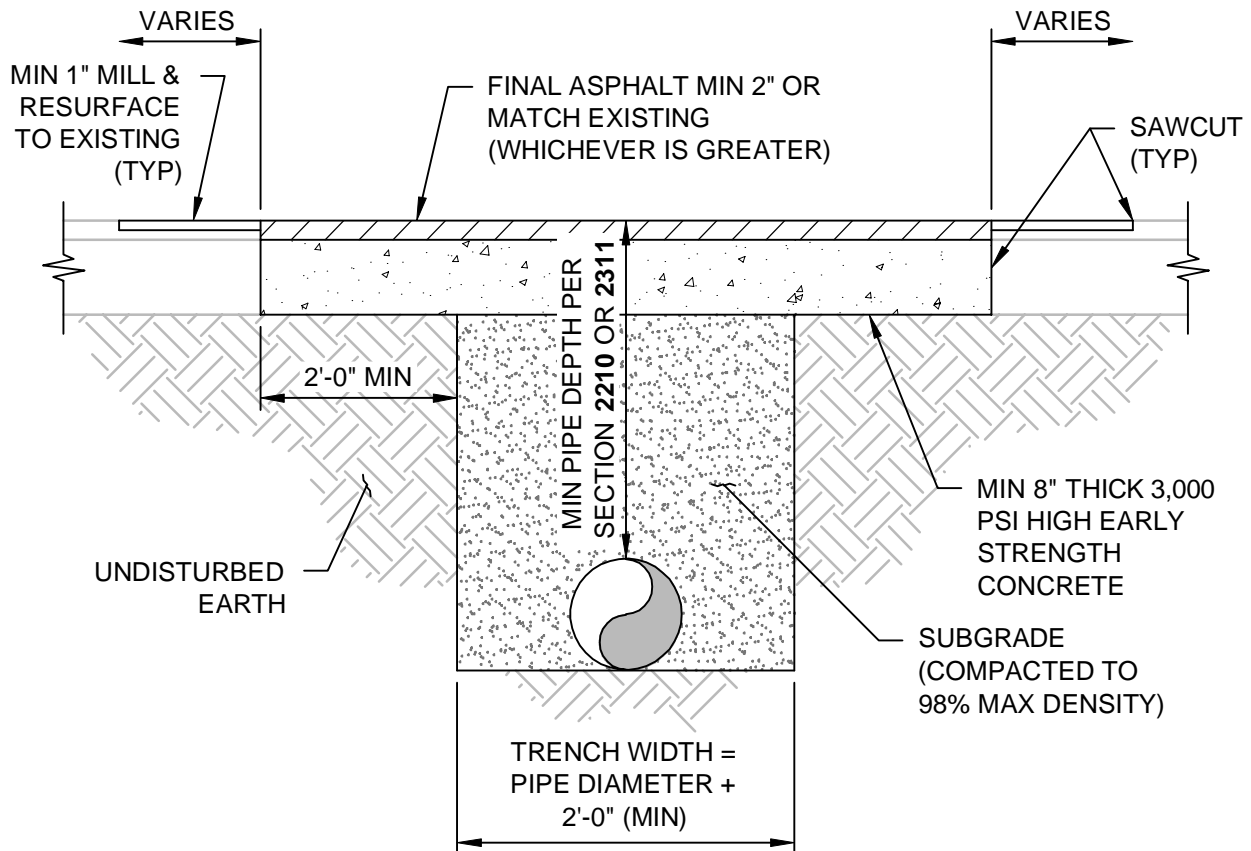
1. TO BE PROVIDED ON AN AS-NEEDED BASIS TO BE DETERMINED BY OCU.
2. A 12-IN MINIMUM CLEARANCE TO BE MAINTAINED BETWEEN AUTOMATIC FLUSHING SYSTEM AND ANY OBSTRUCTIONS.
3. ALL PIPE AND FITTINGS SHALL BE SCH 40 BRASS OR 316 SST.

DIRECTIONAL DRILL

PROFILE VIEW**NOTES:**

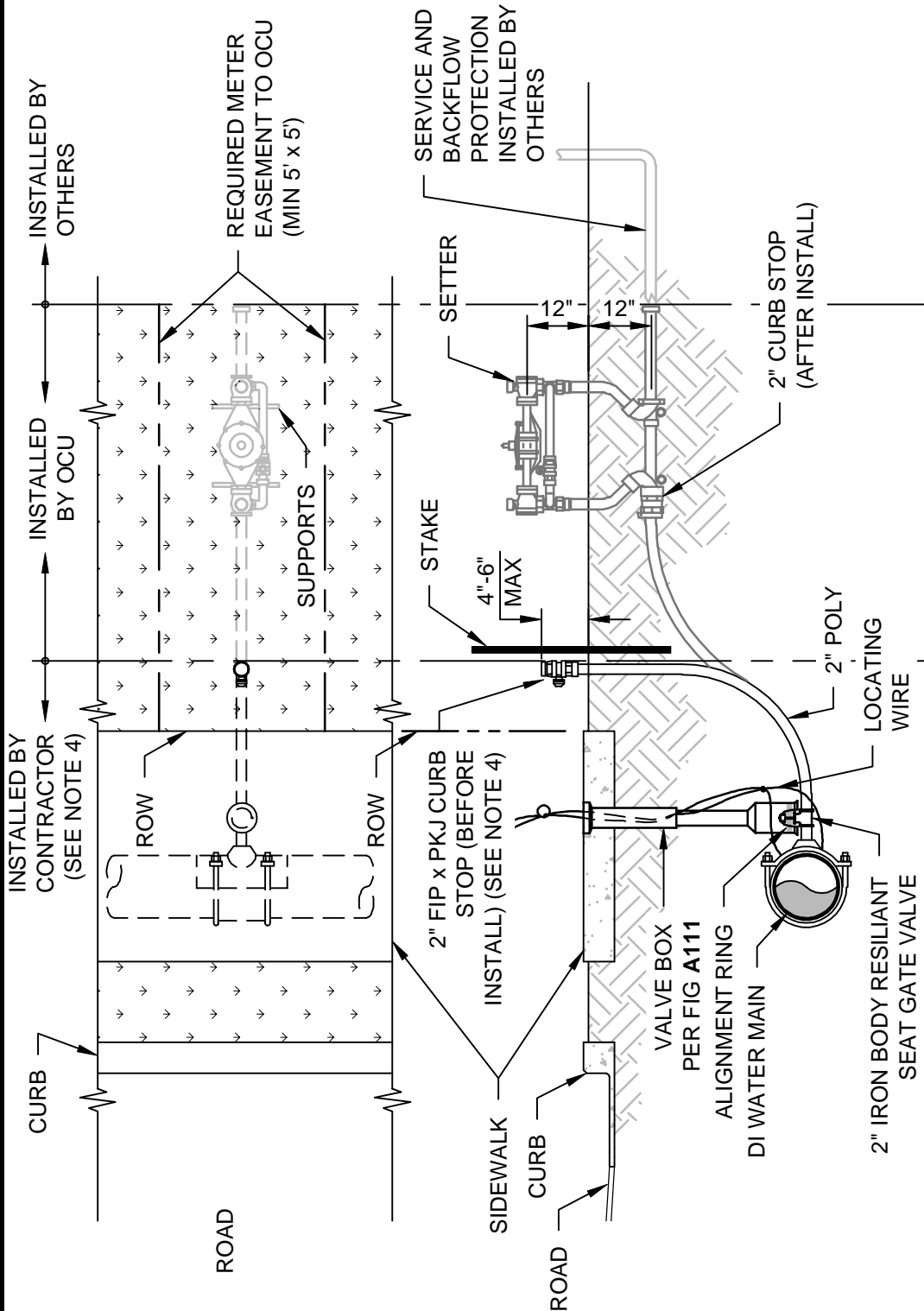
1. SHALL BE DESIGNED PER ASTM F1962-11.
2. POINTS A, B, C & D PULL FORCE ON PIPE.
3. L1 - ADDITIONAL LENGTH OF PIPE REQUIRED FOR HANDLING AND THERMAL CONTRACTION.
4. L2 - HORIZONTAL DISTANCE TO ACHIEVE DESIRED DESIGN DEPTH.
5. L3 - ADDITIONAL DISTANCE TO TRAVERSE AT DESIRED DESIGN DEPTH.
6. L4 - HORIZONTAL DISTANCE TO RISE TO SURFACE.
7. H - DEPTH OFF BORE HOLE FROM GROUND ELEVATION.
8. a1 - PIPE ENTRY ANGLE SHALL NOT EXCEED 15 DEGREES AND THE MANUFACTURERS RECOMMENDATIONS ON DEFLECTION.
9. a2 - PIPE EXIT ANGLE SHALL NOT EXCEED 12 DEGREES AND THE MANUFACTURERS RECOMMENDATIONS ON DEFLECTION.
10. MANDREL TESTING SHALL BE PERFORMED THROUGH THE ENTIRE LENGTH OF THE INSTALLED PIPE, FOR ALL PIPE 16-IN IN DIAMETER AND LARGER. THE MANDREL SIZE SHALL BE 90% OF THE INSIDE DIAMETER OF THE PIPE. MANDREL TESTING ON SMALLER PIPE MAY BE REQUIRED BY UTILITIES.
11. ISOLATION VALVES SHALL BE DESIGNED AND INSTALLED AT BOTH ENDS OF THE DIRECTIONAL DRILL.
12. ALL WORK TO BE PERFORMED WITHIN ROW OR EASEMENT.
13. ENTIRE DIRECTIONAL DRILL TO BE SHOWN IN PLAN VIEW AND PROFILE VIEW ON CONSTRUCTION PLAN.

STANDARD ROADWAY OPENCUT DETAIL

**NOTES:**

1. LONGITUDINAL CUTS SHALL REQUIRE OVERLAY/RESURFACE OF THE COMPLETE WIDTH OF THE TRAVELED WAY.
2. CUTS AT AN INTERSECTION OF STREETS SHALL REQUIRE A COMPLETE OVERLAY/RESURFACING TO THE END OF ALL RETURN RADII AND ALSO TO A POINT TEN (10) FEET BEYOND THE CUT, WHICHEVER IS GREATER.
3. ACTUAL REQUIREMENTS WILL BE AS STATED ON THE APPROVED PERMIT AND DRAWINGS.
4. BASE REPLACEMENT SHALL BE 8-IN THICK 3,000 PSI HIGH EARLY STRENGTH CONCRETE.
5. ASPHALT CONCRETE SURFACE MATERIAL SHALL BE REPLACED WITH THE SAME TYPE OF MATERIAL THAT EXISTED AT THE TIME OF REMOVAL, OR AS APPROVED BY THE COUNTY PUBLIC WORKS DEPARTMENT.
6. MINIMUM ASPHALTIC CONCRETE SURFACE OVERLAY THICKNESS SHALL BE 1-IN OR AS APPROVED BY THE COUNTY ENGINEER OR FDOT.
7. ALL JOINT CUTS SHALL BE MECHANICALLY SAW CUT.
8. IF PERMANENT ASPHALT IS NOT APPLIED WITHIN 24-HRS OF WORK, MIN 2" TEMPORARY COLD PATCH REQUIRED.
9. SUB-GRADE TO BE COMPACTED TO 98% MIN DENSITY AS DETERMINED BY AASHTO T-180. CUT TO BE REPLACED WITH 3,000 PSI HIGH EARLY STRENGTH CONCRETE TO TOP OF EXISTING BASE. CUT AREA TO BE PLATED OR PROTECTED THE DAY OF THE POUR. EXISTING SURFACE TO BE SAW CUT A MINIMUM 5-FT BEYOND BASE CUT.

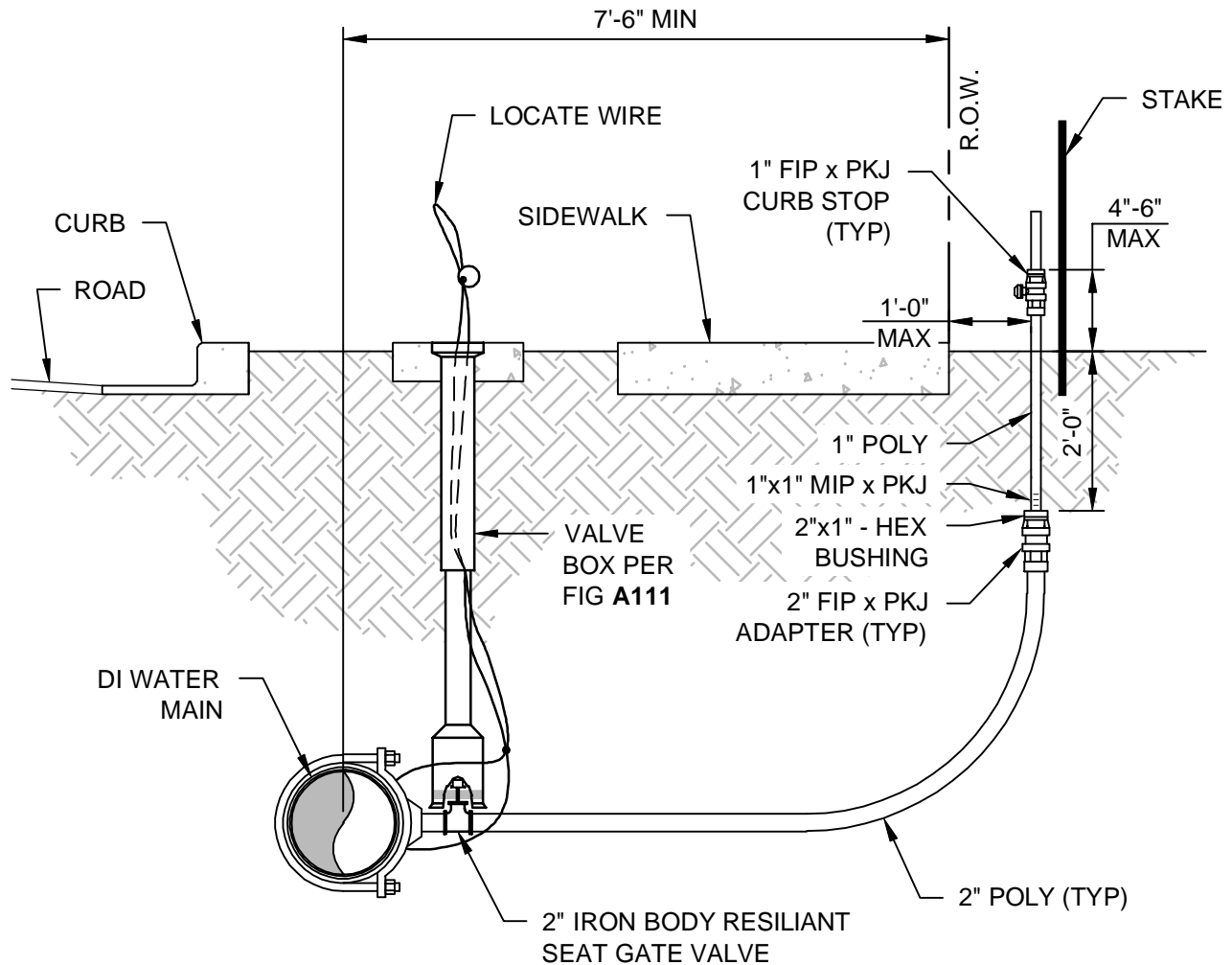
METER INSTALLATION DETAIL - 1 1/2" & 2"



NOTES:

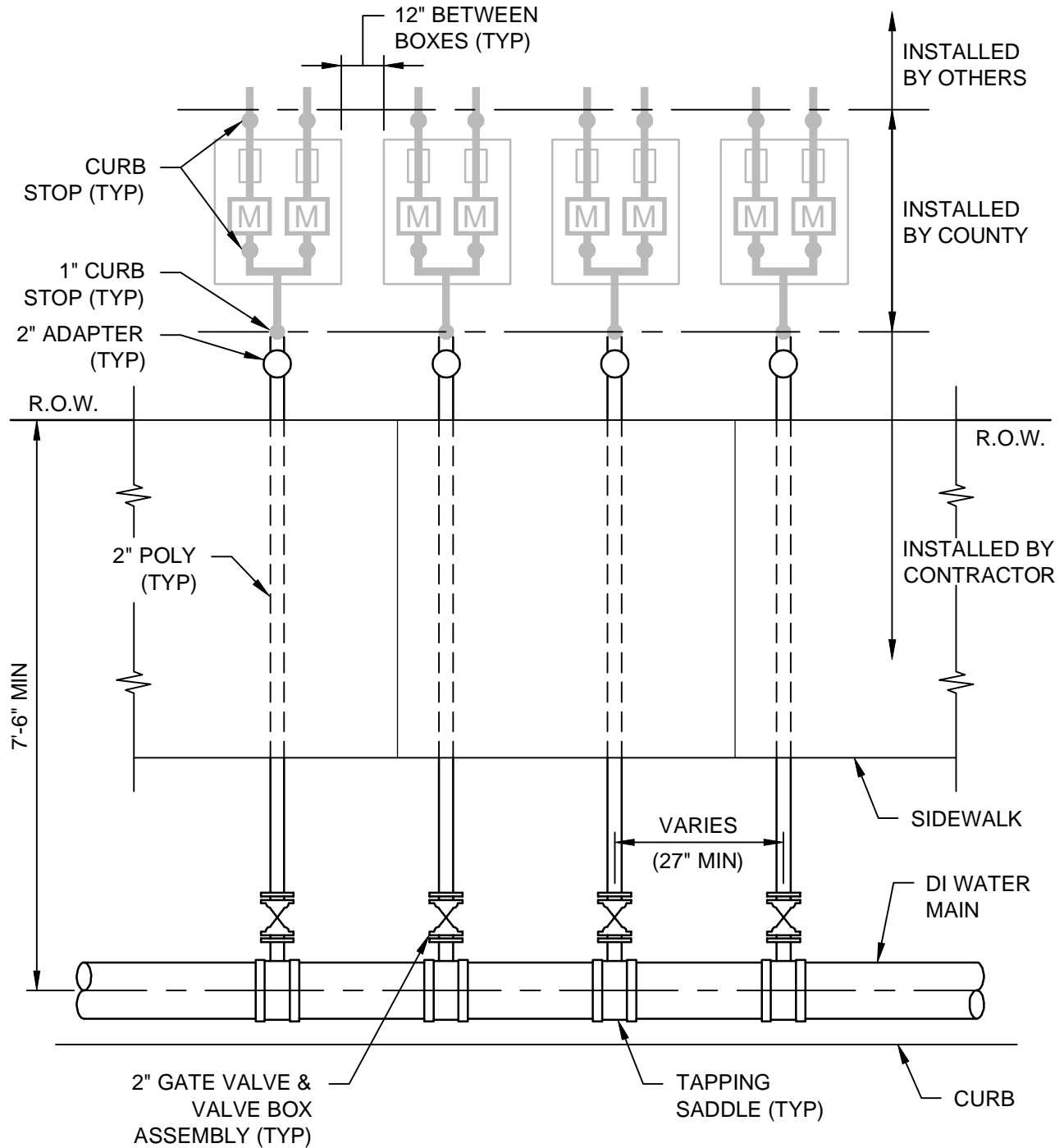
1. 2-IN METER SETTER USED FOR 1.5-IN & 2-IN TURBINES AND DISPLACEMENT METERS.
2. BYPASS USED ON DOMESTIC METERS ONLY. WATER AND RECLAIMED WATER IRRIGATION WILL NOT HAVE BYPASS.
3. TIE LOCATING WIRE INTO EXISTING WIRE WITH WATERPROOF WIRE NUT.
4. CONTRACTOR SHALL USE A 2-IN x 2-IN SQUARE STAKE RISING 24-IN ABOVE THE GROUND AND INSTALL 2-IN POLY AND CURB STOP STUBBED UP 4-IN TO 6-IN. TOP OF STAKE SHALL BE PAINTED THE COLOR OF THE UTILITY SERVICE AND LABELED WITH THE LOT NUMBER(S) IT SERVES.

METER BANKS - MAINS GREATER THAN 7.5-FT FROM R.O.W.

**PROFILE VIEW****NOTES:**

1. MAIN SHALL BE INSTALLED SO THAT VALVE BOXES DO NOT FALL IN CURB.
2. INSTALL 2-IN SERVICE SADDLES AT 3 OR 9 O'CLOCK.
3. FOR SERVICES W/ MAIN INSTALLED GREATER THAN 7.5-FT FROM R.O.W.
4. POLY SHALL BE COLOR CODED BLUE FOR WATER AND PANTONE PURPLE FOR RECLAIMED.
5. 2-IN SERVICE SHALL BE UTILIZED IF RESIDENTIAL FIRE SPRINKLER SYSTEM IS CONNECTED TO SERVICE.
6. CONTRACTOR SHALL USE A 2-IN x 2-IN SQUARE STAKE RISING 24-IN ABOVE THE GROUND AND INSTALL 1-IN POLY AND CURB STOP STUBBED UP 4-IN TO 6-IN. TOP OF STAKE SHALL BE PAINTED THE COLOR OF THE UTILITY SERVICE AND LABELED WITH THE LOT NUMBER(S) IT SERVES.

METER BANKS - SHORT SERVICE, MAINS GREATER THAN 7.5-FT FROM R.O.W.

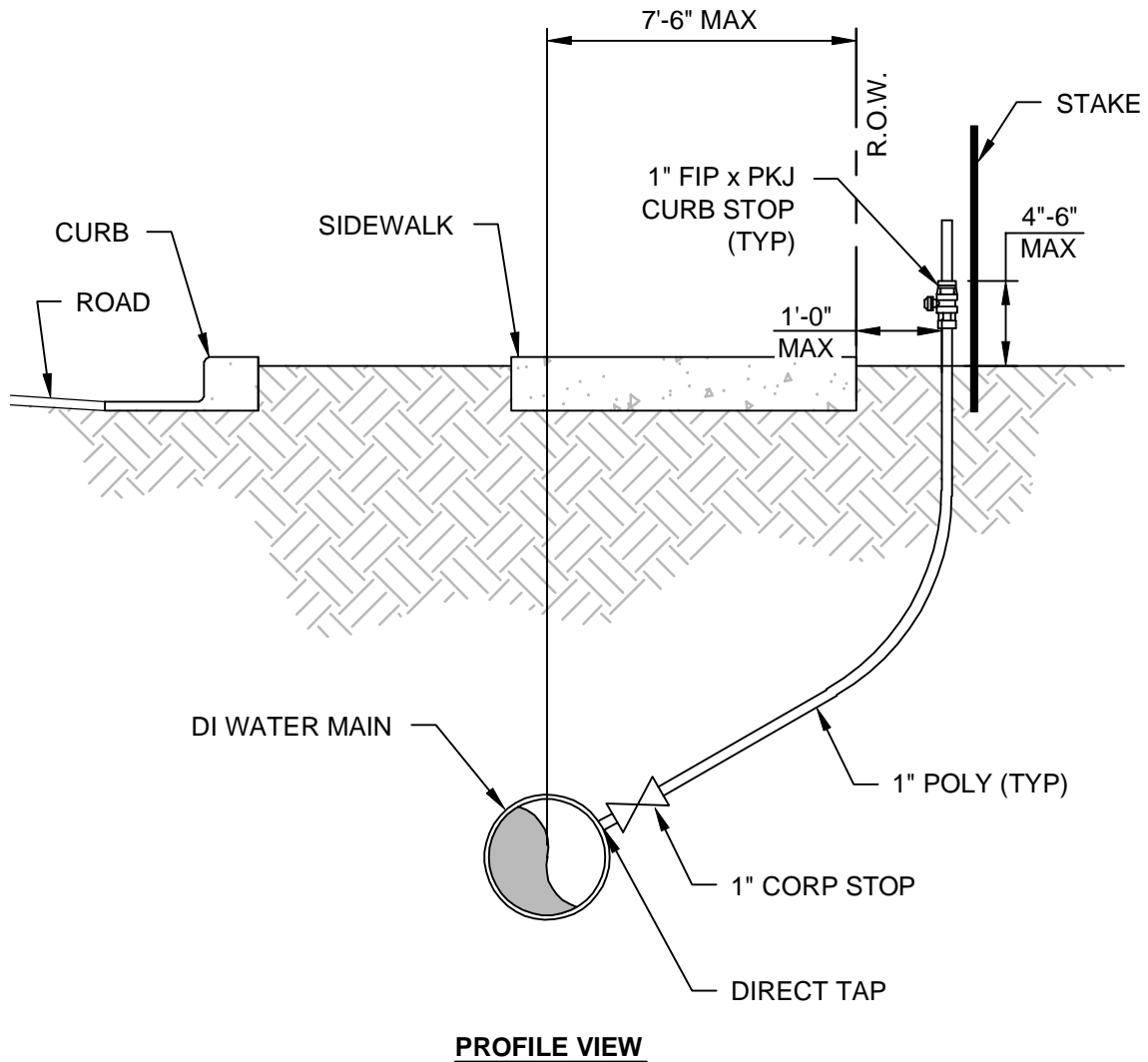


PLAN VIEW

NOTES:

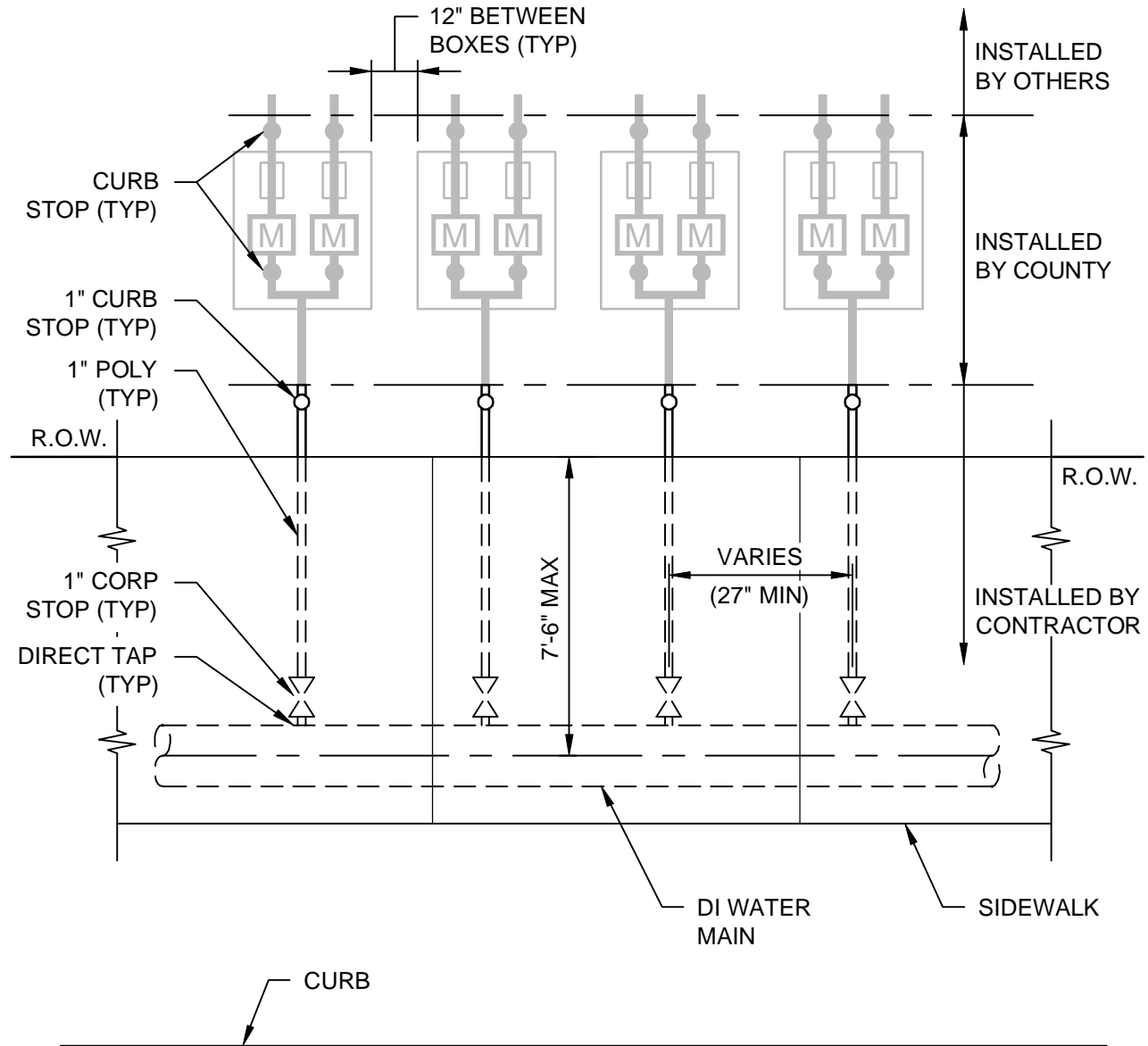
- DI PIPE SHALL EXTEND A MIN OF 5-FT PAST FIRST AND LAST SERVICE CONNECTION ON ALL METER BANK INSTALLS.

METER BANKS - MAINS LESS THAN 7.5-FT FROM R.O.W.

**NOTES:**

1. INSTALL SERVICE LINES WITH 1-INCH DIRECT TAP AT 2 OR 10 O'CLOCK ON DUCTILE IRON PIPE W/ 1-IN CORP STOP AT MAIN.
2. FIG A131-1 IS REQUIRED IF FIRE SYSTEM IS CONNECTED TO POTABLE SERVICE.
3. POLY SHALL BE COLOR CODED BLUE FOR WATER AND PANTONE PURPLE FOR RECLAIMED.

METER BANKS - SHORT SERVICE, MAINS LESS THAN 7.5-FT FROM R.O.W.

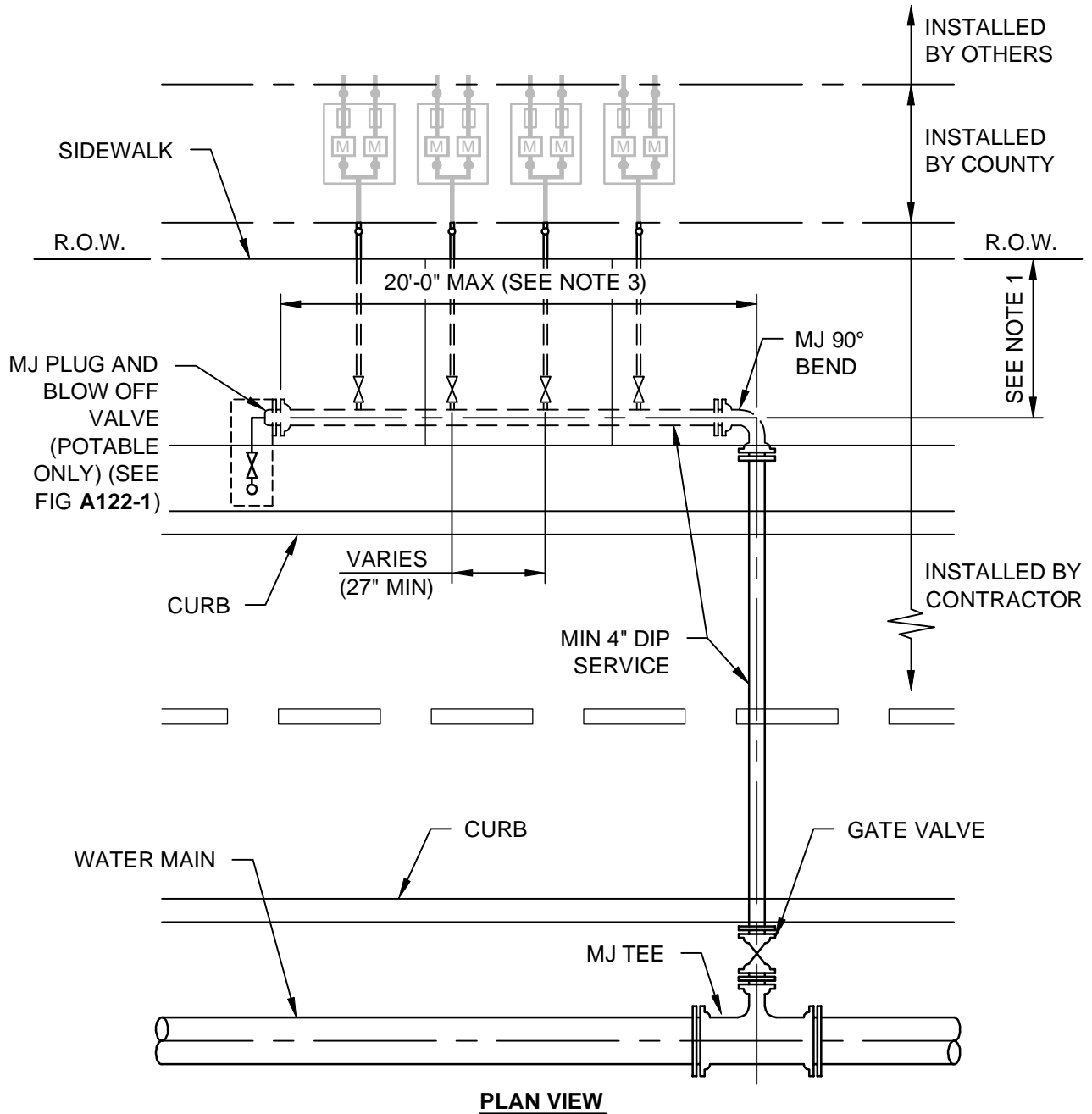


PLAN VIEW

NOTES:

1. DI PIPE SHALL EXTEND A MIN OF 5-FT PAST FIRST AND LAST SERVICE CONNECTION ON ALL METER BANK INSTALLS.

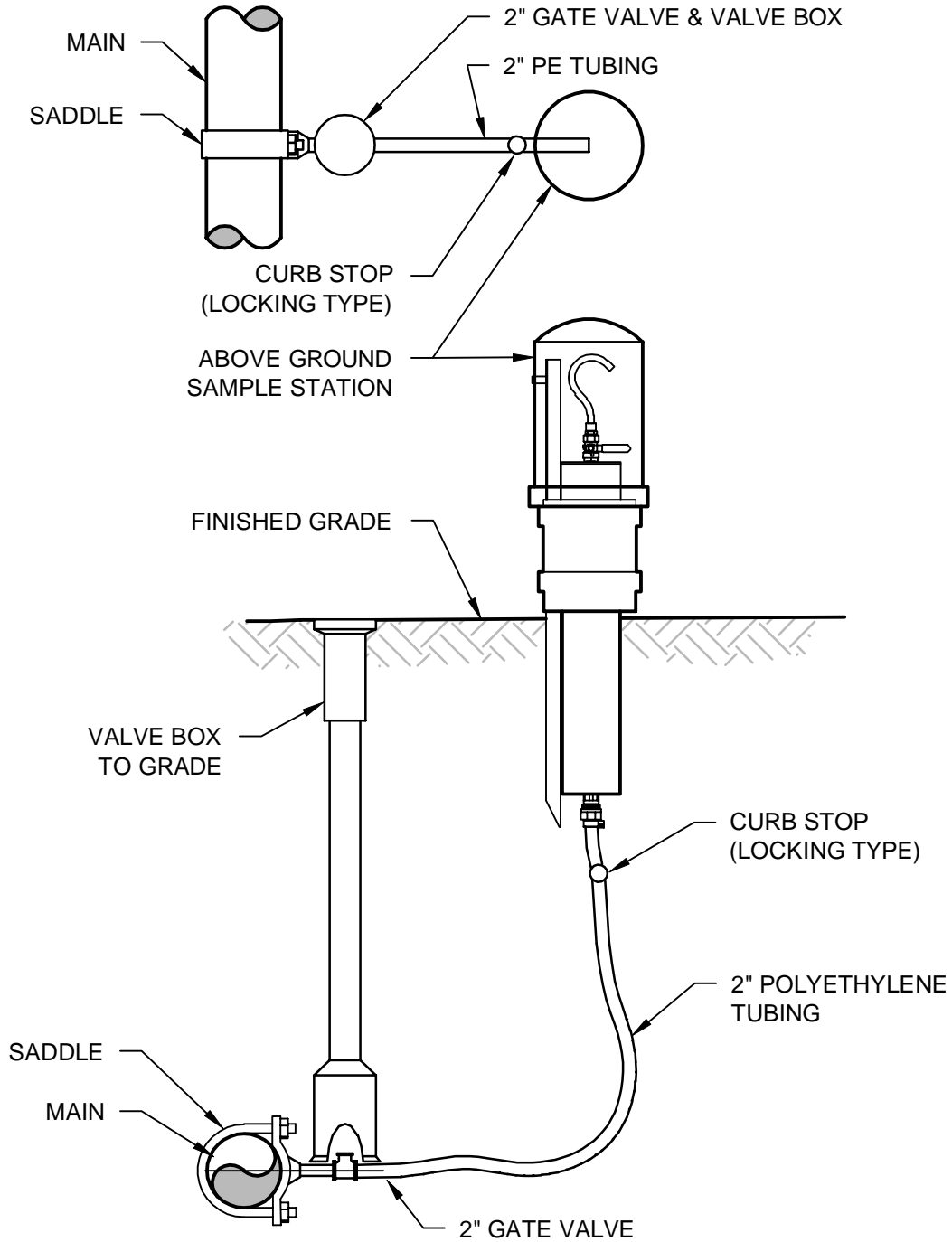
METER BANKS - LONG SERVICE



NOTES:

1. 1-IN DIRECT TAP SERVICES FOR MAINS CLOSER THAN 7.5-FT FROM R.O.W. AND 2-IN SADDLE W/ GATE VALVE IF MAIN IS FARTHER THAN 7.5-FT FROM R.O.W. SEE FIG A132-2 OR A131-2.
2. 2-IN GATE VALVES SHALL NOT BE LOCATED IN CURB.
3. LENGTHS GREATER THAN 20-FT TO BE EVALUATED ON A CASE-BY-CASE BASIS.

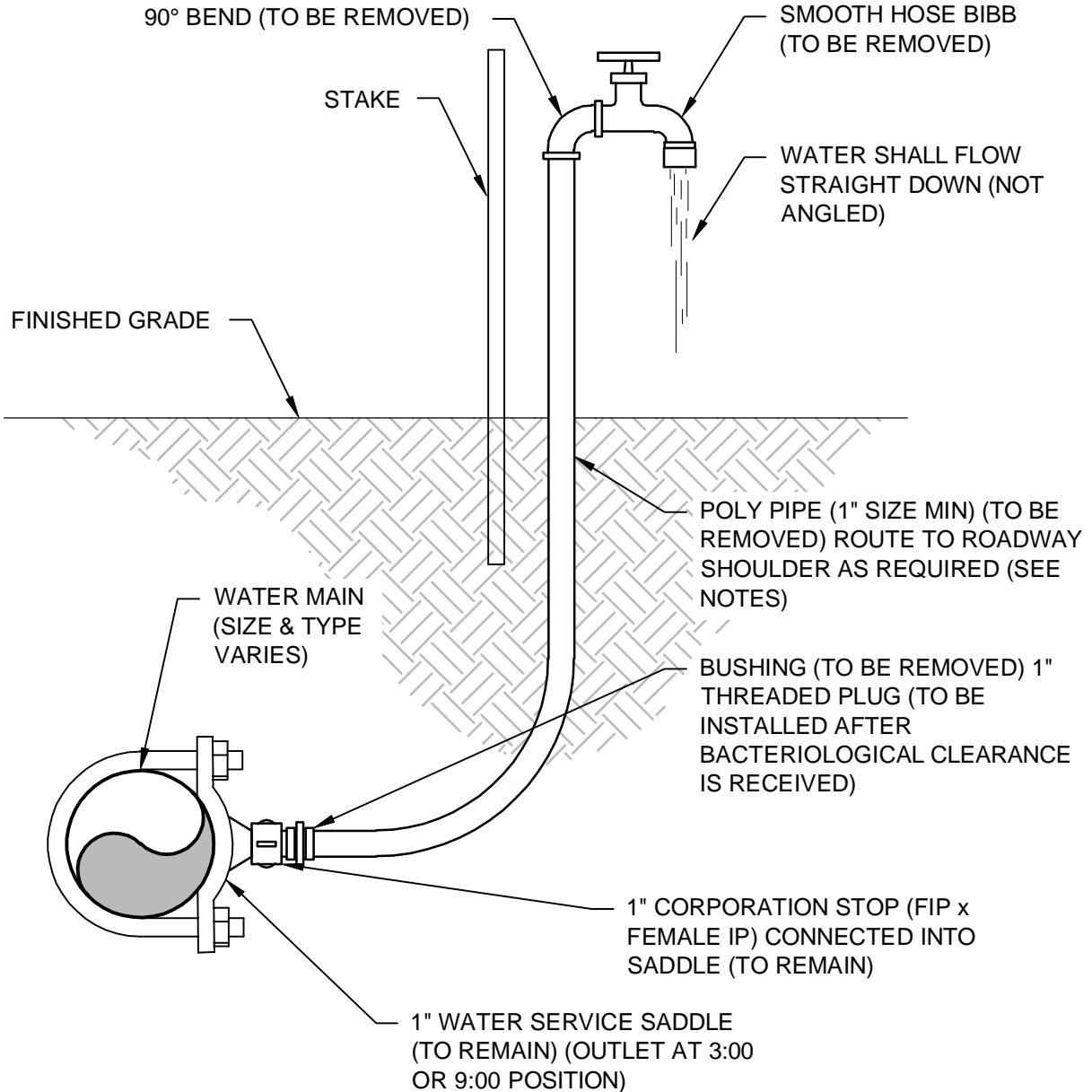
WATER SAMPLE STATION



NOTES:

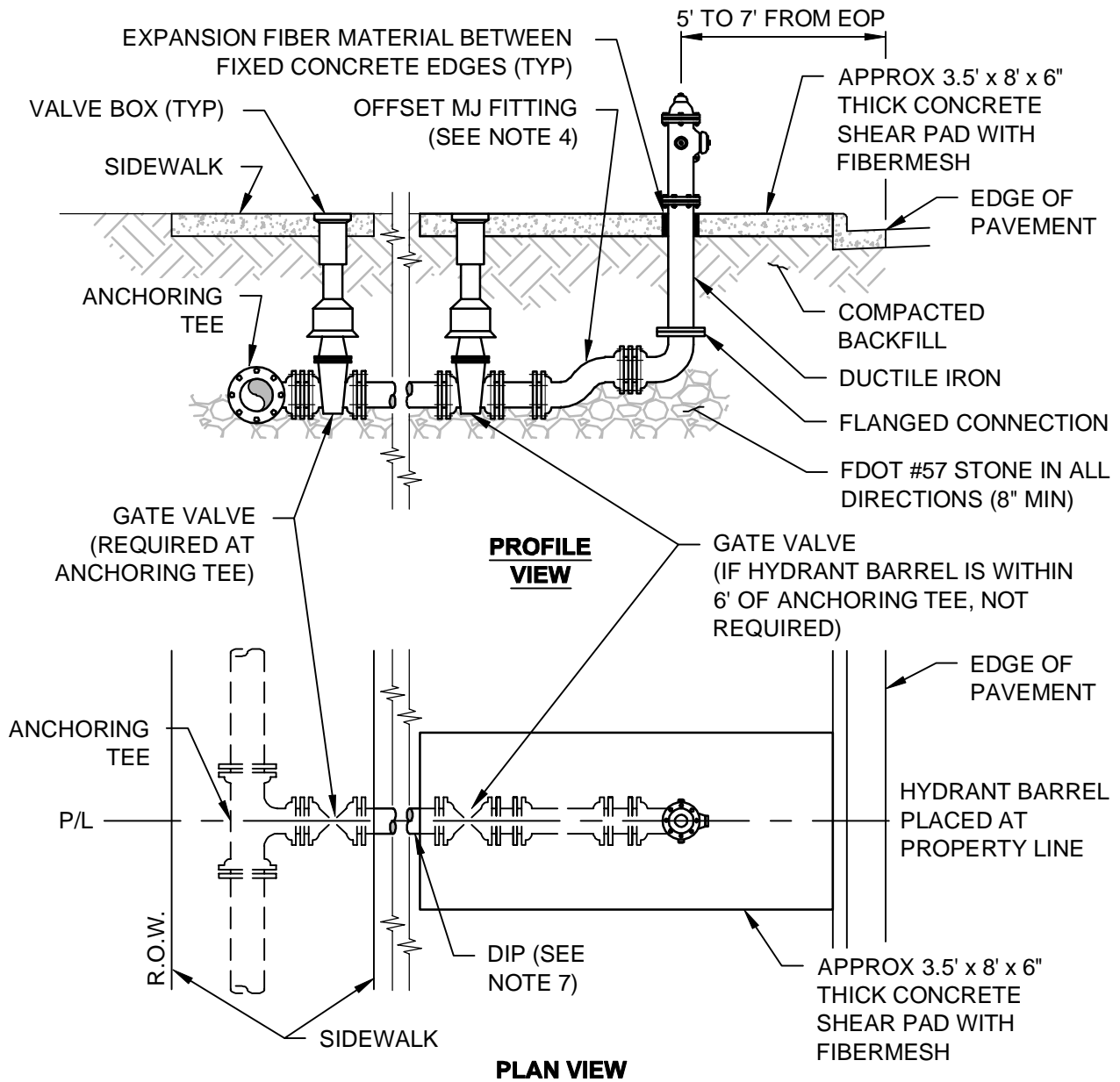
1. A 2-IN SAMPLE STATION INSTALLED AT THE END OF A CUL-DE-SAC CAN ALSO SERVE AS A BLOW-OFF VALVE WHEN BOTH ARE REQUIRED.

TEMPORARY SAMPLE TAP

**NOTES:**

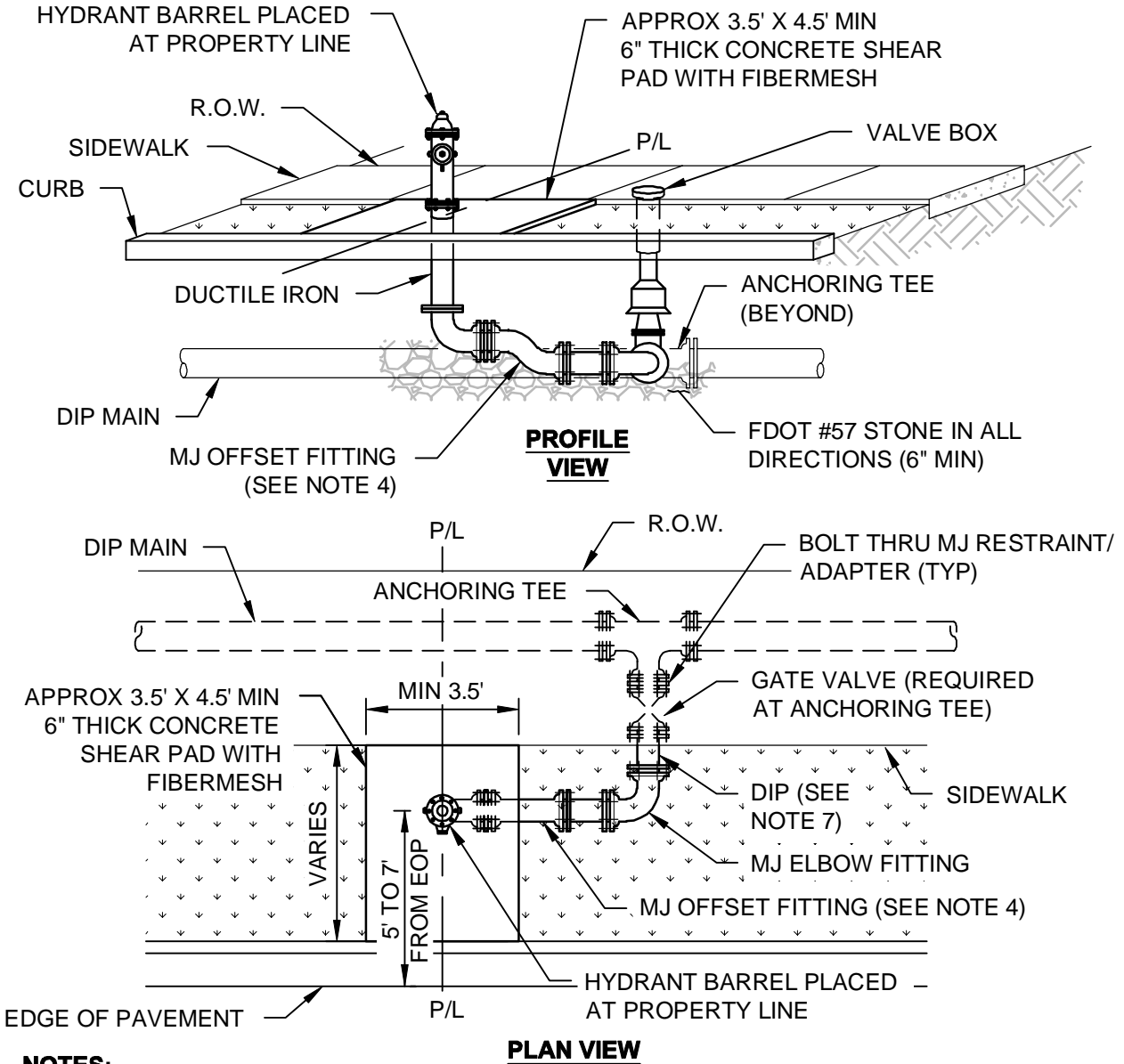
1. LOCATION OF SAMPLE POINT BIBB SHALL NOT BE WITHIN THE ROADWAY BUT ROUTED TO THE ROADWAY SHOULDERS (NON-TRAFFIC AREAS).
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL TEMPORARY PIPING & FITTINGS (AS NOTED) AFTER BACTERIOLOGICAL CLEARANCE IS RECEIVED.
3. THE USE OF THE ABOVE CONSTRUCTION FOR A TEMPORARY SAMPLE POINT SHALL BE LIMITED TO AREAS WHERE A SAMPLE TAP BY ALTERNATIVE METHODS IS NOT FEASIBLE IF DIRECTED OTHERWISE BY OCU.

FIRE HYDRANT ASSEMBLY (STANDARD CONFIGURATION)

**NOTES:**

1. CENTER OF THE FLANGE CONNECTION SHALL BE 4-IN TO 6-IN FROM THE TOP OF THE SLAB.
2. BARREL COLORS: PRIVATE HYDRANTS - RED; PUBLIC HYDRANTS - SILVER.
3. BONNET COLORS: TO BE DETERMINED BY FLOW TEST.
4. OFFSET MJ FITTING ROTATED AS REQUIRED FOR HYDRANT BURY DEPTH ADJUSTMENT. HYDRANT EXTENSION RISERS SHALL NOT BE PERMITTED. ADDITIONAL RESTRAINT FITTINGS AS REQUIRED.
5. HYDRANT SHALL BE CENTERED ON SHEAR PAD.
6. PUMPER NOZZLE SHALL FACE ROADWAY.
7. ALL PIPE SHALL BE RESTRAINED DIP FROM ANCHORING TEE TO HYDRANT.
8. HYDRANT SHALL BE 5-FT TO 7-FT FROM EDGE OF PAVEMENT.

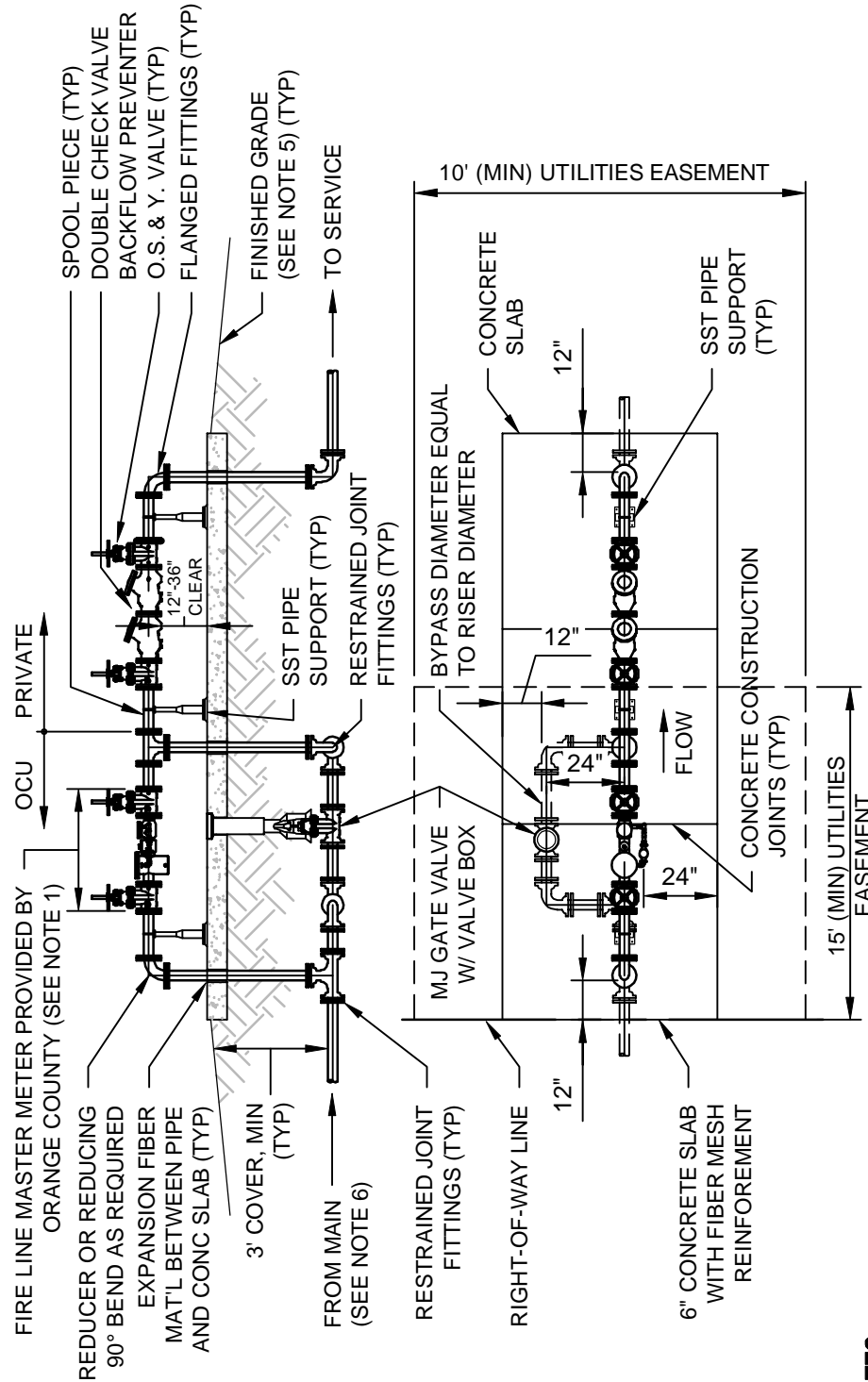
FIRE HYDRANT ASSEMBLY (LIMITED SPACE CONFIGURATION)



NOTES:

1. CENTER OF THE FLANGE CONNECTION SHALL BE 4-IN TO 6-IN FROM THE TOP OF THE SLAB.
2. BARREL COLORS: PRIVATE HYDRANTS - RED; PUBLIC HYDRANTS - SILVER.
3. BONNET COLORS: TO BE DETERMINED BY FLOW TEST.
4. OFFSET MJ FITTING ROTATED AS REQUIRED FOR HYDRANT BURY DEPTH ADJUSTMENT. HYDRANT EXTENSION RISERS SHALL NOT BE PERMITTED.
5. HYDRANT SHALL BE CENTERED ON SHEAR PAD.
6. PUMPER NOZZLE SHALL FACE THE ROADWAY.
7. ALL PIPE SHALL BE RESTRAINED DIP FROM ANCHORING TEE TO HYDRANT.
8. HYDRANT SHALL BE 5-FT TO 7-FT FROM EDGE OF PAVEMENT.

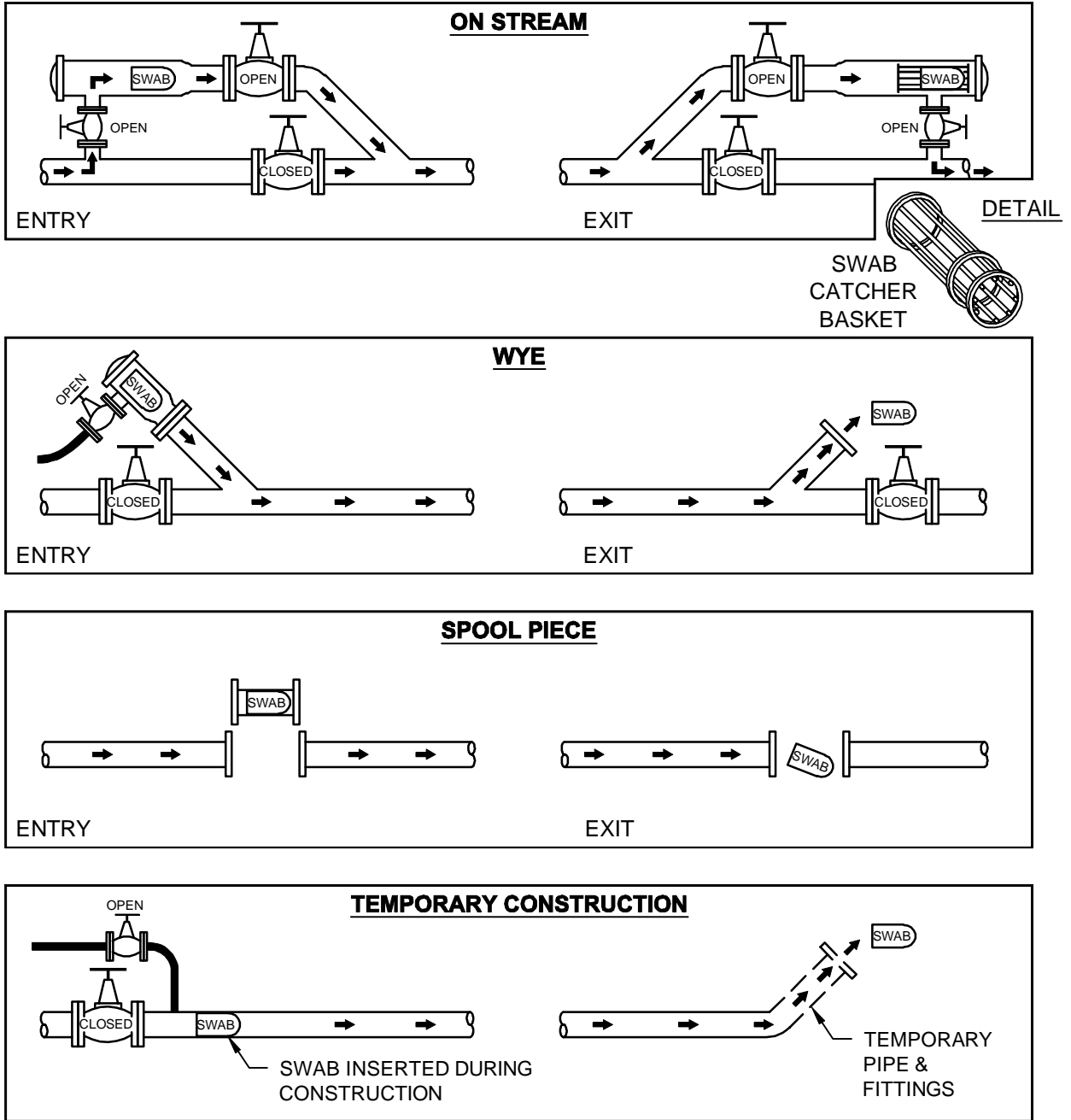
FIRE LINE MASTER METER ASSEMBLY



NOTES:

1. THE CONTRACTOR SHALL CONTACT THE UTILITIES INSPECTOR FOR EXACT METER ASSEMBLY LENGTH AND HEIGHT REQUIREMENTS. THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL PIPE, FITTINGS AND APPURTENANCES, EXCEPT FOR THE METER ASSEMBLY, WHICH SHALL BE PROVIDED BY UTILITIES AND INSTALLED BY THE CONTRACTOR.
2. ALL ABOVE GROUND PIPE SHALL BE FLANGED DUCTILE IRON, PRIMER COATED ONLY.
3. ASSEMBLY SHALL BE PAINTED IN ACCORDANCE WITH SECTION 3119.
4. ALL FLANGES: PIPE, VALVES AND APPURTENANCES SHALL HAVE 316 SST HARDWARE.
5. FINISH GRADE AROUND METER ASSEMBLY SLAB SHALL ENSURE A SAFE WORK ENVIRONMENT. GRADING SLOPE DROP OFF SHALL NOT EXCEED 6-IN WITHIN 5-FT OF SLAB.
6. SERVICES 4-INCH AND LARGER SHALL BE DIP FROM THE POINT OF CONNECTION TO THE MAIN TO THE METER ASSEMBLY IF THE MAIN IS ON THE SAME SIDE OF THE STREET AS THE ASSEMBLY. IF THE MAIN IS ON THE OPPOSITE SIDE OF THE STREET AS THE ASSEMBLY, A MINIMUM OF ONE SEGMENT OF PIPE IMMEDIATELY UPSTREAM FROM THE METER ASSEMBLY SHALL BE DIP. ALL PIPING SHALL BE RESTRAINED.

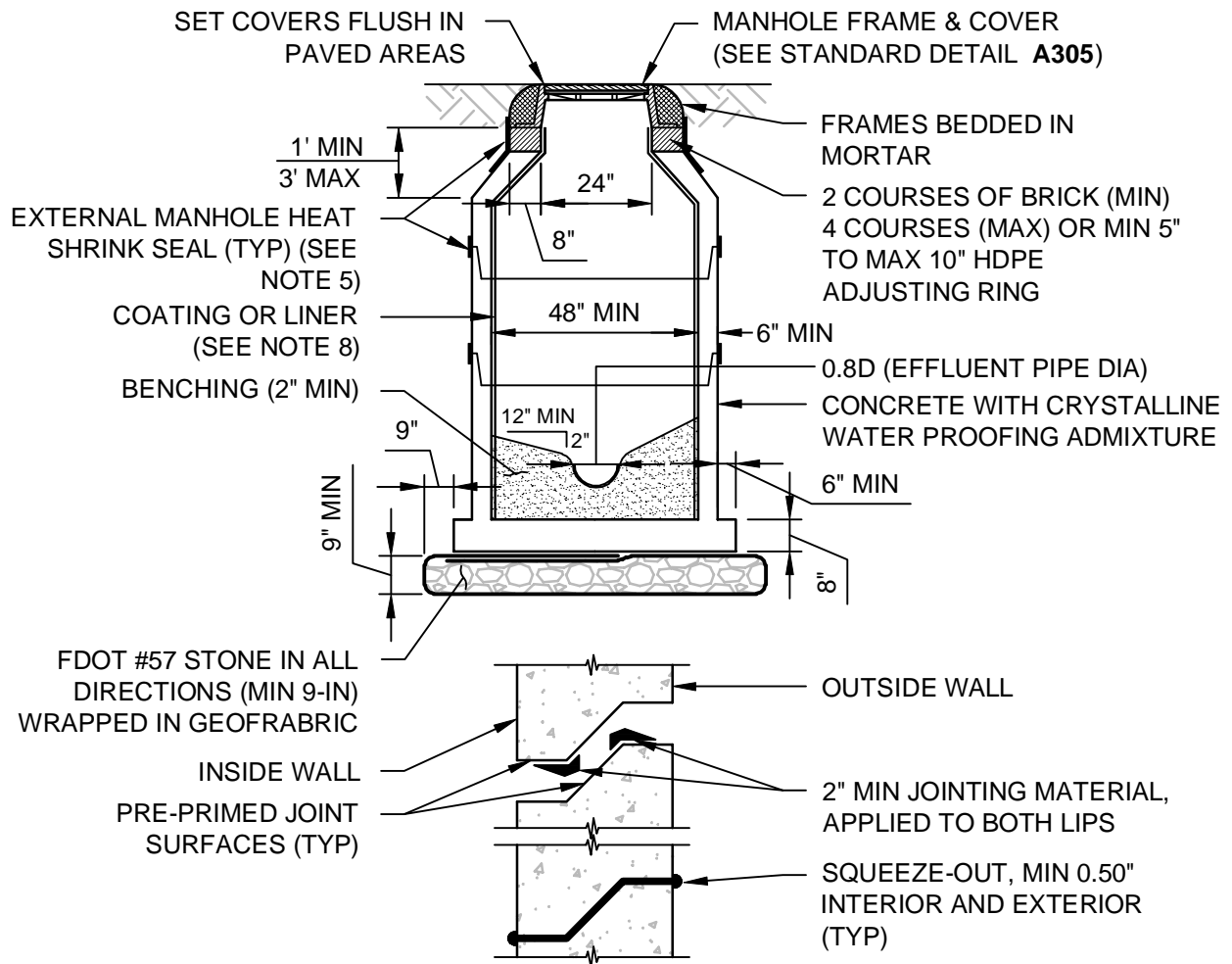
SWABBING ACCESS POINTS



NOTES:

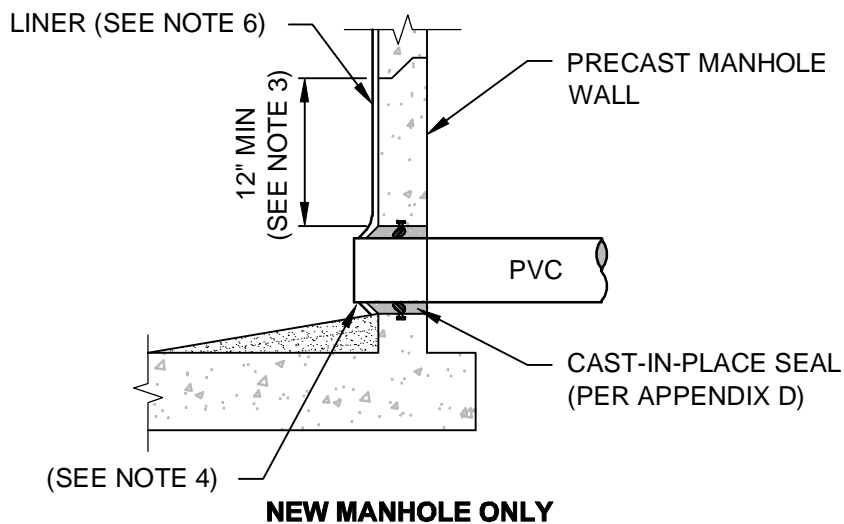
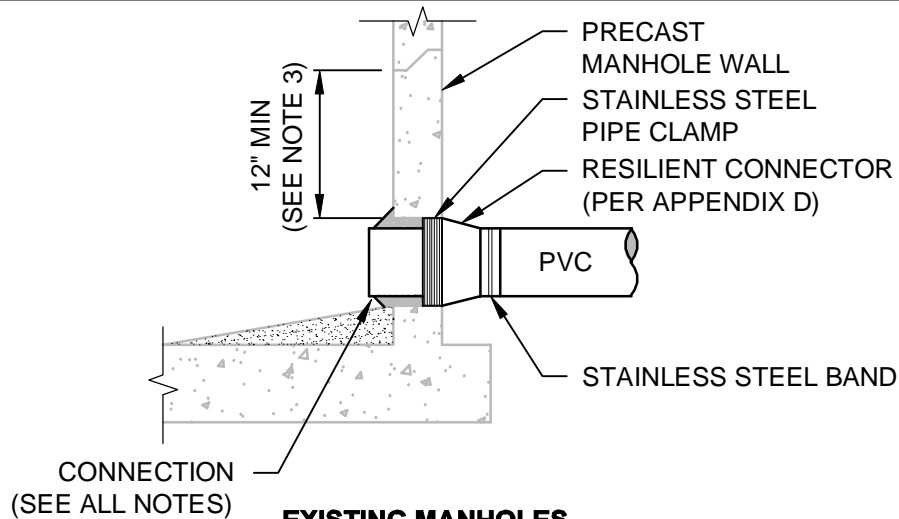
1. FOAM SWAB.
2. SUGGESTED FOR WATER AND RECLAIMED WATER MAINS OF ALL SIZES. REQUIRED FOR WATER AND RECLAIMED WATER MAINS 16-IN DIAMETER AND GREATER.
3. CONCRETE SLAB AND DESIGN SHALL BE REVIEWED BY UTILITIES PRIOR TO APPROVAL.

PRECAST CONCRETE MANHOLE

**NOTES:**

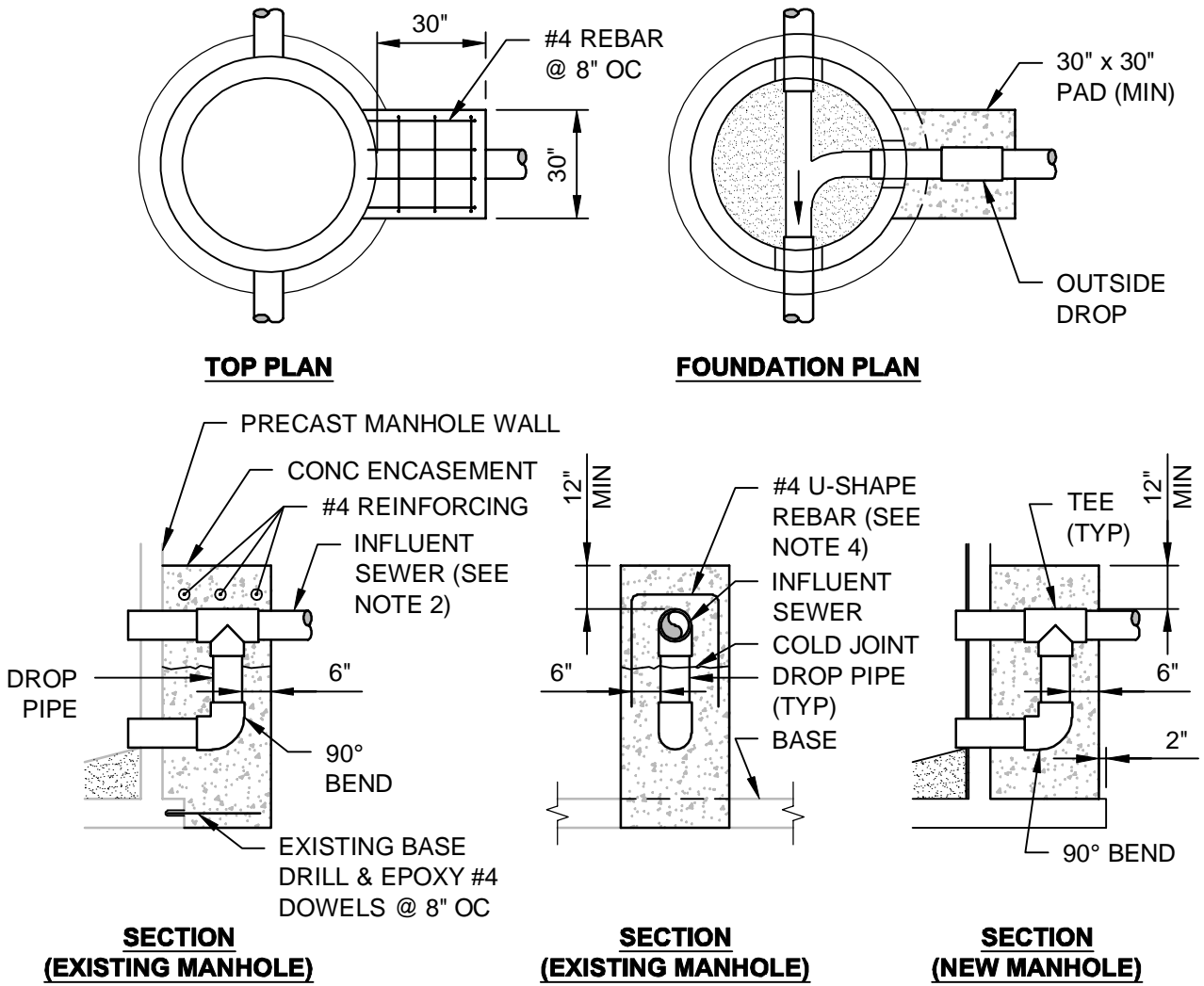
1. DROP CONNECTIONS ARE REQUIRED WHENEVER INVERT OF INFLUENT SEWER IS 24-IN OR MORE ABOVE THE INVERT OF THE MANHOLE. SEE MANHOLE FIG **A302-2**.
2. ECCENTRIC CONE DESIGN MAY BE USED FOR CONFLICT RESOLUTION WITH OCU APPROVAL.
3. A FLOW CHANNEL SHALL BE CONSTRUCTED INSIDE MANHOLE TO DIRECT INFLUENT INTO FLOW STREAM IN ACCORDANCE WITH FIG **A303**.
4. LIFT HOLES THROUGH STRUCTURE ARE NOT PERMITTED.
5. HEAT SHRINK WRAP FOR ALL BARREL SECTION JOINTS SHALL BE A MIN 9-IN WIDTH AND A MIN 17-IN WIDTH WRAP ON THE CORBEL SECTION, RISER RINGS AND RING AND COVER.
6. HDPE ADJUSTING RINGS MAY BE SUBSTITUTED FOR BRICK RISERS.
7. SECTION HEIGHTS VARY AS REQUIRED, AND AS AVAILABLE, FROM APPROVED MANUFACTURERS LISTED IN APPENDIX D AND IN COMPLIANCE WITH ASTM C478.
8. MANHOLE SHALL BE COATED OR LINED IN ACCORDANCE WITH SECTIONS **2310 & 3119**.

GRAVITY MANHOLE CONNECTION

**NOTES:**

1. AN OUTSIDE DROP CONNECTION SHALL BE REQUIRED FOR ALL INFLUENT LINES WHICH HAVE AN INVERT 2-FT OR MORE ABOVE THE MANHOLE INVERT. SEE FIG **A302-2**.
2. CONTRACTOR SHALL COORDINATE THE PRESENCE OF UTILITIES INSPECTOR DURING EXCAVATION, CORING AND CONNECTIONS TO EXISTING MANHOLES.
3. ALL PIPE CONNECTIONS SHALL HAVE A MINIMUM OF 12-IN SEPARATION FROM ALL JOINTS AND CORES.
4. PIPE SHALL PROTRUDE INTO MANHOLE 2-IN TO 4-IN. THE CONTRACTOR SHALL BEVEL MUD FROM EDGE OF PIPE TO WALL.
5. CONNECTIONS ON EXISTING MANHOLES, REFER TO SECTION **3113** FOR EXCAVATIONS FOR STRUCTURES.
6. MANHOLE SHALL BE COATED OR LINED IN ACCORDANCE WITH SECTIONS **2310 & 3119**.

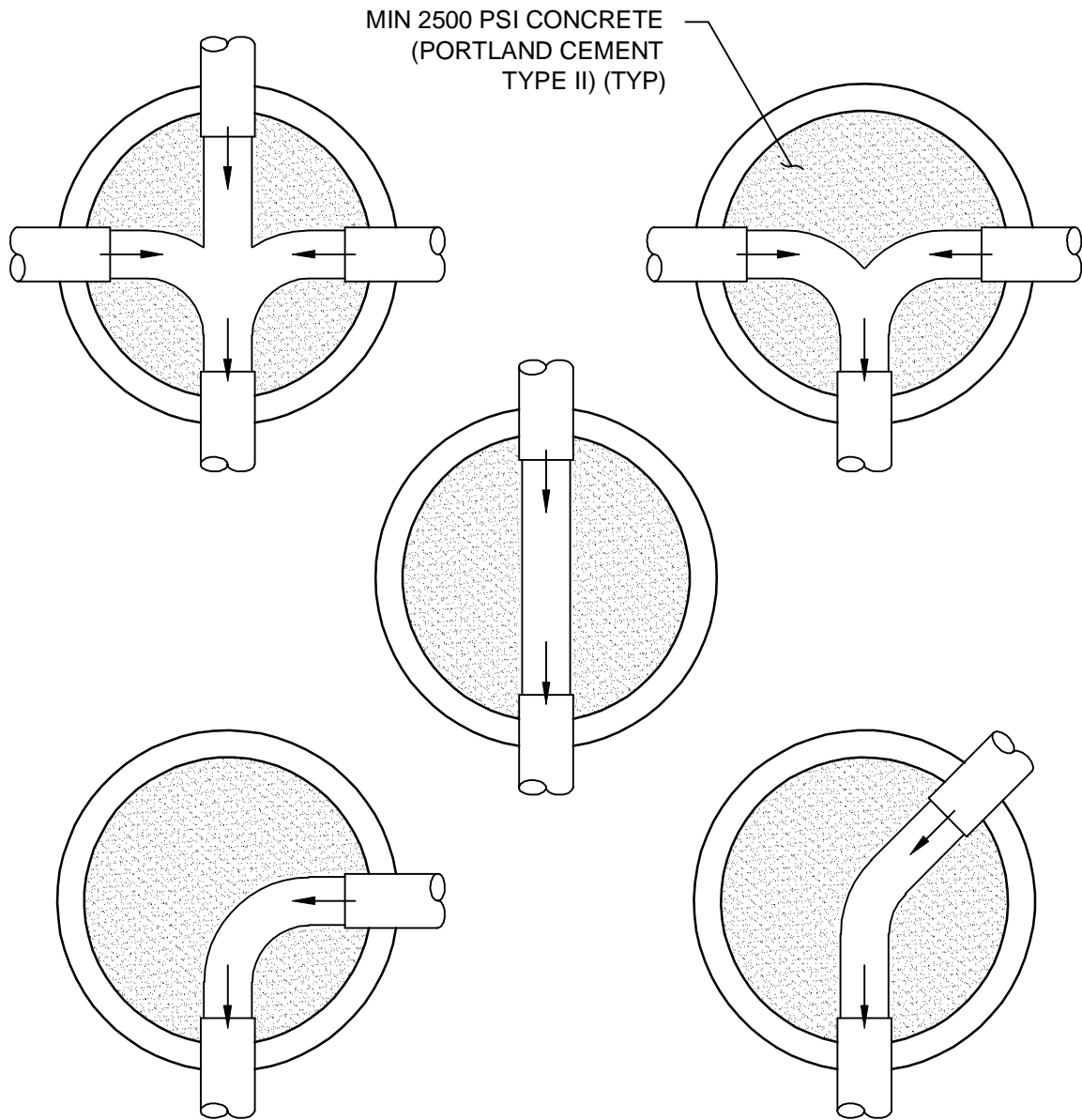
GRAVITY MANHOLE CONNECTION - OUTSIDE DROP



NOTES:

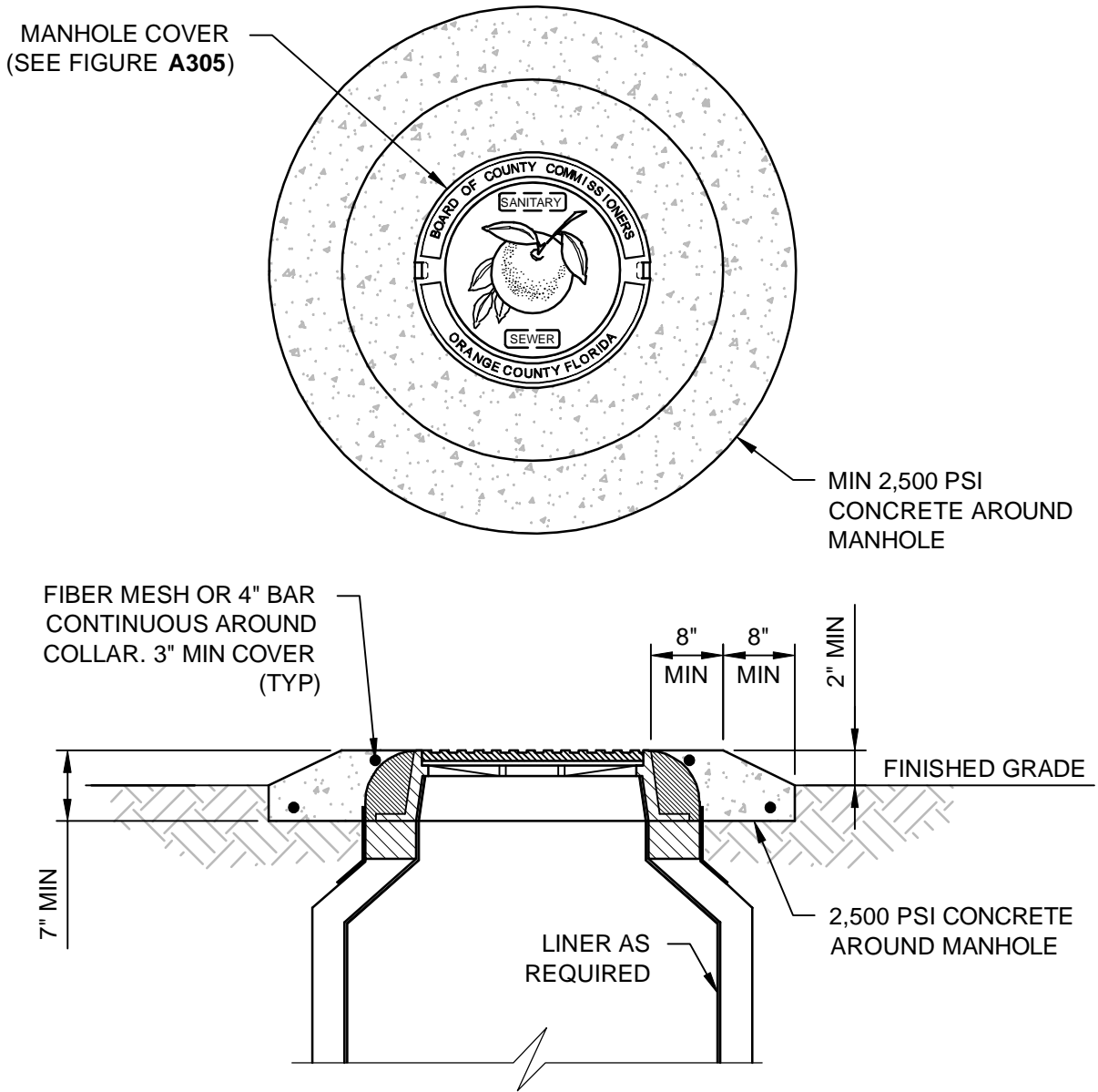
1. DROP PIPE AND FITTINGS SHALL BE OF EQUAL SIZE AND MATERIAL AS THE INFLUENT SEWER.
2. AN OUTSIDE DROP CONNECTION SHALL BE REQUIRED FOR ALL INFLUENT LINES WHICH HAVE AN INVERT 2-FT OR MORE ABOVE THE MANHOLE INVERT.
3. CONTRACTOR SHALL COORDINATE THE PRESENCE OF UTILITIES INSPECTOR DURING EXCAVATION, CORING AND CONNECTIONS TO EXISTING MANHOLES.
4. FORM AND POUR CONCRETE TO BOTTOM OF TEE. INSTALL A MINIMUM OF TWO (2) U-SHAPE REBAR MIN 8-IN BELOW TEE. INSTALL GRAVITY MAIN, FORM & CAP OFF W/ CONCRETE MIN 12-IN ABOVE INFLUENT PIPE.
5. ALL PIPE CONNECTIONS SHALL HAVE A MINIMUM OF 12-IN SEPARATION FROM ALL JOINTS AND CORES.

GRAVITY MANHOLE FLOW CHANNELS

**NOTES:**

1. ALL PIPE CONNECTIONS SHALL BE IN ACCORDANCE WITH FIGS **A302-1**, **A302-2**, GRAVITY MANHOLE CONNECTIONS
2. ALL BENCH WORK SHALL SLOPE TOWARDS THE INVERT AND BE A MIN 2-IN PER FOOT SLOPE.

MANHOLE IN NON-PAVED AREA

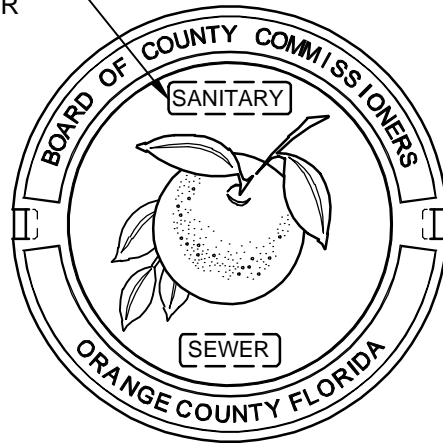


NOTES:

1. MINIMUM CLEARANCE OF 30-IN FREE FROM OBSTRUCTIONS IN ALL DIRECTIONS.
2. AREAS SUPPORTING CONCRETE COLLAR OR SLAB SHALL BE PROPERLY COMPACTED.
3. TOP OF MANHOLE SHALL BE 2-IN ABOVE FINISHED GRADE, CROWN OF ADJACENT ROADWAY, OR 100 YEAR FLOOD ELEVATION, WHICHEVER IS GREATER.

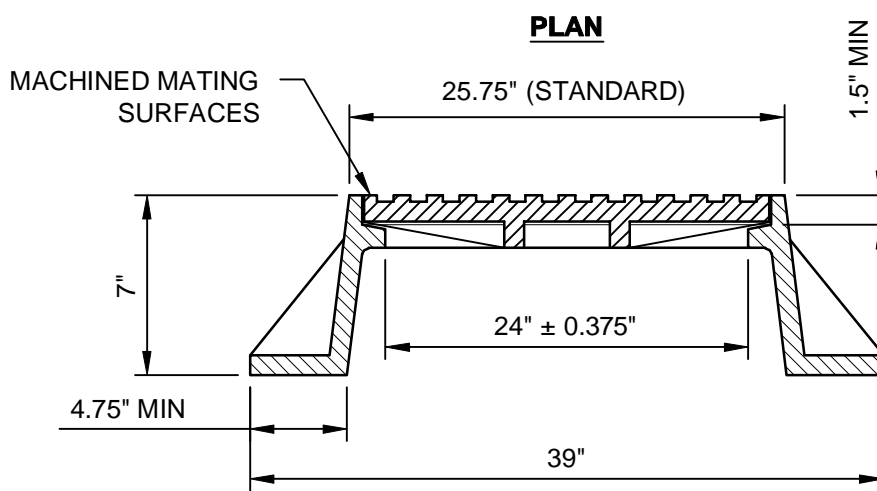
STANDARD MANHOLE FRAME & COVER

RAISED 1.5" LETTERS FLUSH WITH TOP OF COVER



TWO NON-PENETRATING PICK HOLES

PLAN

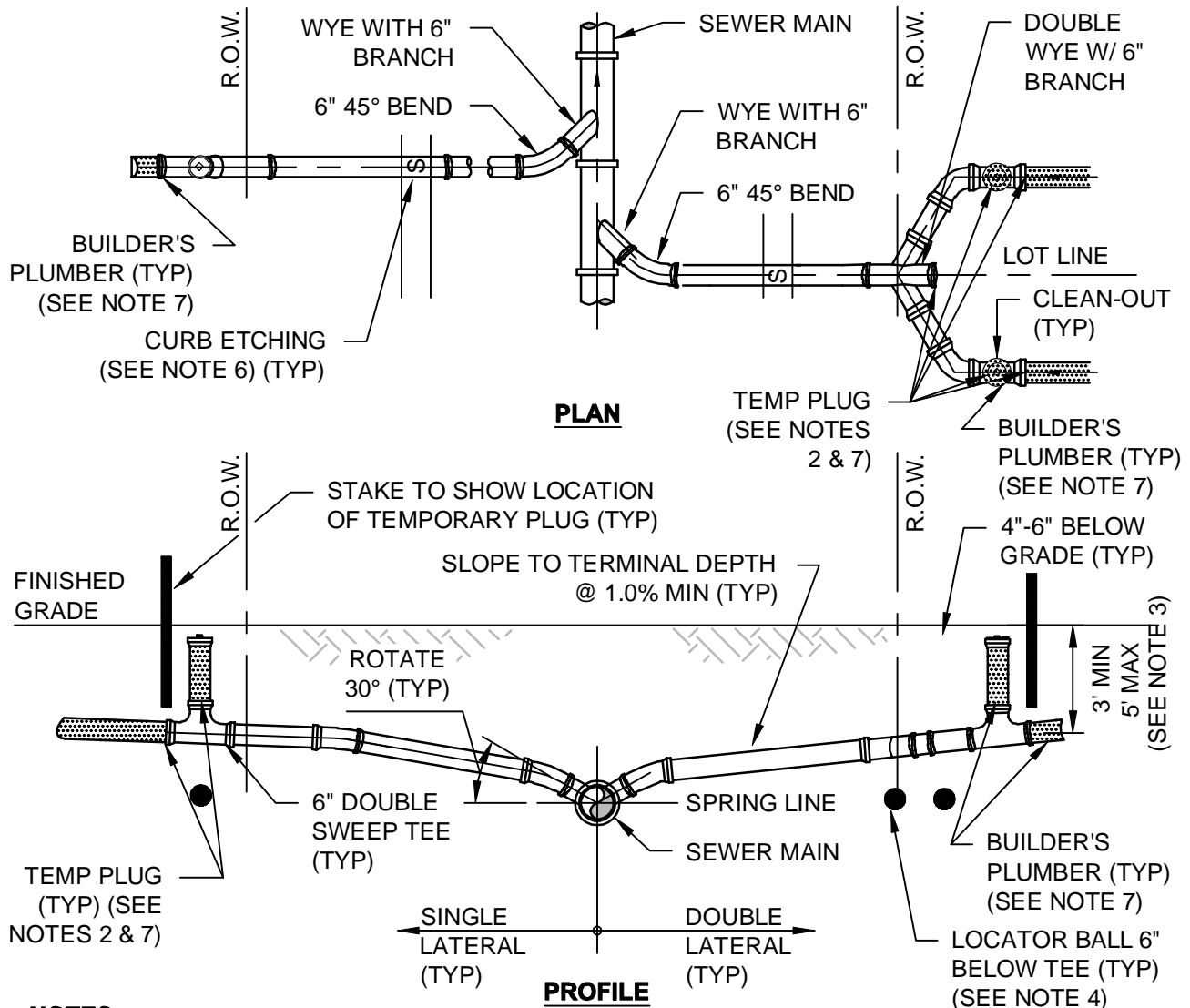


ELEVATION

NOTES:

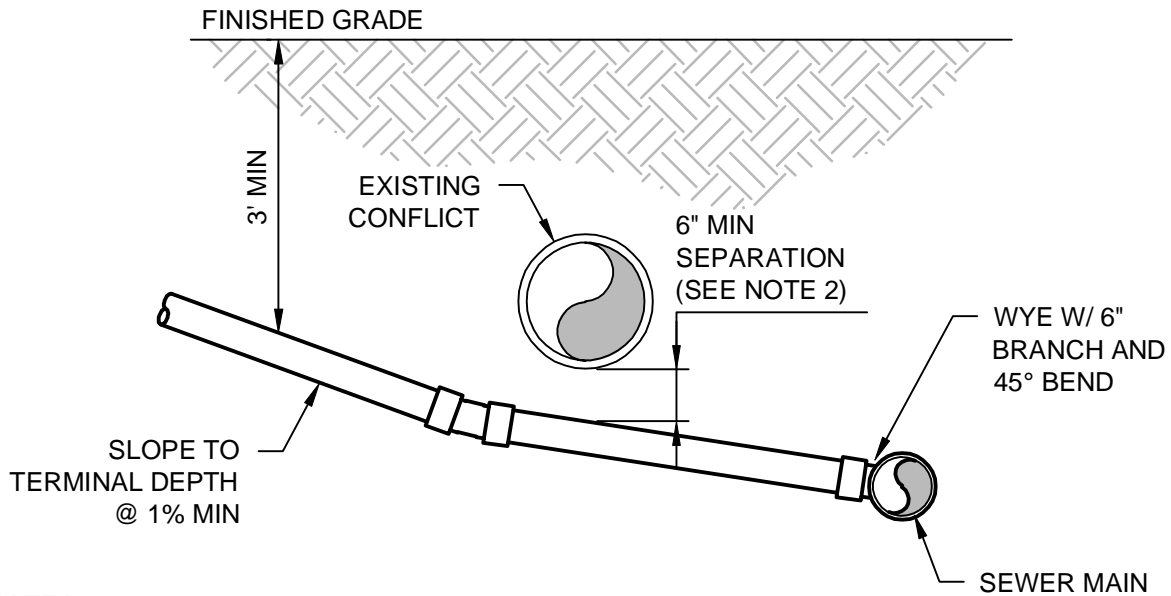
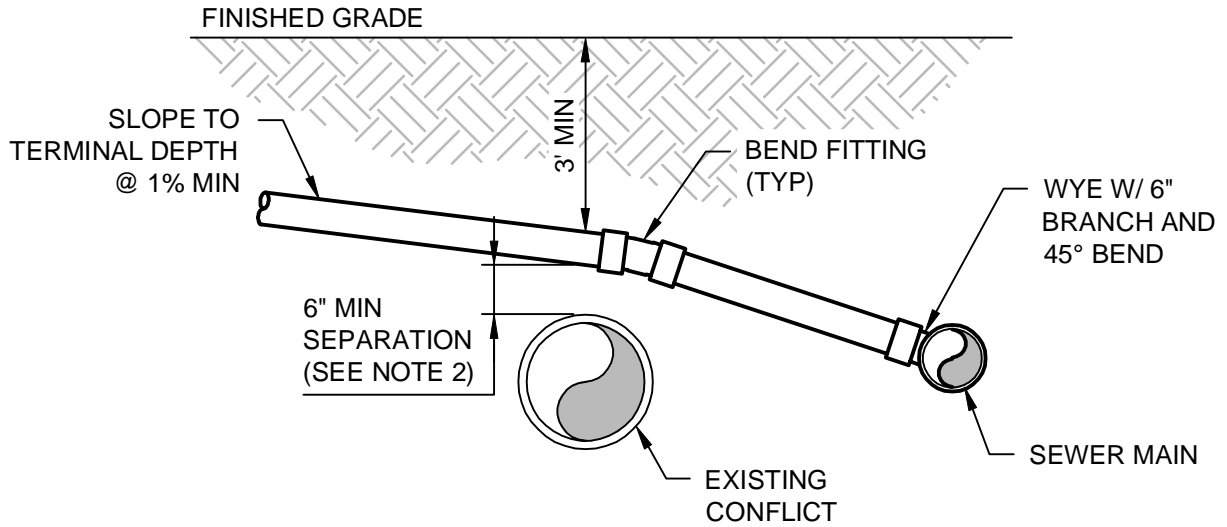
1. ONLY APPLIES TO UTILITIES OWNED AND MAINTAINED MANHOLES. "ORANGE COUNTY" SHALL NOT APPEAR ON PRIVATE MANHOLES.

SERVICE LATERAL

**NOTES:**

1. INVERT OF SERVICE LATERAL SHALL NOT ENTER SEWER MAIN BELOW SPRING LINE.
2. SERVICE LATERAL AND DOUBLE SWEEP TEES SHALL BE CAPPED BY DEVELOPER'S SITE-WORK CONTRACTOR.
3. TEE & WYE SHALL BE NO SHALLOWER THAN 3-FT AND NO DEEPER THAN 5-FT.
4. LOCATOR BALLS TO BE INSTALLED BY DEVELOPER'S SITE-WORK CONTRACTOR, TWO PER DOUBLE SERVICE AND ONE PER SINGLE SERVICE AT MINIMUM.
5. ALL FITTINGS SHOWN ARE TO BE INSTALLED.
6. SERVICE CONNECTIONS SHALL BE PERMANENTLY MARKED BY CUTTING AN "S" IN THE CURB DIRECTLY OVER THE LATERAL.
7. BUILDER'S PLUMBER WILL REMOVE PLUG(S), INSTALL CLEANOUT ON DOUBLE SWEEP TEE, AND CONNECT SERVICE LATERAL TO HOUSE. NO DIRT OR DEBRIS SHALL ENTER THE SERVICE LATERAL THROUGHOUT CONSTRUCTION.

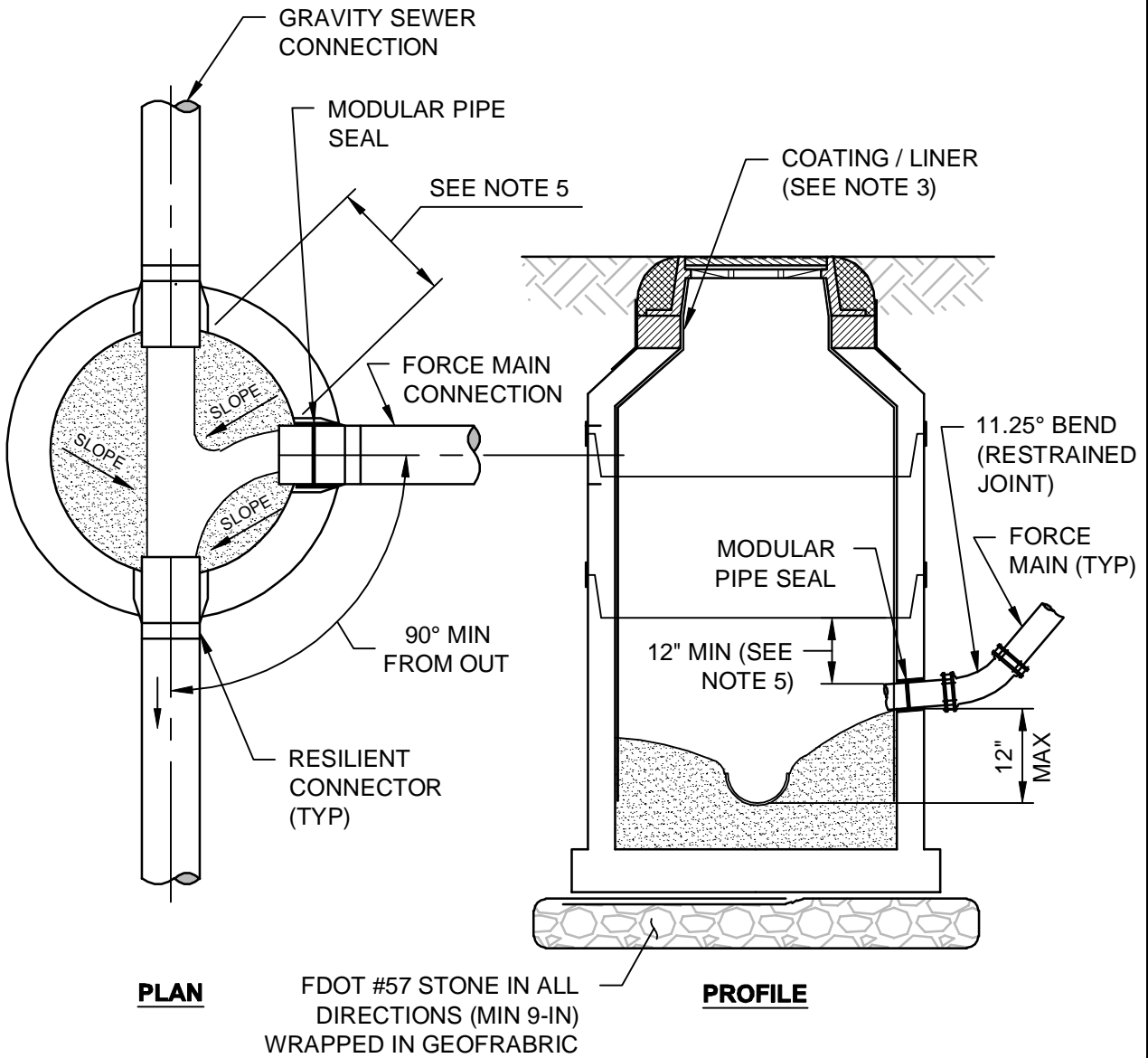
SERVICE LATERAL - PIPE CONFLICT



NOTES:

1. GRADE MAX CHANGE TO INSTALL SEWER LATERAL OVER OR UNDER AN EXISTING CONFLICT.
2. ALL CONFLICT SEPARATIONS LESS THAN THE MINIMUM SHALL NOT BE PERMITTED UNLESS APPROVED BY THE UTILITIES INSPECTOR.
3. MINIMUM SLOPE SHALL NOT BE LESS THAN 1%.
4. BEND FITTINGS SHALL BE USED TO ENSURE PROPER SEPARATION FROM ALL HORIZONTAL CONFLICTS.
5. IF A CONFLICT AT THE PROPERTY LINE EXISTS, TWO SINGLE SEWER SERVICES SHALL BE INSTALLED IN AN APPROVED LOCATION BY UTILITIES.

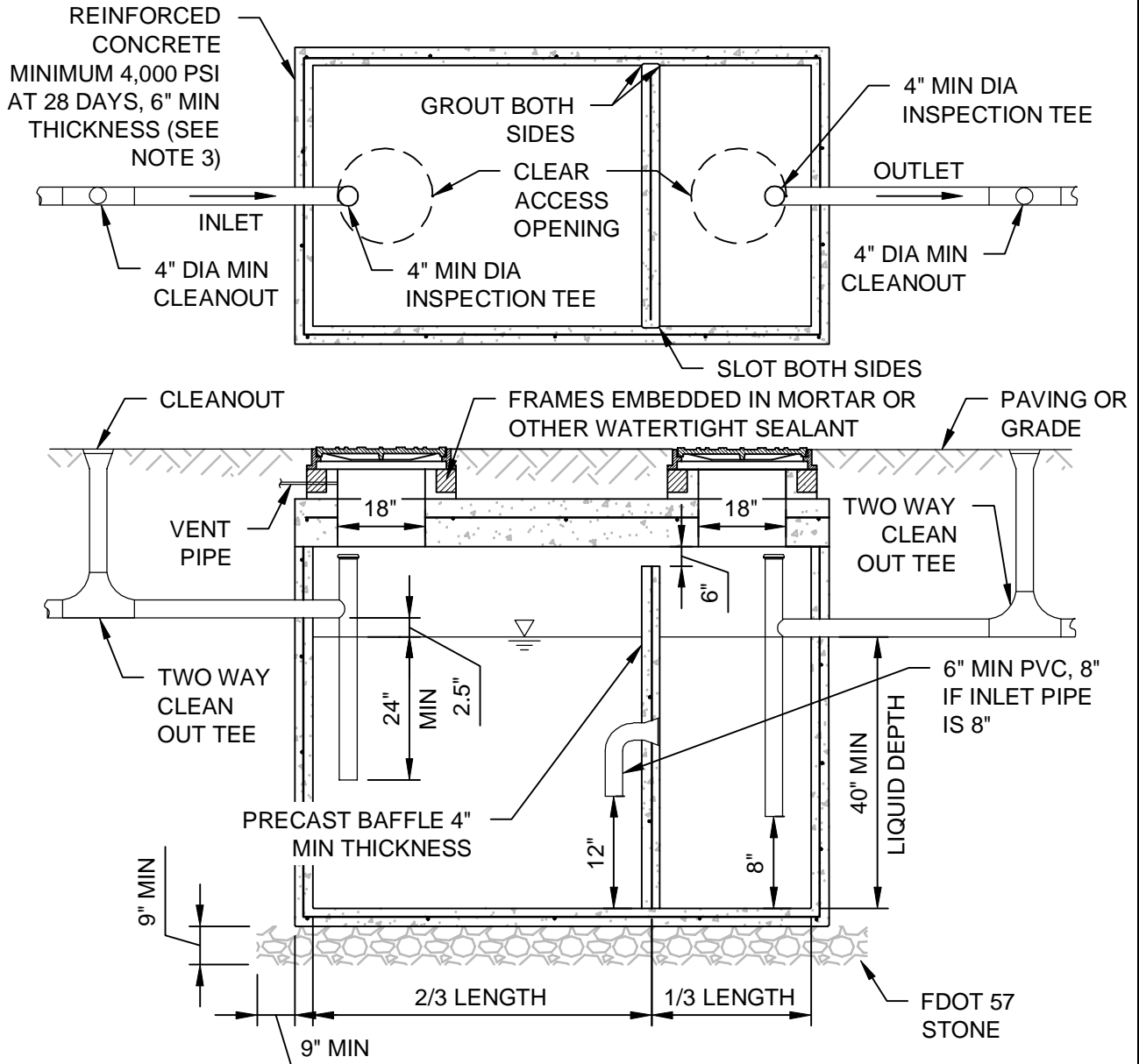
FORCE MAIN TO GRAVITY SEWER CONNECTION



NOTES:

1. FORCE MAIN ORIENTED TO FACILITATE FLOW AND SHALL ENTER MANHOLE WITHIN 1-FT ABOVE INVERT OF THE EFFLUENT PIPE.
2. BENCH AS REQUIRED FOR FORCE MAIN.
3. NEW MANHOLE RECEIVING FORCE MAIN AND NEXT MANHOLE DOWNSTREAM, SHALL BE LINED. FOR CONNECTIONS TO EXISTING MANHOLES, MANHOLE RECEIVING FORCE MAIN AND NEXT MANHOLE DOWNSTREAM SHALL BE COATED OR LINED PER APPENDIX D.
4. CONTRACTOR SHALL COORDINATE THE PRESENCE OF UTILITIES INSPECTOR DURING EXCAVATION, CORING, AND CONNECTIONS TO EXISTING MANHOLES.
5. ALL PIPE CONNECTIONS SHALL HAVE A MINIMUM OF 12-IN SEPARATION FROM ALL JOINTS AND CORES.

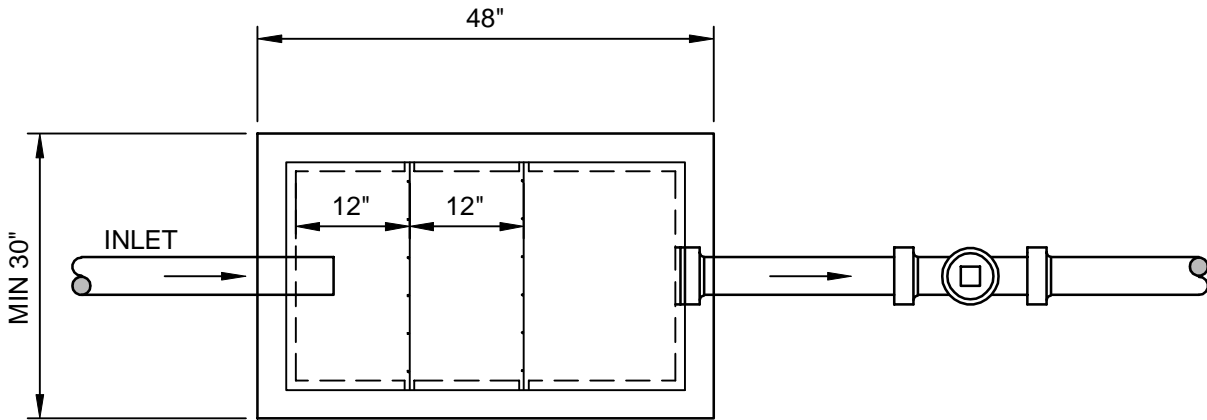
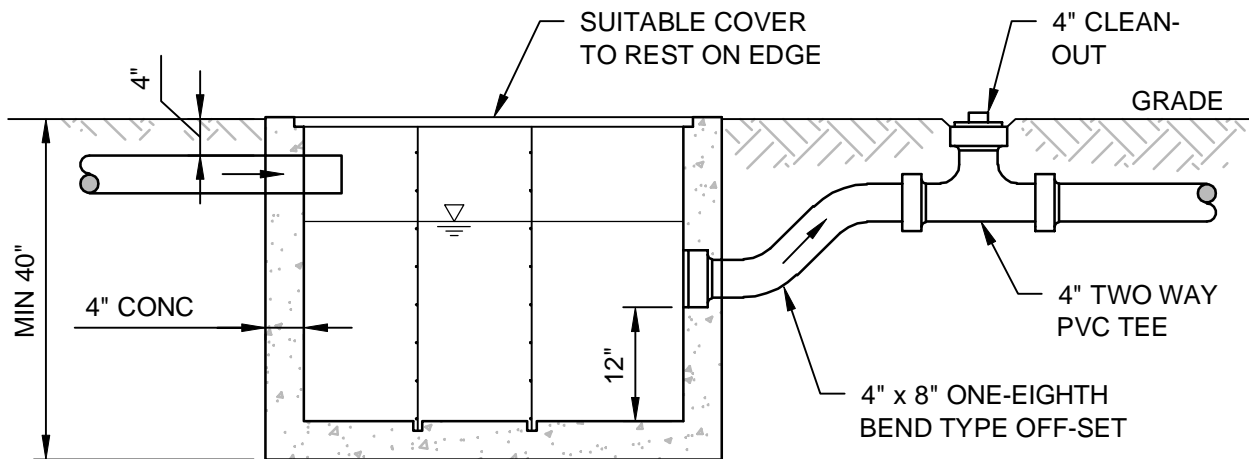
GREASE INTERCEPTOR



NOTES:

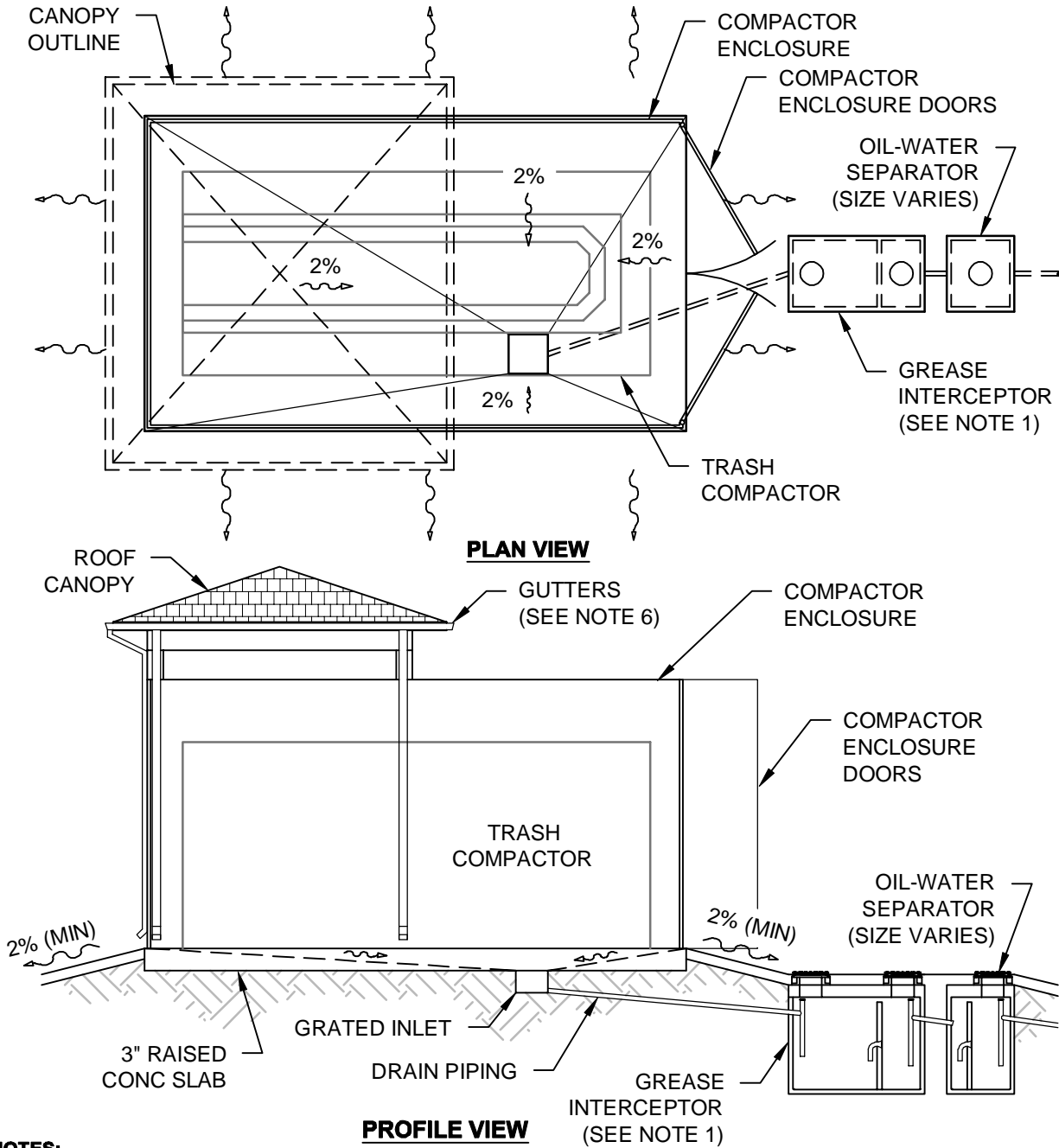
1. SPECIFIC DESIGN DETAILS MUST IN ALL ASPECTS MEET APPLICABLE FLORIDA PLUMBING AND ADMINISTRATIVE CODE.
2. SIZE GREASE INTERCEPTOR PER OCU MANUAL, SECTION 2310. MINIMUM SIZE 750 GAL; MAXIMUM SIZE 1250 GAL.
3. INTERCEPTORS SHALL BE MONOLITHIC, WATER AND GAS TIGHT. SECTIONAL TANKS SHALL NOT BE PERMITTED.
4. ALL FIXTURES LOCATED IN FOOD AND BEVERAGE PREPARATION AREAS SHALL BE ROUTED THOUGH GREASE INTERCEPTOR. RESTROOM WASTE SHALL NOT BE ROUTED THROUGH INTERCEPTOR.
5. BAFFLE REQUIRED; ALTERNATIVE DESIGNS ARE ACCEPTABLE. DESIGN MUST MEET FLORIDA PLUMBING AND ADMINISTRATIVE CODE.
6. LOADS: H-20 TRUCK WHEELS WITH 30% IMPACT PER AASHTO. TRAFFIC BEARING FRAME AND COVER TO MEET FDOT STANDARDS IF APPLICABLE.

LINT TRAP

**PLAN****SECTION****NOTES:**

1. SPECIFIC DESIGN DETAILS SHALL MEET APPLICABLE FLORIDA PLUMBING CODE.
2. LINT INTERCEPTOR SHALL BE SIZED PER SECTION 2310 OF THE MANUAL. MINIMUM SIZE PERMITTED IS 100 GALLONS.
3. INTERCEPTOR SHALL BE MONOLITHIC AND WATER TIGHT.
4. ALL LAUNDRY EQUIPMENT DISCHARGE SHALL BE ROUTED THROUGH LINT INTERCEPTOR.
5. TRAFFIC BEARING FRAME AND COVER TO MEET FDOT STANDARDS LOADS: H-20 TRUCK WHEELS WITH 30% IMPACT PER AASHTO.

TRASH COMPACTOR DRAINAGE



NOTES:

1. REFER TO DETAIL **A308-1** FOR GREASE INTERCEPTOR REQUIREMENTS.
2. SMALLER SIZE GREASE INTERCEPTOR MAY BE APPROVED BY UTILITIES BASED ON VOLUME OF DISCHARGE.
3. EDGE OF SLAB SHALL BE 1-FT ABOVE 100-YEAR FLOOD ELEVATION.
4. DRAIN SHALL BE VISIBLE & ACCESSIBLE AT ALL TIMES FOR INSPECTION & MAINTENANCE.
5. GREASE INTERCEPTOR AND OIL-WATER SEPARATOR SHALL BE REQUIRED IF TRASH COMPACTOR DRAINAGE IS PROPOSED TO CONNECT TO SANITARY SEWER.
6. GUTTERS REQUIRED IF ROOF CANOPY IS SLOPED TOWARDS OPEN COMPACTOR AREA.

PUMP STATION GENERAL NOTES**NOTES:**

1. GRAVITY PIPES ENTERING WET WELL SHALL BE MADE WATERTIGHT WITH AN APPROVED RESILIENT CONNECTOR LISTED IN APPENDIX D.
2. ALL LOCATIONS WHERE PRESSURE PIPES PENETRATE THE WET WELL SHALL BE MADE WATERTIGHT WITH A WALL SLEEVE AND MODULAR COMPRESSION SEAL.
3. THERE SHALL BE NO VALVES OR ELECTRICAL JUNCTION BOXES IN THE WET WELL.
4. WET WELL COVERS SHALL BE ALUMINUM WITH 316 STAINLESS STEEL HARDWARE WITH RECESSED LOCK BRACKET. WET WELL COVER SHALL HAVE "CONFINED SPACE" ETCHED OR WELDED INTO COVER.
5. ALL HARDWARE IN WET WELL SHALL BE 316 STAINLESS STEEL.
6. PUMP MANUFACTURER SUBMERGENCE REQUIREMENTS SHALL BE MET AS A MINIMUM.
7. PIPE JOINTS IN THE WET WELL AND ABOVE GROUND SHALL BE FLANGED. UNDER GROUND PIPE JOINTS SHALL BE RESTRAINED MECHANICAL JOINTS.
8. CHECK VALVE ARMS SHALL BE LOCATED WITH THE SAME ORIENTATION (I.E. ALL ARMS ON THE LEFT SIDE OF VALVE).
9. REFER TO APPENDIX D FOR ADMIX, COATINGS AND LININGS.
10. EACH PUMP SHALL HAVE ONE DEDICATED ALUMINUM WET WELL ACCESS HATCH PER PUMP.
11. PUMP STATION TRACT (INCLUDING DRIVEWAY) AND UTILITY EASEMENT SHALL BE DEDICATED TO ORANGE COUNTY UTILITIES.
12. THE BOUNDARY OF ALL NEW PUMP STATION TRACTS SHALL BE LOCATED A MINIMUM OF 50-FT AWAY FROM ANY EXISTING, PROPOSED OR FUTURE SINGLE FAMILY RESIDENTIAL LOT (INCLUDING TOWNHOMES) AND OFF-SITE SINGLE FAMILY RESIDENTIAL LAND USE. MAINTAIN 50-FT SPACING FROM POOL DECKS, AMENITY AREAS AND OTHER PUBLIC GATHERING SPACES.
13. PLUG VALVE SEAT ORIENTATION VARIES PER VALVE LOCATION. SEE LEGEND ON PUMP STATION DETAILS.

DUPLEX PUMP STATION DESIGN SPECIFICATIONS

PUMP STATION ID: _____

MANUFACTURER: FLYGT DESIGN A SPECIFICATIONS

PUMP MODEL: _____ VOLTAGE: _____
 IMPELLER MODEL: _____ PHASE: _____
 IMPELLER DIAMETER (MM): _____ MOTOR H.P.: _____
 NOMINAL SPEED (RPM): _____ MAX. SOLID SIZE (IN): _____
 DISCHARGE SIZE (IN): _____ CURVE NUMBER: _____

PEAK DESIGN INFLOW: _____ GPM
 SHUT OFF HEAD: _____ FEET TDH
 HIGH HEAD CONDITION: _____ GPM AT _____ FEET TDH (DESIGN POINT)
 MINIMUM HEAD CONDITION: _____ GPM AT _____ FEET TDH

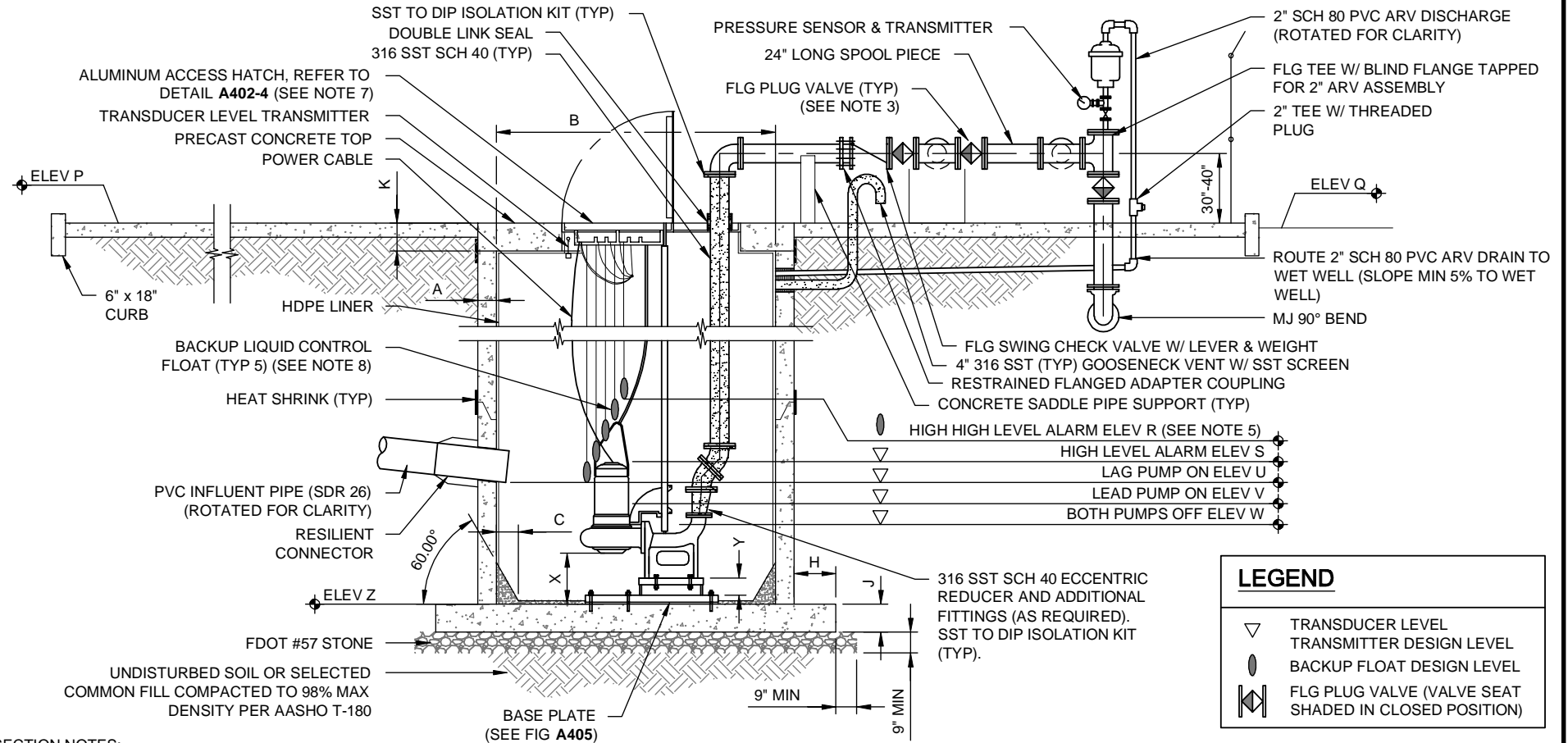
MANUFACTURER: ABS DESIGN B SPECIFICATIONS

PUMP MODEL: _____ VOLTAGE: _____
 IMPELLER MODEL: _____ PHASE: _____
 IMPELLER DIAMETER (MM): _____ MOTOR H.P.: _____
 NOMINAL SPEED (RPM): _____ MAX. SOLID SIZE (IN): _____
 DISCHARGE SIZE (IN): _____ CURVE NUMBER: _____

PEAK DESIGN INFLOW: _____ GPM
 SHUT OFF HEAD: _____ FEET TDH
 HIGH HEAD CONDITION: _____ GPM AT _____ FEET TDH (DESIGN POINT)
 MINIMUM HEAD CONDITION: _____ GPM AT _____ FEET TDH

DESCRIPTION	SYMBOL	DIM	DESIGN ELEV *	AS-BUILT ELEV	AS-BUILT DEPTH **	DESIGN A & B SPECIFICATION NOTES
THICKNESS OF WALL	A	8" (MIN)	-	-	-	1. PER PUMP MANUFACTURER REQUIREMENTS.
DIAMETER OF WET WELL	B	6" (MIN)	-	-	-	2. DIMENSION X AND ELEVATION Y AND Z MUST MEET BOTH PUMP MFR'S REQUIREMENTS.
WIDTH OF BOTTOM FILLET	C	SEE NOTE 1	-	-	-	3. EL V - EL Z ≥ 5 FEET.
C/L OF WET WELL TO C/L OF PIPES	D	SEE NOTE 1	-	-	-	4. ELEVATION OF HIGH HIGH LEVEL ALARM SHALL BE A MIN OF 12-IN LOWER THAN THE LOWEST MANHOLE LID ELEVATION IN THE UPSTREAM GRAVITY SYSTEM.
LENGTH OF PUMP ACCESS OPENING	E	SEE NOTE 1	-	-	-	5. TOP ELEVATION OF WETWELL SHALL BE A MINIMUM OF 1-FT ABOVE THE 100-YEAR FLOOD ELEVATION AND THE ELEVATION OF THE CROWN OF THE ROAD.
WIDTH OF PUMP ACCESS OPENING	F	SEE NOTE 1	-	-	-	6. PUMP OFF ELEVATION TO BE PER MANUFACTURER'S MINIMUM SUBMERGENCE.
CENTER OF WET WELL TO EDGE OF HATCH	G	SEE NOTE 1	-	-	-	* PROVIDE WET WELL DIMENSIONS SUFFICIENT TO ACCOMMODATE BOTH FLYGT AND ABS PUMP MODELS. THE LARGER /DEEPER OF THE TWO SHALL PREVAIL.
LIP WIDTH OF WET WELL BASE	H	18" (MIN)	-	-	-	** PROVIDE AS-BUILT DEPTH IN INCHES FROM TOP OF HATCH.
THICKNESS OF WET WELL BASE	J	12" (MIN)	-	-	-	† POPULATE ELEV S, U, V, AND W WITH TRANSDUCER ELEV AND DEPTHS. THE TRANSDUCER SYSTEM SHALL CONTROL THE OPERATION OF THE PUMPS UNDER NORMAL OPERATING CONDITIONS. THERE SHALL ALSO BE A BACKUP FLOAT CONTROL SYSTEM. ELEV R "HIGH HIGH FLOAT", IS POSITIONED 36-IN ABOVE THE TRANSDUCER AT ELEV S. FOUR (4) ADDITIONAL FLOATS (NOT SHOWN ON THIS DRAWING) HIGH LEVEL, LAG, LEAD AND OFF, WILL BE POSITIONED BELOW THE HIGH HIGH FLOAT AT 12-IN INTERVALS AS SHOWN IN FIG A402-2.
THICKNESS OF WET WELL TOP SLAB	K	12" (MIN)	-	-	-	
TOP OF WET WELL	P	SEE NOTE 5	-	-	-	
FINISHED GRADE	Q	PER DESIGN	SEE SITE PLAN	-	-	
HIGH HIGH LEVEL ALARM (FLOAT ONLY)	R	ELEV S + 36"	-	-	-	
HIGH LEVEL ALARM †	S	ELEV U + 12"	-	-	-	
LAG PUMP ON (INFLUENT PIPE INVERT) †	U	ELEV V + 12"	-	-	-	
LEAD PUMP ON †	V	PER DESIGN	-	-	-	
PUMPS OFF (SEE NOTE 6) †	W	PER DESIGN	-	-	-	
BOTTOM OF PUMP	X	SEE NOTE 2	-	-	-	
TOP OF STEP	Y	SEE NOTE 2	-	-	-	
FLOOR OF WET WELL	Z	SEE NOTE 2 & 3	-	-	-	

DUPLEX PUMP STATION SECTION

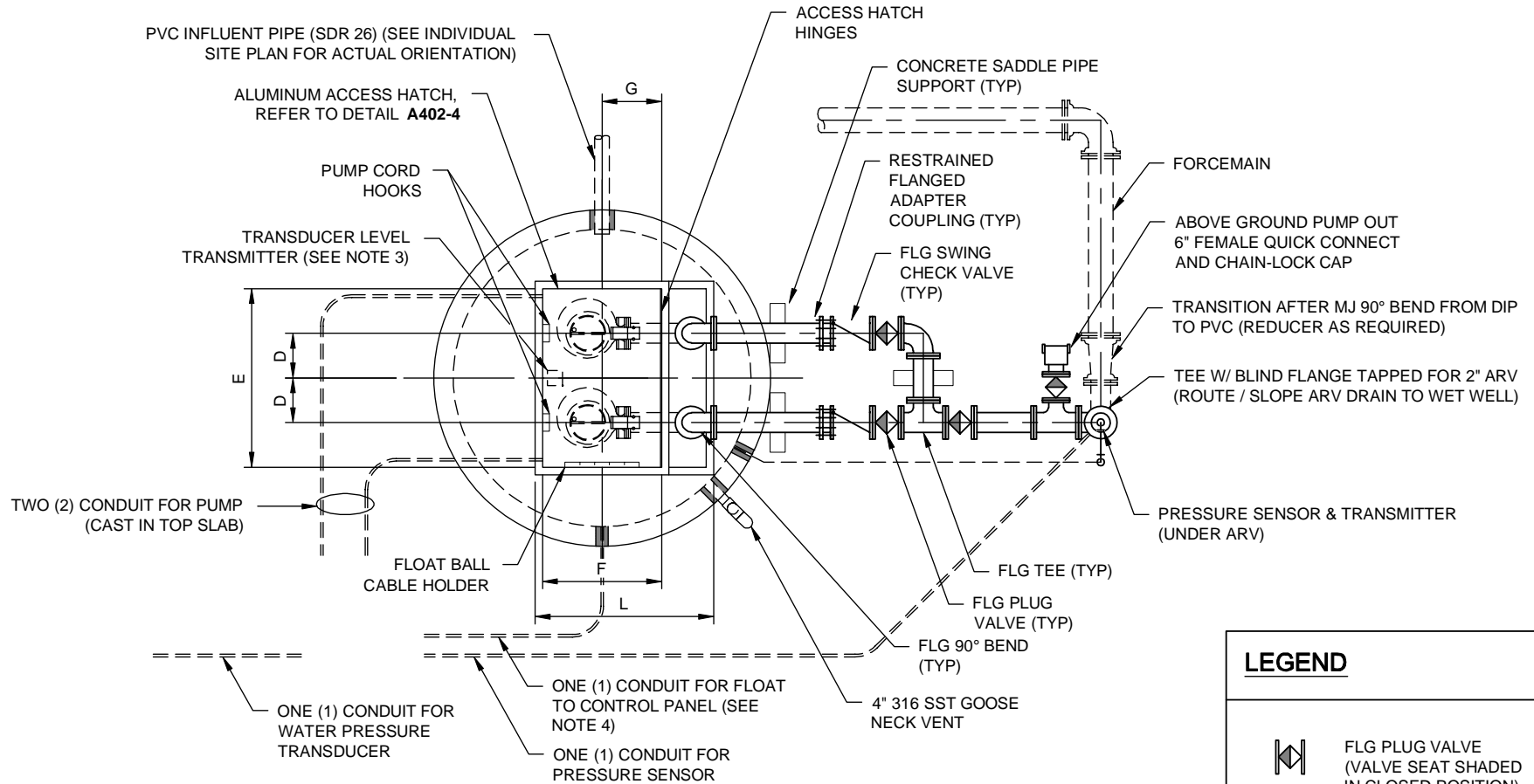


SECTION NOTES:

1. EACH PUMP SHALL BE FITTED WITH 6-FT OF TYPE 316 SST CHAIN ATTACHED TO THE LIFTING MECHANISM AND AIRCRAFT RATED 0.25-IN SST CABLE PROVIDED BETWEEN THE CABLE HOLDER AND THE CHAIN PER MANUFACTURER'S RECOMMENDATIONS.
2. WALL SLEEVE AND COMPRESSION SEALS SHALL BE COMPATIBLE WITH LINER.
3. IF PV = 4-IN, LEVER OPERATED; IF PV > 4-IN, WHEEL OPERATED.
4. SEE FIGURE A402-1 FOR DESCRIPTIONS OF DIMENSION SYMBOLS.
5. INSTALLED TO PROVIDE DRY CONTACT FOR SCADA. BACK-UP FLOAT ONLY.
6. ALL FLANGES: PIPE, VALVES AND APPURTENANCES SHALL BE 316 SST SCH 40 AND HAVE 316 SST HARDWARE.
7. EACH INDIVIDUAL PUMP HATCH SHALL OPEN TOWARD ABOVE GROUND PIPE.
8. BACK-UP FLOATS TO BE INSTALLED AT 12-IN INTERVALS WITH THE BACK-UP FLOAT "PUMPS OFF" STARTING AT ELEVATION U.
9. LOCK NUTS SHALL BE INSTALLED ON ALL FLANGES INSIDE THE WET WELL, AND ON BASE PLATE.

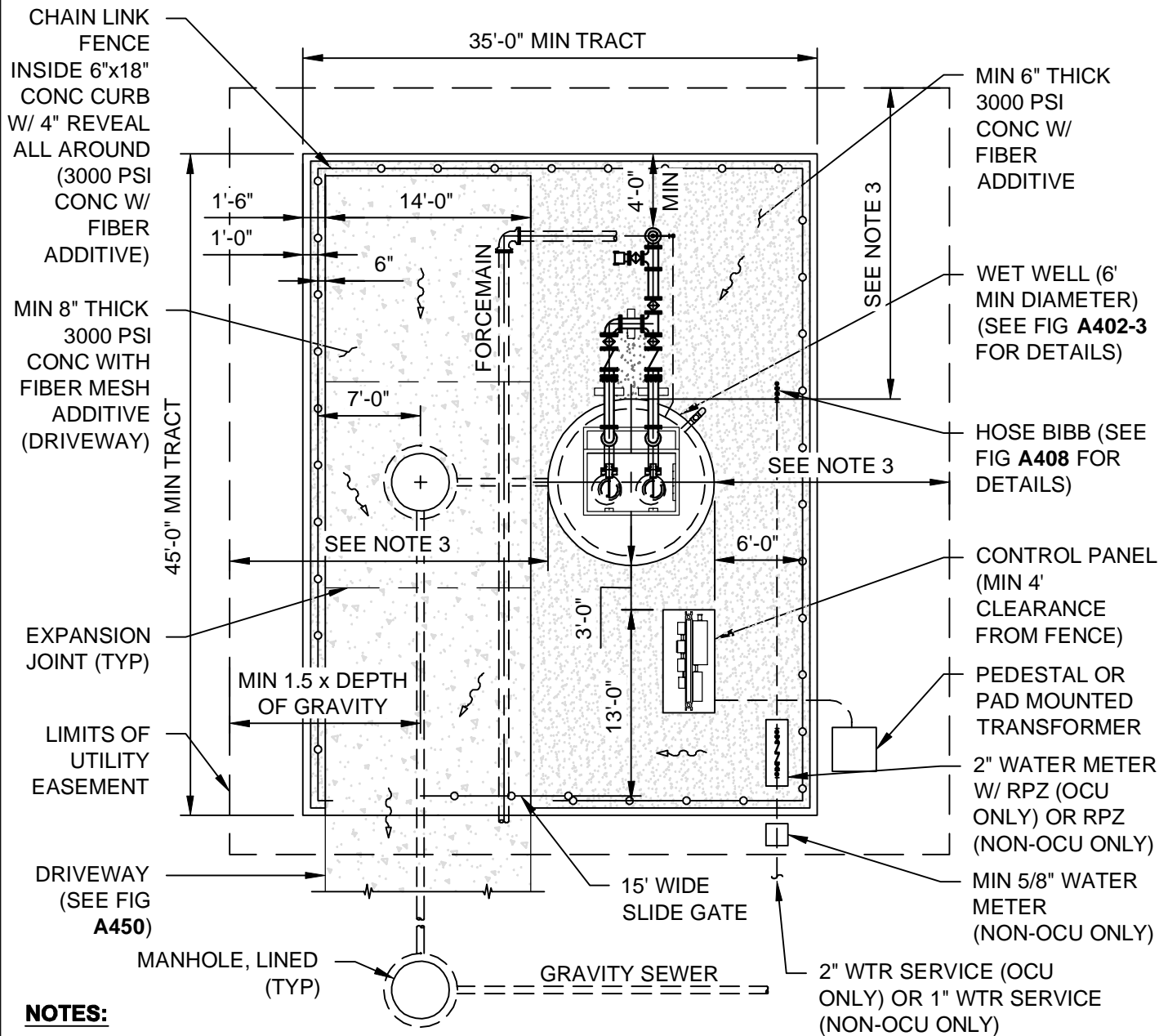
LEGEND	
▽	TRANSDUCER LEVEL TRANSMITTER DESIGN LEVEL
●	BACKUP FLOAT DESIGN LEVEL
⊘	FLG PLUG VALVE (VALVE SEAT SHADED IN CLOSED POSITION)

DUPLEX PUMP STATION PLAN



- NOTES:**
1. SEE FIGURE A402-1 FOR DESCRIPTIONS OF DIMENSION SYMBOLS.
 2. SEE FIGURE A402-2 FOR DUPLEX PUMP STATION SECTION.
 3. TRANSDUCER LEVEL TRANSMITTER (LIT) TO HANG DOWN 12-IN FROM TOP OF THE SLAB, MOUNTED IN THE MIDDLE OF THE HATCH ON A 316 SST, 3/8-IN HOOK (OPPOSITE OF HINGES).
 4. FLOAT CABLES AND LIT CABLE IN SINGLE CONDUIT TO PUMP CONTROL PANEL.

DUPLEX PUMP STATION SITE PLAN



NOTES:

1. THIS DRAWING IS PROVIDED AS REFERENCE ONLY. DESIGN ENGINEER SHALL PROVIDE A SITE SPECIFIC DRAWING TO A SCALE OF 1" = 10'.
2. FOR NON-RESIDENTIAL ROADS, DISTANCE BETWEEN EDGE OF PAVEMENT AND GATE SHALL BE 40' MINIMUM FROM FUTURE EOP.
3. THIS DIMENSION, AS MEASURED FROM THE SIDE OF THE WET WELL TO THE PUBLIC UTILITY EASEMENT LIMIT, SHALL BE EQUAL TO OR GREATER THAN THE DEPTH OF THE WET WELL.
4. CONTROL PANEL DOOR HINGES TO BE LOCATED ON THE SIDE OF THE PANEL FARTHEST FROM THE WELL.
5. DRIVEWAY SUBGRADE TO BE 8" THICK. SUBGRADE TO BE COMPACTED TO A MINIMUM DENSITY 98% OF THE MAX DENSITY AS DETERMINED BY ASTM D1557 OR AASHTO T-180.
6. LIMITS OF UTILITY EASEMENT SHALL BE A MINIMUM OF 5' FROM TOP OF BANK.
7. A 12' DIAMETER WETWELL SHALL REQUIRE A 40' x 55' MIN TRACT.
8. PROVIDE MAX 2% SLOPE FOR PUMP STATION SITE DRAINING. SLOPE TO DRIVEWAY APRON.

TRIPLEX PUMP STATION DESIGN SPECIFICATIONS

PUMP STATION ID: _____

MANUFACTURER: **FLYGT**

DESIGN A SPECIFICATIONS

MANUFACTURER: **ABS**

DESIGN B SPECIFICATIONS

PUMP MODEL: _____ VOLTAGE: _____
 IMPELLER MODEL: _____ PHASE: _____
 IMPELLER DIAMETER (MM): _____ MOTOR H.P.: _____
 NOMINAL SPEED (RPM): _____ MAX. SOLID SIZE (IN): _____
 DISCHARGE SIZE (IN): _____ CURVE NUMBER: _____

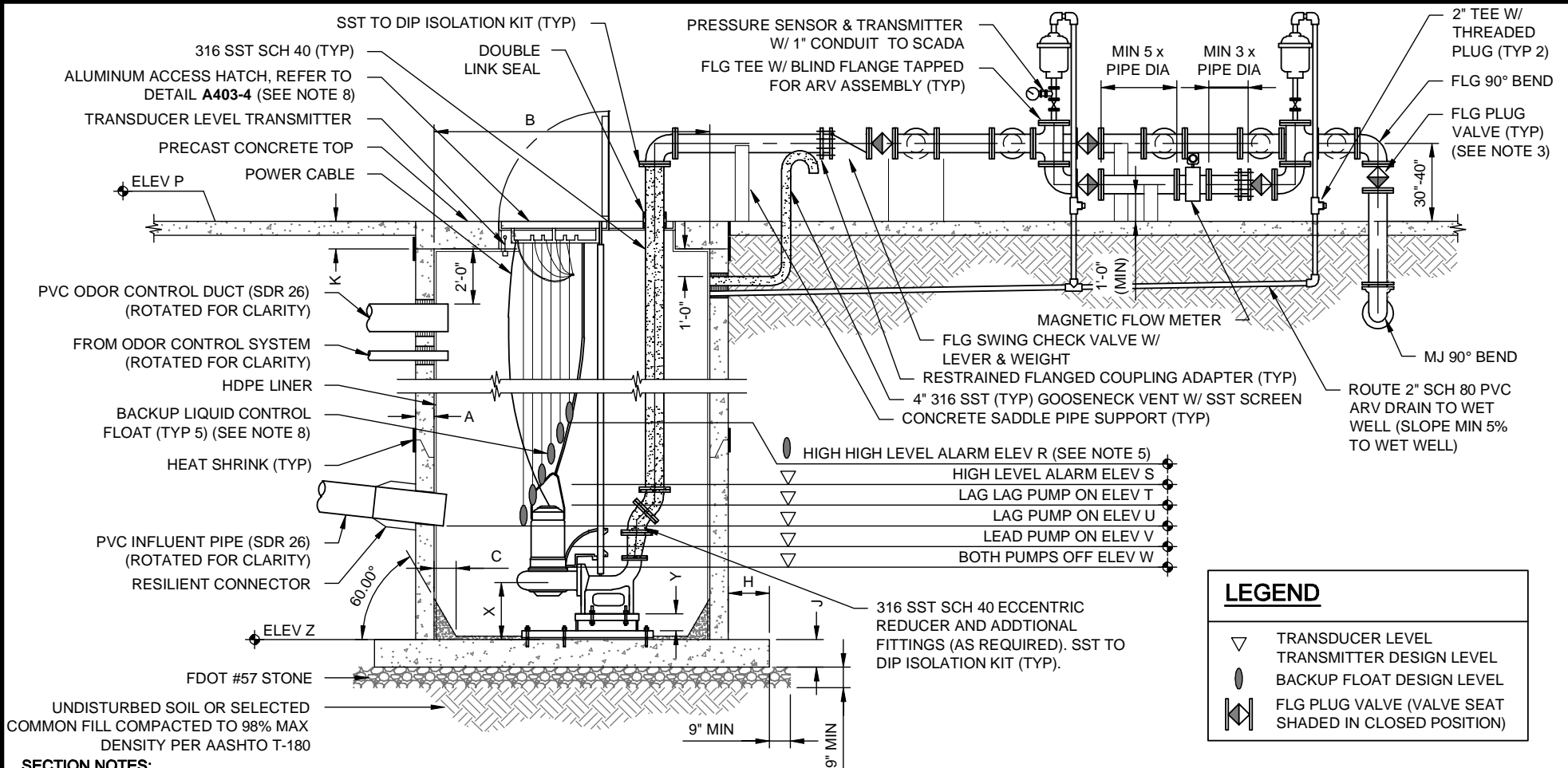
PUMP MODEL: _____ VOLTAGE: _____
 IMPELLER MODEL: _____ PHASE: _____
 IMPELLER DIAMETER (MM): _____ MOTOR H.P.: _____
 NOMINAL SPEED (RPM): _____ MAX. SOLID SIZE (IN): _____
 DISCHARGE SIZE (IN): _____ CURVE NUMBER: _____

PEAK DESIGN INFLOW: _____ GPM
 SHUT OFF HEAD: _____ FEET TDH
 HIGH HEAD CONDITION: _____ GPM AT _____ FEET TDH (DESIGN HEAD)
 MINIMUM HEAD CONDITION: _____ GPM AT _____ FEET TDH

PEAK DESIGN INFLOW: _____ GPM
 SHUT OFF HEAD: _____ FEET TDH
 HIGH HEAD CONDITION: _____ GPM AT _____ FEET TDH (DESIGN HEAD)
 MINIMUM HEAD CONDITION: _____ GPM AT _____ FEET TDH

DESCRIPTION	SYMBOL	DIM	DESIGN ELEV *	AS-BUILT ELEV	AS-BUILT DEPTH **	DESIGN A & B SPECIFICATION NOTES
THICKNESS OF WALL	A	12" (MIN)	-	-	-	1. PER PUMP MANUFACTURER REQUIREMENTS. 2. DIMENSION X AND ELEVATION Y AND Z MUST MEET BOTH PUMP MFR'S REQUIREMENTS. 3. EL V - EL Z \geq 5 FEET. 4. ELEVATION OF HIGH HIGH LEVEL ALARM SHALL BE A MIN OF 12-IN LOWER THAN THE LOWEST MANHOLE LID ELEVATION IN THE UPSTREAM GRAVITY SYSTEM. 5. TOP ELEVATION OF WETWELL SHALL BE A MINIMUM OF 1-FT ABOVE THE 100-YEAR FLOOD ELEVATION AND THE ELEVATION OF THE CROWN OF THE ROAD. 6. PUMP OFF ELEVATION TO BE PER MANUFACTURER'S MINIMUM SUBMERGENCE. * PROVIDE WET WELL DIMENSIONS SUFFICIENT TO ACCOMMODATE BOTH FLYGT AND ABS PUMP MODELS. THE LARGER / DEEPER OF THE TWO SHALL PREVAIL. ** PROVIDE AS-BUILT DEPTH IN INCHES FROM TOP OF HATCH. † POPULATE ELEV S, T, U, V, AND W WITH TRANSDUCER ELEV AND DEPTHS. THE TRANSDUCER SYSTEM SHALL CONTROL THE OPERATION OF THE PUMPS UNDER NORMAL OPERATING CONDITIONS. THERE SHALL ALSO BE A BACKUP FLOAT CONTROL SYSTEM. ELEV R "HIGH HIGH FLOAT", IS POSITIONED 36-IN ABOVE THE TRANSDUCER AT ELEV S. FIVE (5) ADDITIONAL FLOATS (NOT SHOWN ON THIS DRAWING) HIGH LEVEL, LAG LAG, LAG, LEAD AND OFF, WILL BE POSITIONED BELOW THE HIGH HIGH FLOAT AT 12-IN INTERVALS AS SHOWN IN FIG A403-2.
DIAMETER OF WET WELL	B	12' (MIN)	-	-	-	
WIDTH OF BOTTOM FILLET	C	SEE NOTE 1	-	-	-	
C/L OF WET WELL TO C/L OF PIPES	D	SEE NOTE 1	-	-	-	
LENGTH OF PUMP ACCESS OPENING	E	SEE NOTE 1	-	-	-	
WIDTH OF PUMP ACCESS OPENING	F	SEE NOTE 1	-	-	-	
CENTER OF WET WELL TO EDGE OF HATCH	G	SEE NOTE 1	-	-	-	
LIP WIDTH OF WET WELL BASE	H	18" (MIN)	-	-	-	
THICKNESS OF WET WELL BASE	J	12" (MIN)	-	-	-	
THICKNESS OF WET WELL TOP SLAB	K	12" (MIN)	-	-	-	
TOP OF WET WELL	P	SEE NOTE 5				
FINISHED GRADE	Q	PER DESIGN	SEE SITE PLAN			
HIGH HIGH LEVEL ALARM (FLOAT ONLY)	R	ELEV S + 36"				
HIGH LEVEL ALARM †	S	ELEV T + 12"				
LAG LAG PUMP ON †	T	ELEV U + 12"				
LAG PUMP ON (INFLUENT PIPE INVERT) †	U	ELEV V + 12"				
LEAD PUMP ON †	V	PER DESIGN				
PUMPS OFF (SEE NOTE 6) †	W	PER DESIGN				
BOTTOM OF PUMP	X	SEE NOTE 2				
TOP OF STEP	Y	SEE NOTE 2				
FLOOR OF WET WELL	Z	SEE NOTE 2 & 3				

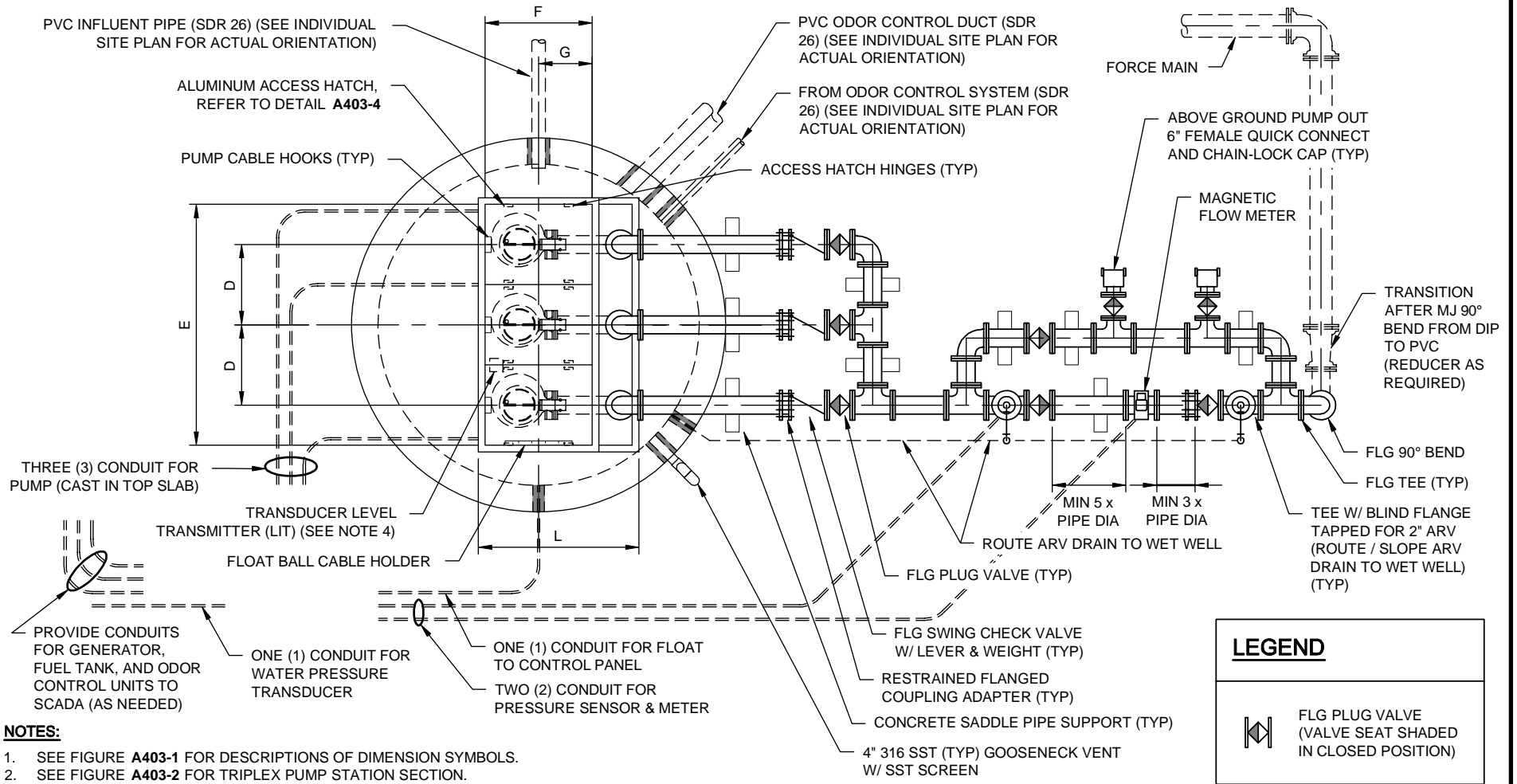
TRIPLEX PUMP STATION SECTION




LEGEND	
	TRANSDUCER LEVEL
	TRANSMITTER DESIGN LEVEL
	BACKUP FLOAT DESIGN LEVEL
	FLG PLUG VALVE (VALVE SEAT SHADED IN CLOSED POSITION)

- SECTION NOTES:**
1. EACH PUMP SHALL BE FITTED WITH 6-FT OF TYPE 316 SST CHAIN ATTACHED TO THE LIFTING MECHANISM AND AIRCRAFT RATED 0.25-IN SST CABLE PROVIDED BETWEEN THE CABLE HOLDER AND THE CHAIN PER MANUFACTURER'S RECOMMENDATIONS.
 2. WALL SLEEVE AND COMPRESSION SEALS SHALL BE COMPATIBLE WITH LINER.
 3. IF PV = 4-IN, LEVER OPERATED; IF PV > 4-IN, WHEEL OPERATED.
 4. SEE FIGURE A403-1 FOR DESCRIPTIONS OF DIMENSION SYMBOLS.
 5. INSTALLED TO PROVIDE DRY CONTACT FOR SCADA. BACK-UP FLOAT ONLY.
 6. ALL FLANGES: PIPE, VALVES AND APPURTENANCES SHALL HAVE 316 SST HARDWARE.
 7. EACH INDIVIDUAL PUMP HATCH SHALL OPEN TOWARD ABOVE GROUND PIPE.
 8. BACK-UP FLOATS TO BE INSTALLED AT 12-IN INTERVALS WITH THE BACK-UP FLOAT "PUMPS OFF" STARTING AT ELEVATION U.
 9. LOCK NUTS SHALL BE INSTALLED ON ALL FLANGES INSIDE THE WET WELL, AND ON BASE PLATE.

TRIPLEX PUMP STATION PLAN

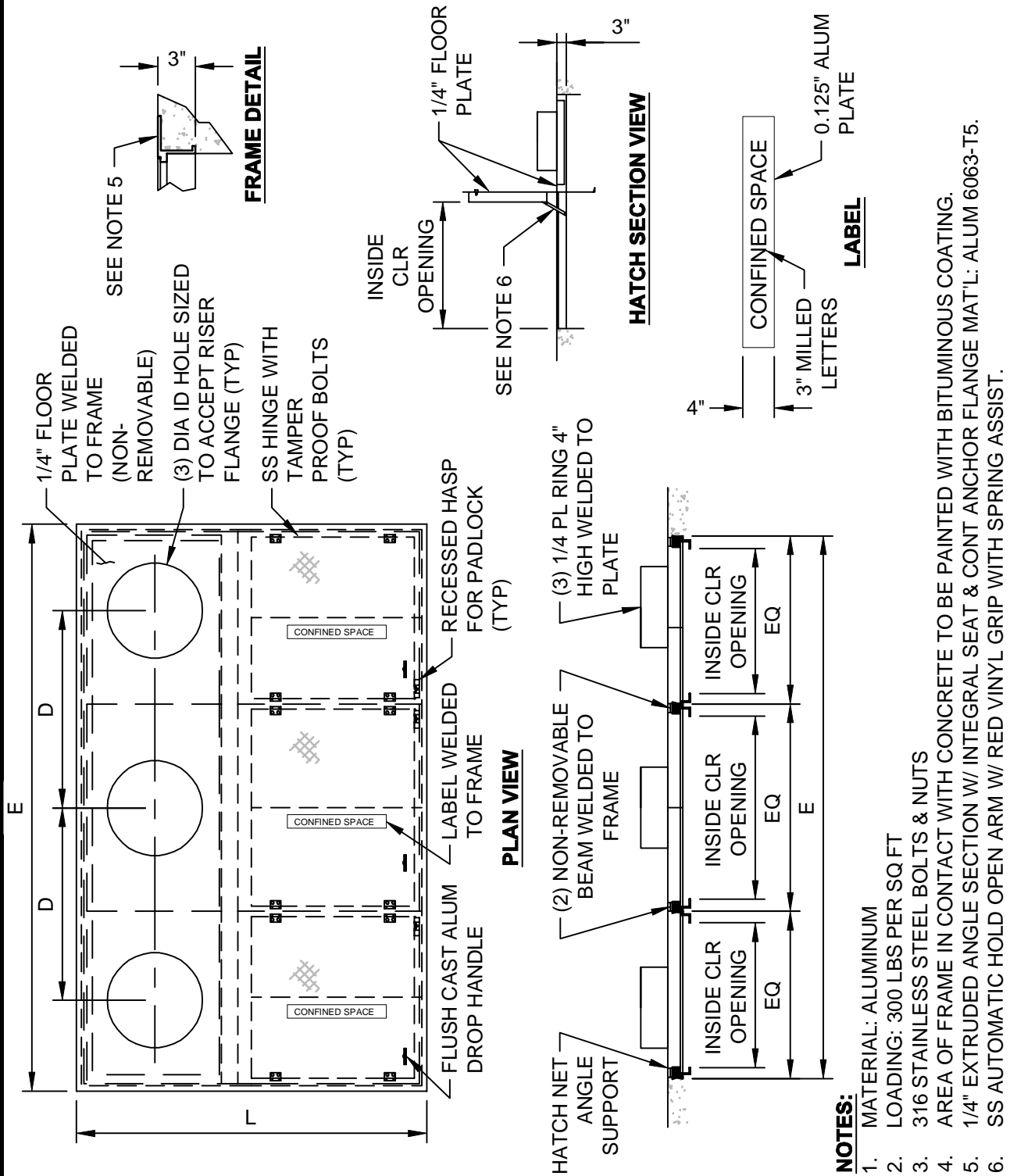


LEGEND

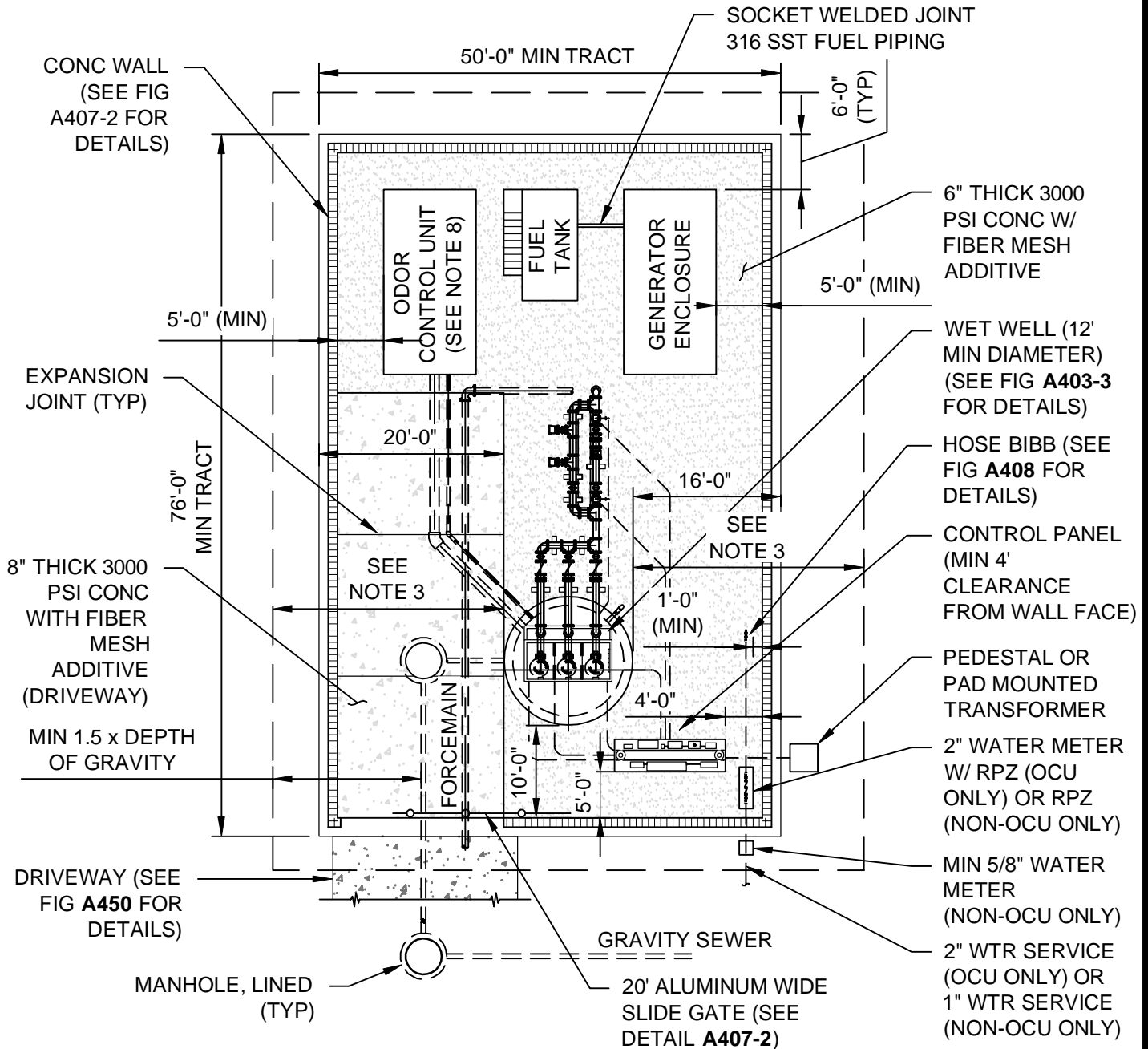
 FLG PLUG VALVE (VALVE SEAT SHADED IN CLOSED POSITION)

- NOTES:**
1. SEE FIGURE A403-1 FOR DESCRIPTIONS OF DIMENSION SYMBOLS.
 2. SEE FIGURE A403-2 FOR TRIPLEX PUMP STATION SECTION.
 3. CONTRACTOR TO PROVIDE CONDUITS FOR GENERATOR, FUEL TANK, AND ODOR CONTROL UNITS TO SCADA.
 4. TRANSDUCER LEVEL TRANSMITTER (LIT) TO HANG DOWN 12-IN FROM TOP OF THE SLAB, MOUNTED ON A 316 SST HOOK (AWAY FROM THE PUMPS).
 5. FLOAT CABLE AND LIT CABLE IN SINGLE CONDUIT TO PCP.

TRIPLEX PUMP STATION ACCESS HATCH



TRIPLEX PUMP STATION SITE PLAN



NOTES:

1. THIS DRAWING IS PROVIDED AS REFERENCE ONLY. DESIGN ENGINEER SHALL PROVIDE A SITE SPECIFIC DRAWING TO A SCALE OF 1" = 10'.
2. FOR NON-RESIDENTIAL ROADS, DISTANCE BETWEEN EDGE OF PAVEMENT AND GATE SHALL BE 40-FT MINIMUM FROM FUTURE EOP.
3. THIS DIMENSION, AS MEASURED FROM THE SIDE OF THE WET WELL TO THE PUBLIC UTILITY EASEMENT LIMIT, SHALL BE EQUAL TO OR GREATER THAN THE DEPTH OF THE WET WELL.
4. CONTROL PANEL DOOR HINGES TO BE LOCATED ON THE SIDE OF THE PANEL FARTHEST FROM THE WELL.
5. DRIVEWAY SUBGRADE TO BE 8-IN THICK. SUBGRADE TO BE COMPACTED TO A MINIMUM DENSITY 98% OF THE MAX DENSITY AS DETERMINED BY ASTM DI557.
6. LIMITS OF UTILITY EASEMENT SHALL BE A MINIMUM OF 5-FT FROM TOP OF BANK.
7. PROVIDE MIN 1% SLOPE FOR PUMP STATION SITE DRAINING. SLOPE TO DRIVEWAY APRON.
8. WATER CABINET, BLOWER, GREASE MIST ELIMINATOR, CONTROL PANEL, NUTRIENT SOLUTION TANK; TO BE ON BACK SIDE OF ODOR CONTROL UNIT. ALL PIPING SHALL BE UNDERGROUND.

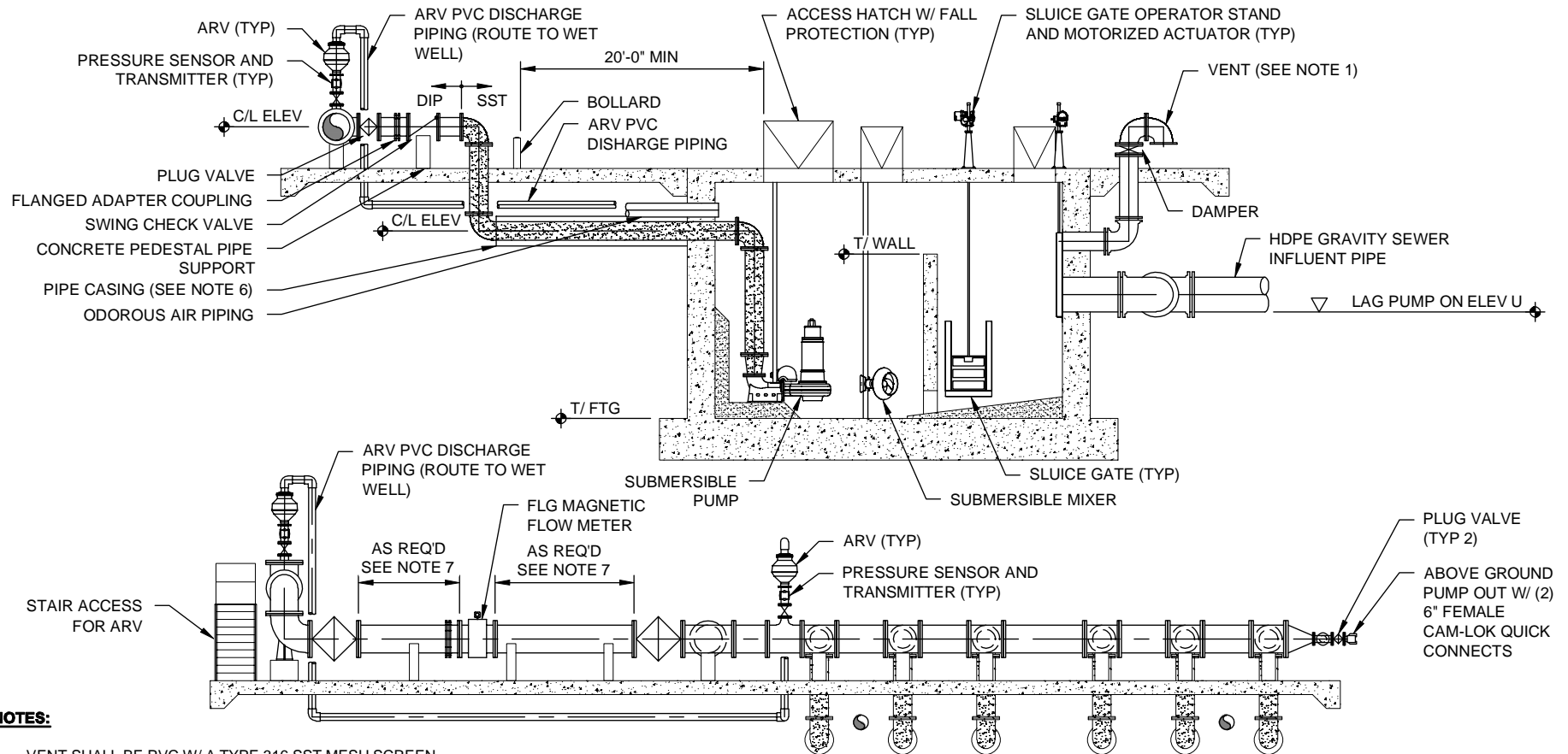
QUADPLEX (PLUS) PUMP STATION DESIGN SPECIFICATIONS

PUMP STATION ID: _____

<p>MANUFACTURER: <u>FLYGT</u> DESIGN A SPECIFICATIONS</p> <p>PUMP MODEL: _____ VOLTAGE: _____ IMPELLER MODEL: _____ PHASE: _____ IMPELLER DIAMETER (MM): _____ MOTOR H.P.: _____ NOMINAL SPEED (RPM): _____ MAX. SOLID SIZE (IN): _____ DISCHARGE SIZE (IN): _____ CURVE NUMBER: _____</p> <p>PEAK DESIGN INFLOW: _____ GPM SHUT OFF HEAD: _____ FEET TDH HIGH HEAD CONDITION: _____ GPM AT _____ FEET TDH (DESIGN HEAD) MINIMUM HEAD CONDITION: _____ GPM AT _____ FEET TDH</p>	<p>MANUFACTURER: <u>ABS</u> DESIGN B SPECIFICATIONS</p> <p>PUMP MODEL: _____ VOLTAGE: _____ IMPELLER MODEL: _____ PHASE: _____ IMPELLER DIAMETER (MM): _____ MOTOR H.P.: _____ NOMINAL SPEED (RPM): _____ MAX. SOLID SIZE (IN): _____ DISCHARGE SIZE (IN): _____ CURVE NUMBER: _____</p> <p>PEAK DESIGN INFLOW: _____ GPM SHUT OFF HEAD: _____ FEET TDH HIGH HEAD CONDITION: _____ GPM AT _____ FEET TDH (DESIGN HEAD) MINIMUM HEAD CONDITION: _____ GPM AT _____ FEET TDH</p>
---	---

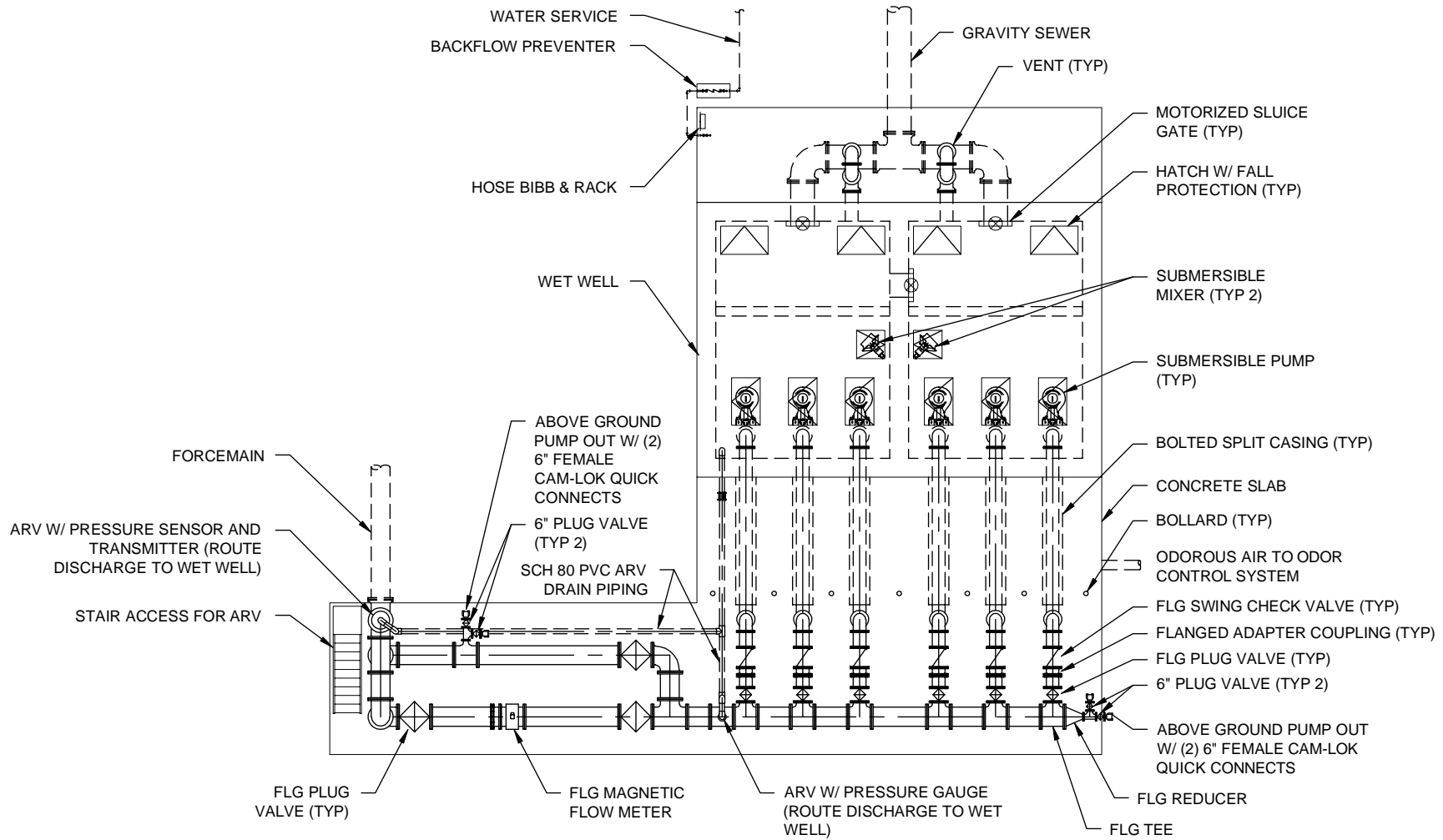
DESCRIPTION	SYMBOL	DIM	DESIGN ELEV *	AS-BUILT ELEV	AS-BUILT DEPTH **	DESIGN A & B SPECIFICATION NOTES
THICKNESS OF WALL	A	12" (MIN)	-	-	-	1. PER PUMP MANUFACTURER REQUIREMENTS. 2. DIMENSION X AND ELEVATION Y AND Z MUST MEET BOTH PUMP MFR'S REQUIREMENTS. 3. EL V - EL Z ≥ 5 FEET. 4. ELEVATION OF HIGH HIGH LEVEL ALARM SHALL BE A MIN OF 12-IN LOWER THAN THE LOWEST MANHOLE LID ELEVATION IN THE UPSTREAM GRAVITY SYSTEM. 5. TOP ELEVATION OF WETWELL SHALL BE A MINIMUM OF 1-FT ABOVE THE 100-YEAR FLOOD ELEVATION AND THE ELEVATION OF THE CROWN OF THE ROAD. 6. PUMP OFF ELEVATION TO BE PER MANUFACTURER'S MINIMUM SUBMERGENCE. * PROVIDE WET WELL DIMENSIONS SUFFICIENT TO ACCOMMODATE BOTH FLYGT AND ABS PUMP MODELS. THE LARGER / DEEPER OF THE TWO SHALL PREVAIL. ** PROVIDE AS-BUILT DEPTH IN INCHES FROM TOP OF HATCH. † POPULATE ELEV S, T, U, V, AND W WITH TRANSDUCER ELEV AND DEPTHS. THE TRANSDUCER SYSTEM SHALL CONTROL THE OPERATION OF THE PUMPS UNDER NORMAL OPERATING CONDITIONS. THERE SHALL ALSO BE A BACKUP FLOAT CONTROL SYSTEM. ELEV R "HIGH HIGH FLOAT", IS POSITIONED 36-IN ABOVE THE TRANSDUCER AT ELEV S. ADDITIONAL FLOATS (NOT SHOWN ON THIS DRAWING) WILL BE POSITIONED BELOW THE HIGH HIGH FLOAT AT 12-IN INTERVALS.
DIAMETER OF WET WELL	B	12' (MIN)	-	-	-	
WIDTH OF BOTTOM FILLET	C	SEE NOTE 1	-	-	-	
C/L OF WET WELL TO C/L OF PIPES	D	SEE NOTE 1	-	-	-	
LENGTH OF PUMP ACCESS OPENING	E	SEE NOTE 1	-	-	-	
WIDTH OF PUMP ACCESS OPENING	F	SEE NOTE 1	-	-	-	
CENTER OF WET WELL TO EDGE OF HATCH	G	SEE NOTE 1	-	-	-	
LIP WIDTH OF WET WELL BASE	H	18" (MIN)	-	-	-	
THICKNESS OF WET WELL BASE	J	12" (MIN)	-	-	-	
THICKNESS OF WET WELL TOP SLAB	K	12" (MIN)	-	-	-	
TOP OF WET WELL	P	SEE NOTE 5				
FINISHED GRADE	Q	PER DESIGN	SEE SITE PLAN			
HIGH HIGH LEVEL ALARM (FLOAT ONLY)	R	ELEV S + 36"				
HIGH LEVEL ALARM †	S	ELEV T + 12"				
LAG LAG PUMP ON †	T	ELEV U + 12"				
(ADDITIONAL AS REQUIRED PER DESIGN)	T1					
(ADDITIONAL AS REQUIRED PER DESIGN)	T2					
(ADDITIONAL AS REQUIRED PER DESIGN)	T3					
LAG PUMP ON (INFLUENT PIPE INVERT) †	U	ELEV V + 12"				
LEAD PUMP ON †	V	PER DESIGN				
PUMPS OFF (SEE NOTE 6) †	W	PER DESIGN				
BOTTOM OF PUMP TO FLOOR OF WET WELL	X	SEE NOTE 2				
TOP OF STEP	Y	SEE NOTE 2				
FLOOR OF WET WELL	Z	SEE NOTE 2 & 3				

QUADPLEX (PLUS) PUMP STATION SECTIONS

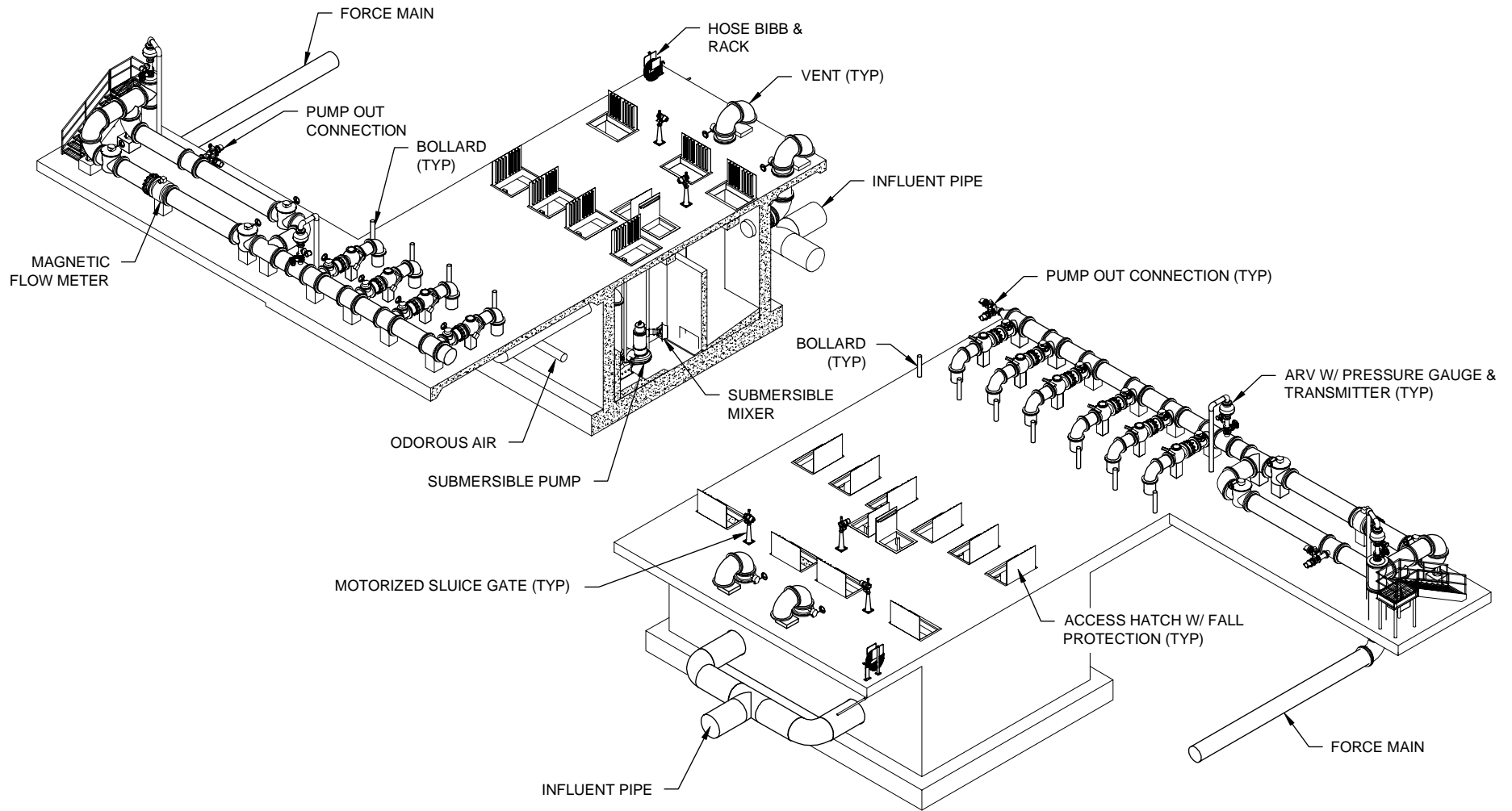
**NOTES:**

1. VENT SHALL BE PVC W/ A TYPE 316 SST MESH SCREEN.
2. WET WELL LINER SHALL BE INSTALLED ON INSIDE WALLS AND UNDERSIDE OF TOP SLAB.
3. SUBMERSIBLE MIXERS SHALL BE SUPPORTED BY 2-INCH 316 SST GUIDE RAILS. MIXER SHALL BE POSITIONED 1-FOOT OFF WET WELL BOTTOM AND ROTATED 60-DEGREES FROM BAFFLE WALL.
4. DISCHARGE PIPING IN THE WET WELL SHALL BE 316 SST UP TO AND INCLUDING 90° BEND ABOVE GRADE. ALL OTHER DISCHARGE PIPING TO BE DUCTILE IRON.
5. SST PIPING TRANSITION TO DUCTILE IRON SHALL BE RESTRAINED.
6. SST PUMP DISCHARGE PIPING BELOW GRADE UP TO THE BELOW GRADE 90° BEND SHALL BE PLACED IN A BOLTED SPLIT CASING.
7. FLOW METER TO HAVE STRAIGHT PIPE UPSTREAM MIN LENGTH OF 5 x PIPE DIAMETER AND STRAIGHT PIPE DOWNSTREAM MIN LENGTH OF 3 x PIPE DIAMETER.
8. LOCK NUTS SHALL BE INSTALLED ON ALL FLANGES INSIDE THE WET WELL, AND ON BASE PLATE.

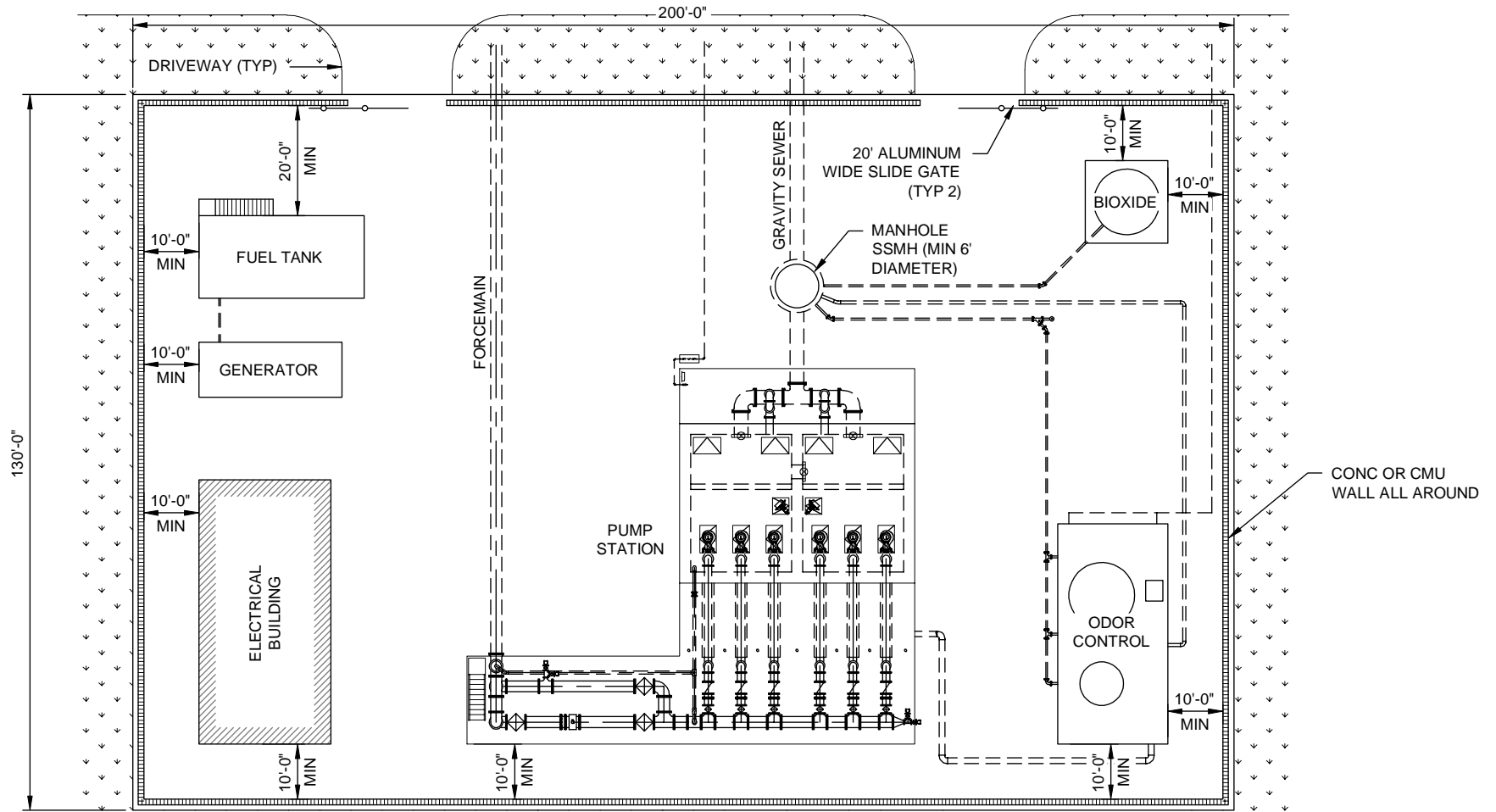
QUADPLEX (PLUS) PUMP STATION PLAN



QUADPLEX (PLUS) PUMP STATION 3D PERSPECTIVES



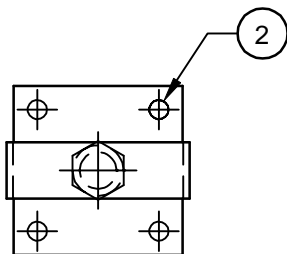
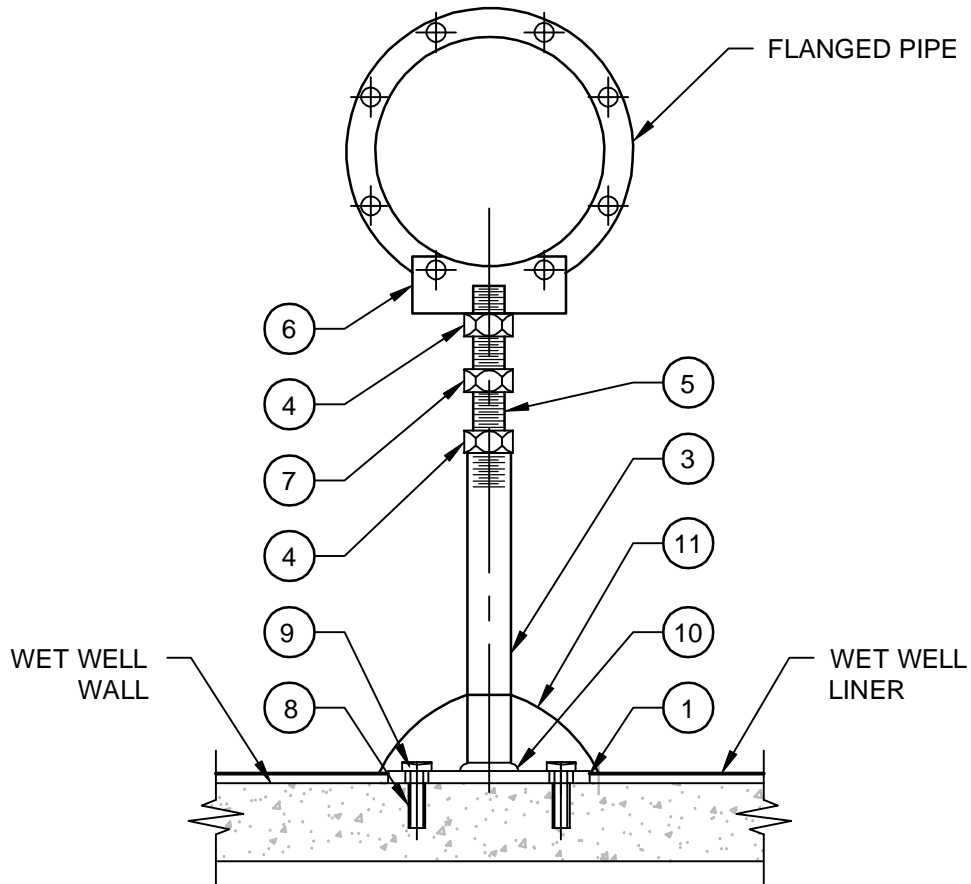
QUADPLEX (PLUS) PUMP STATION SITE PLAN



NOTES:

1. DEVELOPER SHALL ACCOMMODATE ALL STORM WATER OR SHALL PROVIDE ADDITIONAL LAND FOR POND.
2. FOR PUMP STATIONS WITH FOUR OR MORE PUMPS, SITE SPECIFIC DETAILS ARE REQUIRED.
3. FIGURES A404-1 THROUGH A404-5 ARE GUIDELINES DEPICTING MINIMUM REQUIREMENTS.

WET WELL RISER PIPE SUPPORT ASSEMBLY (FOUR OR MORE PUMPS)



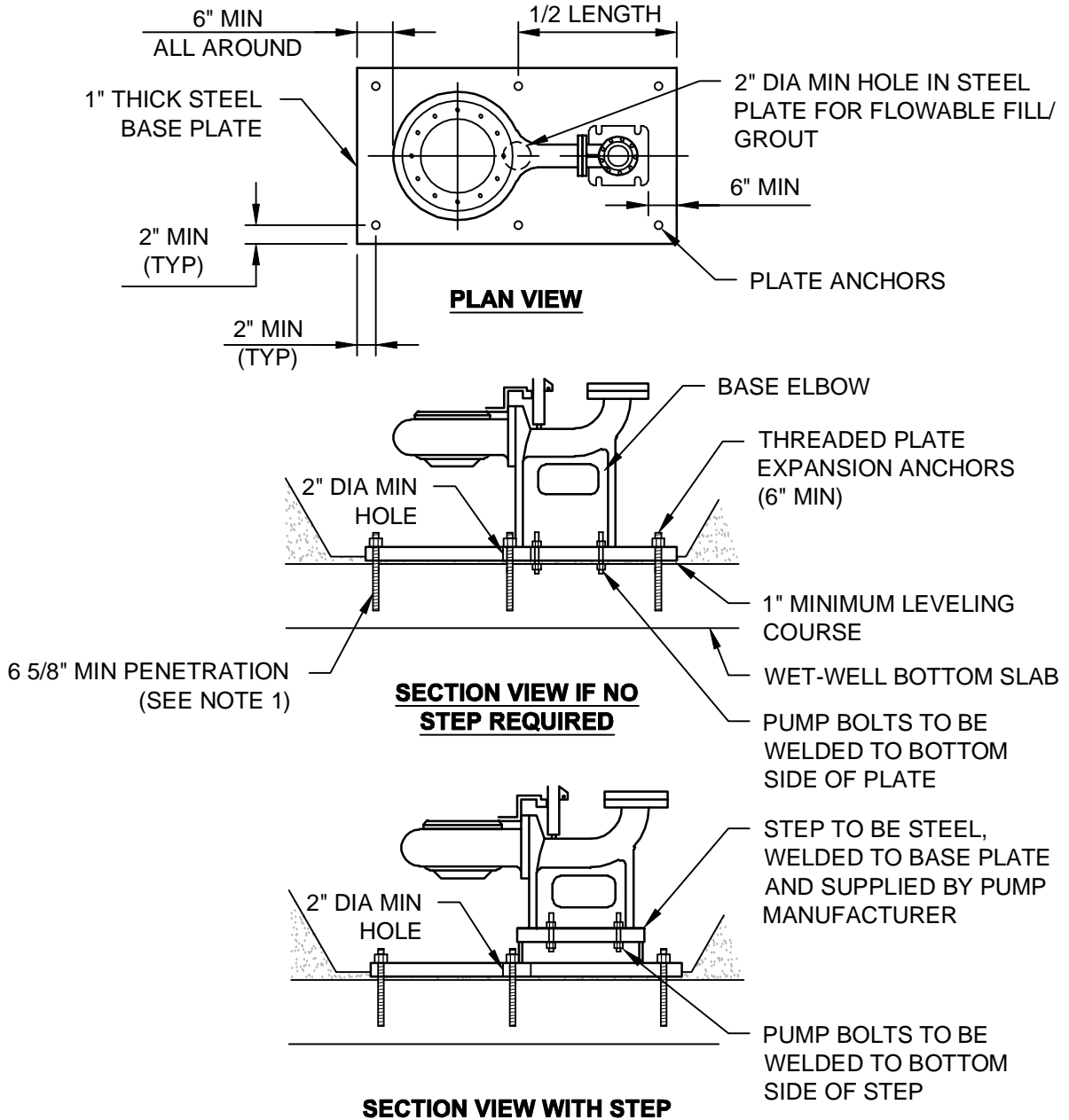
LEGEND:

- 1. BASE (1/4-IN SST)
- 2. MOUNTING HOLE (4 TYP)
- 3. SUPPORT COLUMN (1-IN SST SCH 40)
- 4. HEIGHT ADJUSTMENT NUT (1R & 1L)
- 5. SUPPORT SHAFT (THREADED)
- 6. PIPE SUPPORT FLANGE
- 7. ADJUSTMENT BOLT
- 8. ANCHOR (4 5/8-IN SST)
- 9. LAG BOLT (4 5/8-IN SST)
- 10. WELD
- 11. HDPE WELDED BOOT

NOTES:

- 1. ALL LEGEND ITEMS 1 THRU 9 TO BE 316 SST.

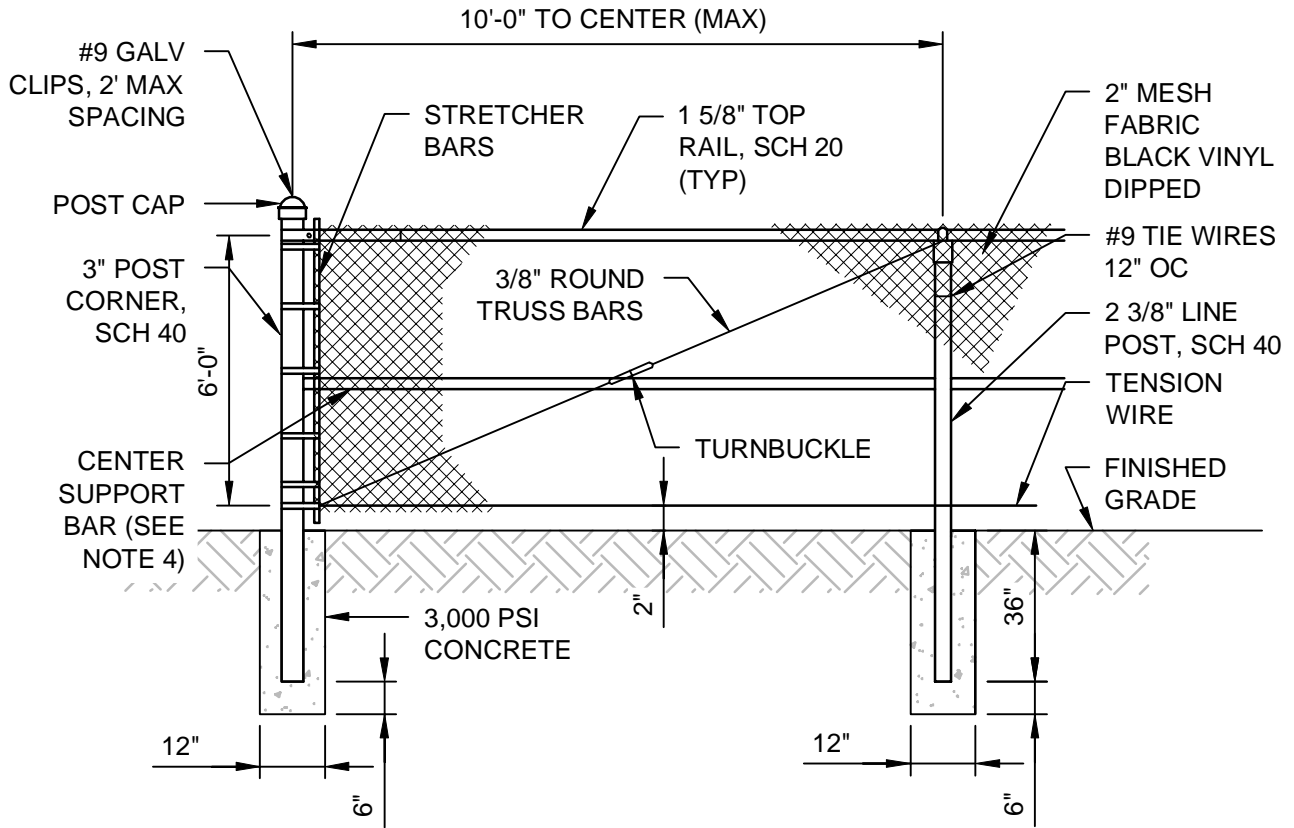
PUMP BASE PLATE



NOTES:

1. PLATE ANCHORS TO BE 6-IN MINIMUM 3/4-IN DIAMETER, PROVIDING A MINIMUM EMBEDMENT DEPTH OF 6-5/8-IN.
2. PLATE SIZE: 6-IN LARGER THAN BASE ELBOW & PUMP VOLUTE TYP ALL AROUND. BASE PLATE SHALL BE TRIMMED TO FIT, IF REQUIRED.
3. BASE ELBOW BOLTS, PLATE ANCHORS AND STUDS TO BE STEEL (MIN ASTM A307 GRADE B AND A563).

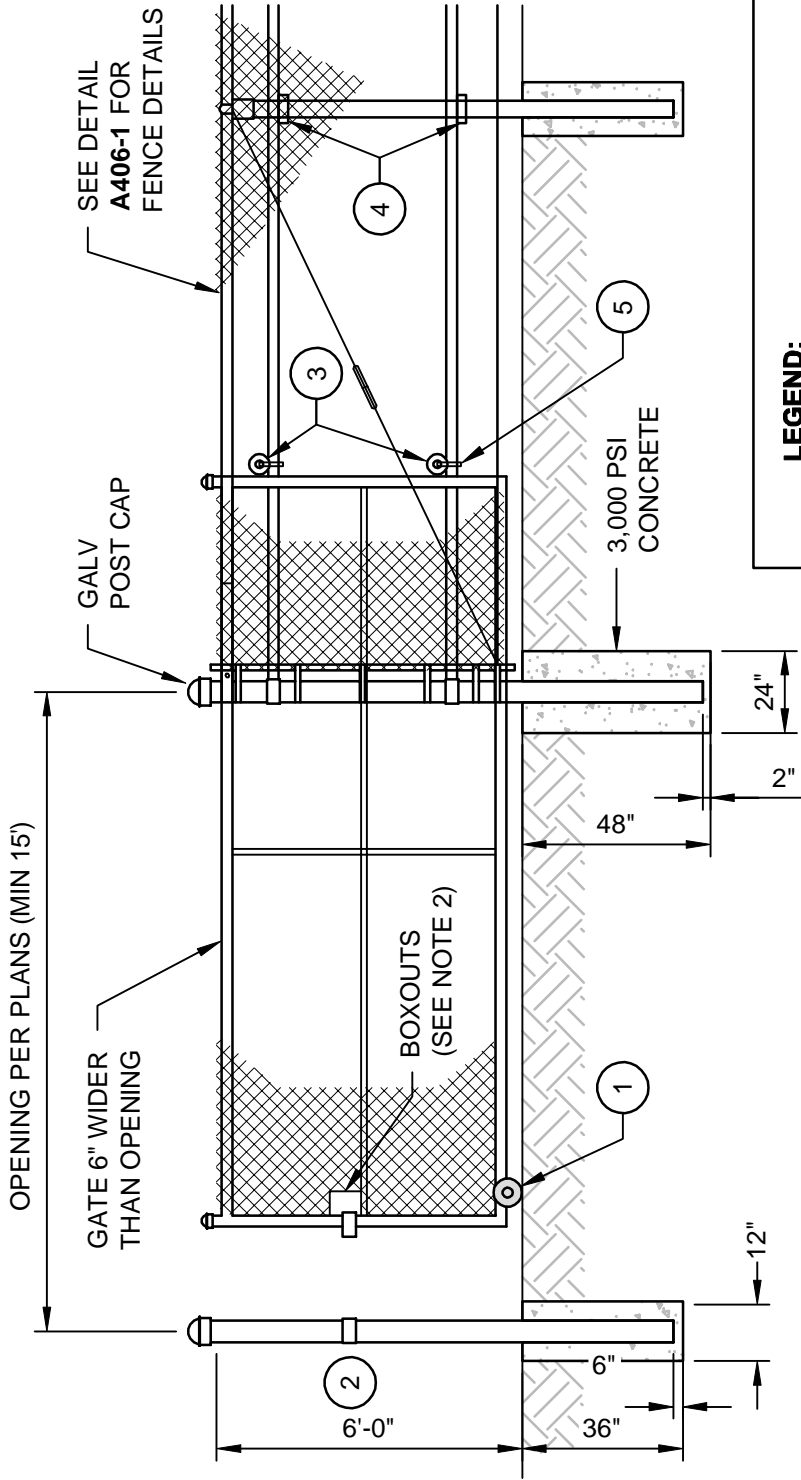
CHAIN LINK FENCE



NOTES:

1. TRUSS BARS ARE REQUIRED FOR EACH GATE SECTION AND THE FIRST SPAN ON EACH SIDE OF A CORNER POST ONLY.
2. PROVIDE CHAIN AND LOCK FOR SECURING GATE
3. FENCING AND POSTS SHALL BE BLACK, VINYL DIPPED.
4. CENTER SUPPORT BAR IS REQUIRED ON ALL FENCE SECTIONS.

ROLLING SLIDE GATE ON CHAIN LINK FENCE



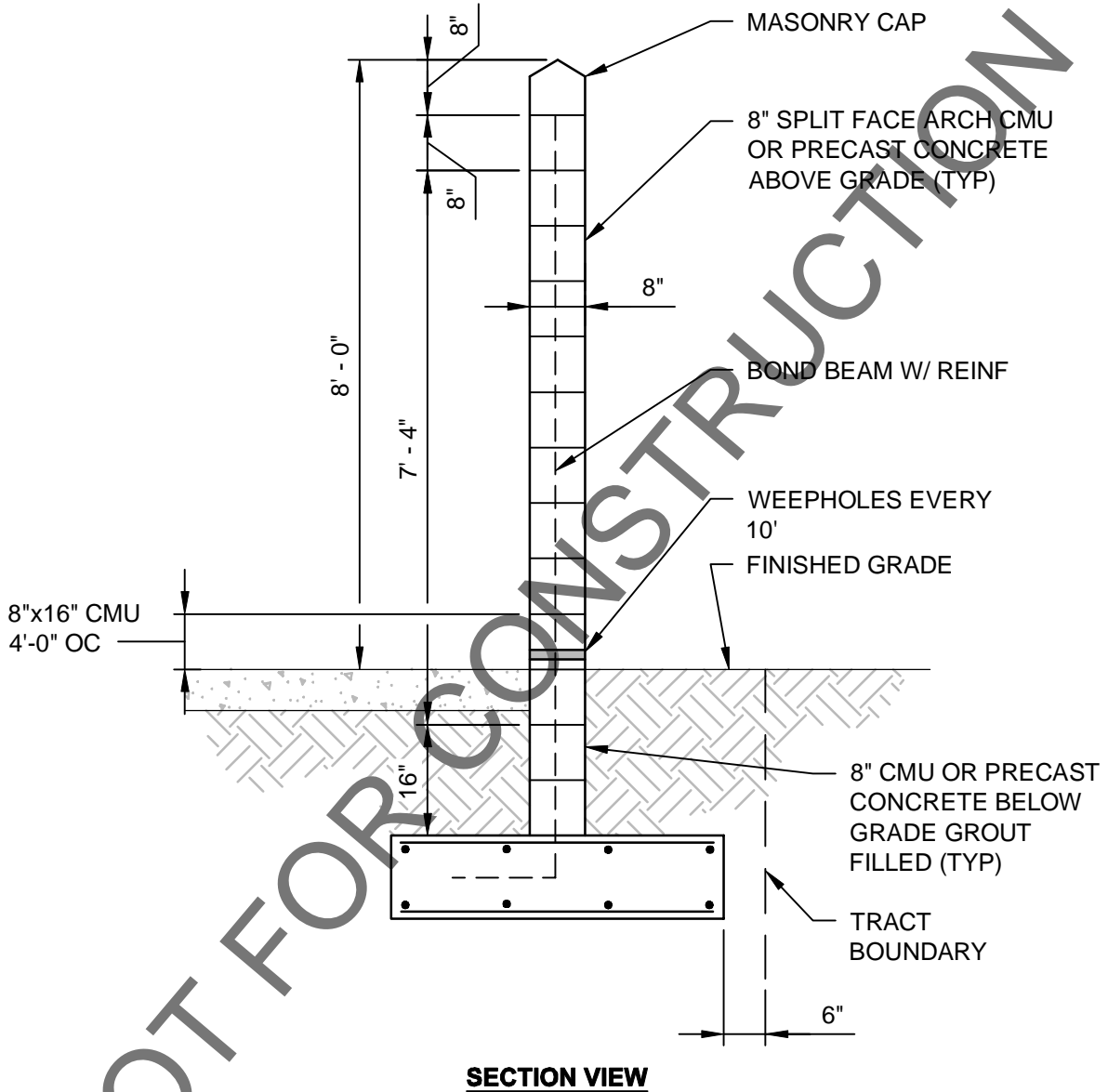
LEGEND:

- 1 FRONT WHEEL - DOUBLE SOLID WHEEL TROLLEY (QTY 1)
- 2 LOCKING DEVICE (QTY 1)
- 3 REAR WHEEL FOR TRACK (QTY 2)
- 4 TRACK BRACKETS (TO ATTACH 1-5/8" PIPE TO LINE AND GATE POSTS) (QTY 4-6) (SEE NOTE 1)
- 5 BRACKETS FOR REAR WHEELS (ATTACH TO GATE FRAME) (QTY 2)

NOTES:

1. TRACK BRACKETS & PIPE SHALL BE PLACED ON THE INTERIOR OF THE FENCE.
2. BOXOUTS FOR CHAIN AND PAD LOCKS.
3. MINIMUM REQUIREMENT FOR ALL DUPLEX PUMP STATIONS.
4. GATE TO ROLL OPEN ON THE INSIDE OF THE FENCE.

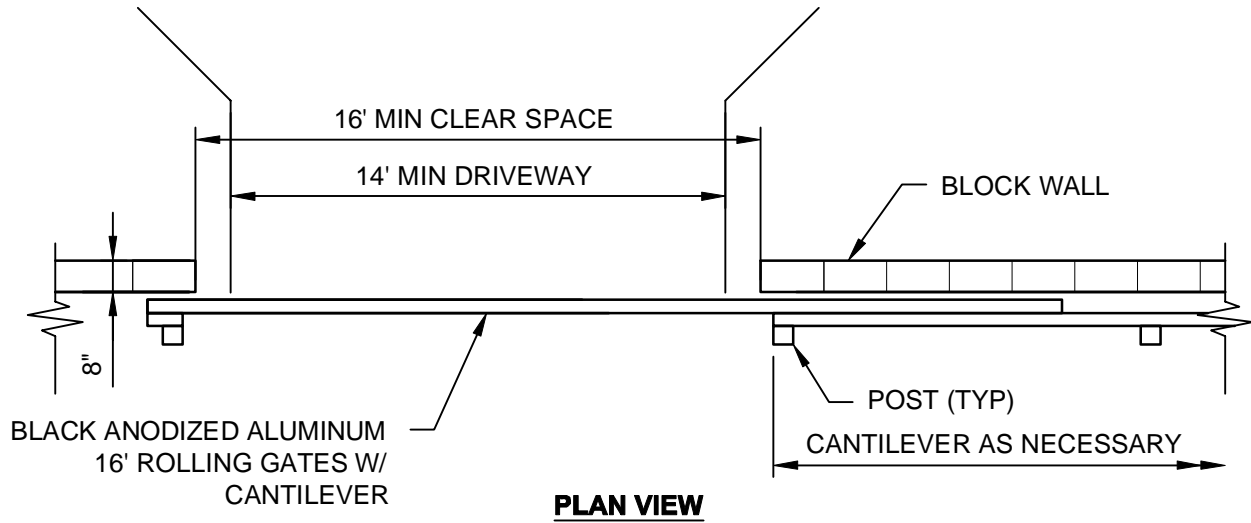
PUMP STATION BLOCK WALL



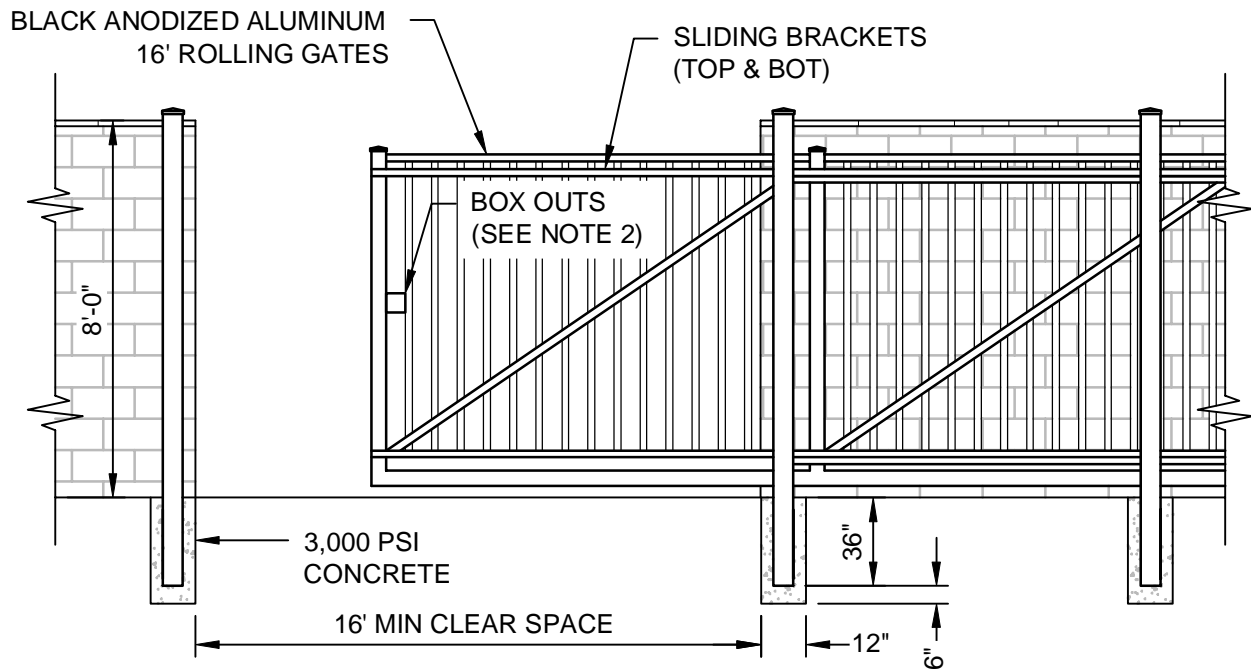
NOTES:

1. ENGINEER TO PROVIDE SIGNED AND SEALED WALL DESIGN.

ROLLING SLIDE GATE ON BLOCK WALL



PLAN VIEW

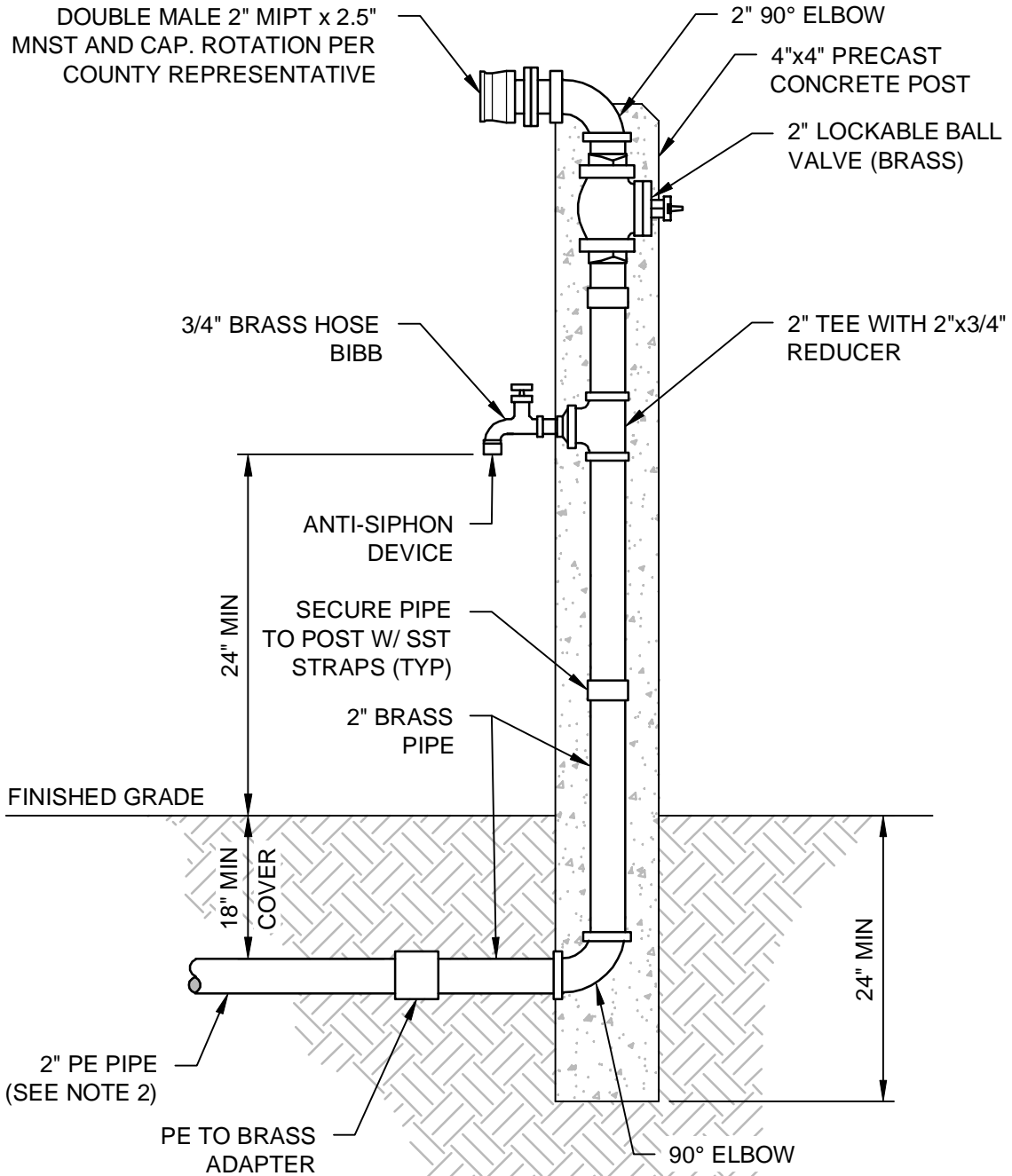


GATE ELEVATION
(INTERIOR VIEW)

NOTES:

1. GATE POSTS SHALL NOT BE ATTACHED TO THE WALL AND SHALL BE PLACED ON THE INTERIOR SIDE OF THE WALL.
2. BOX OUTS FOR CHAIN & PAD LOCKS.
3. FOR ALL TRIPLEX PUMP STATIONS

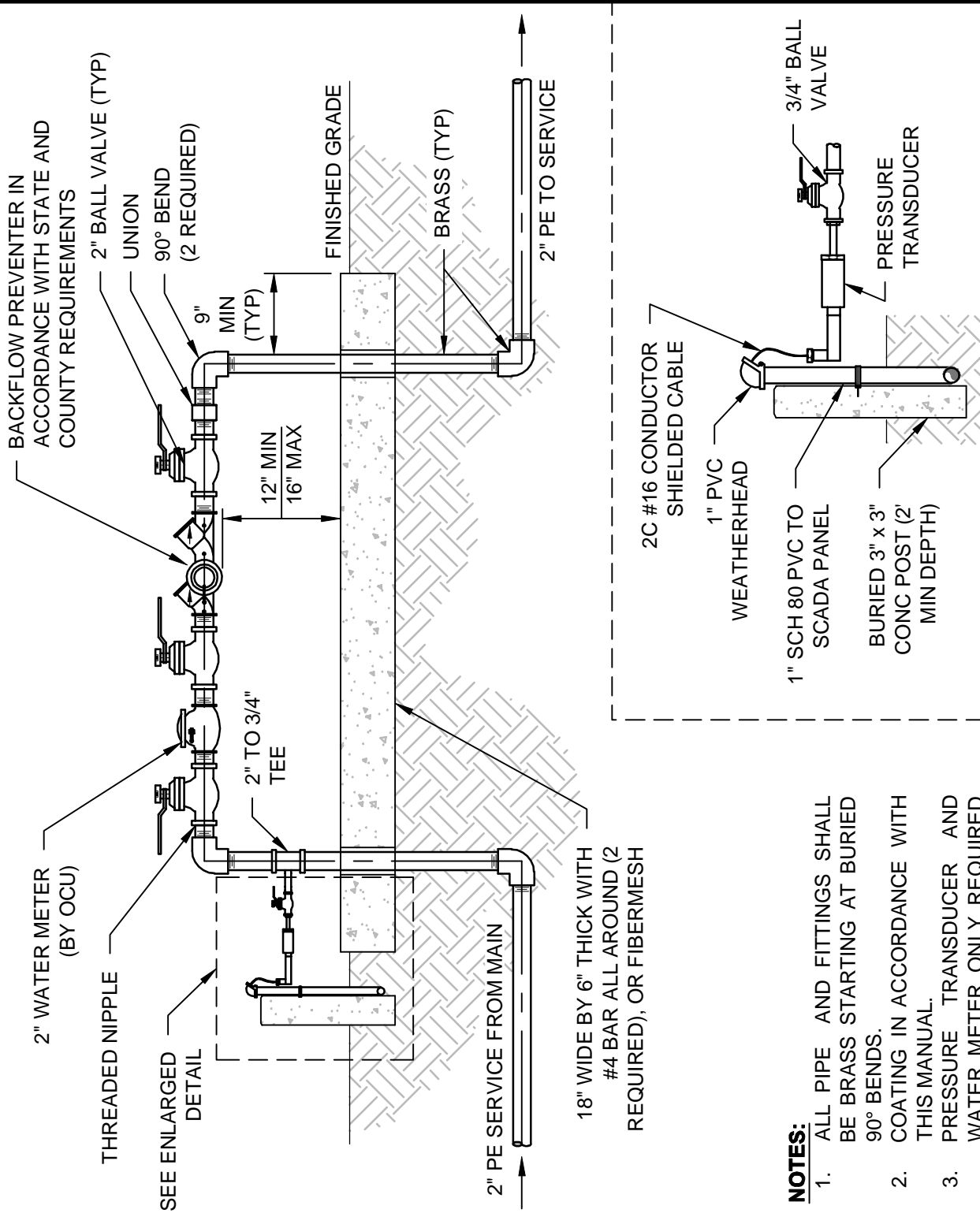
YARD HYDRANT / HOSE BIBB AT PUMP STATION



NOTES:

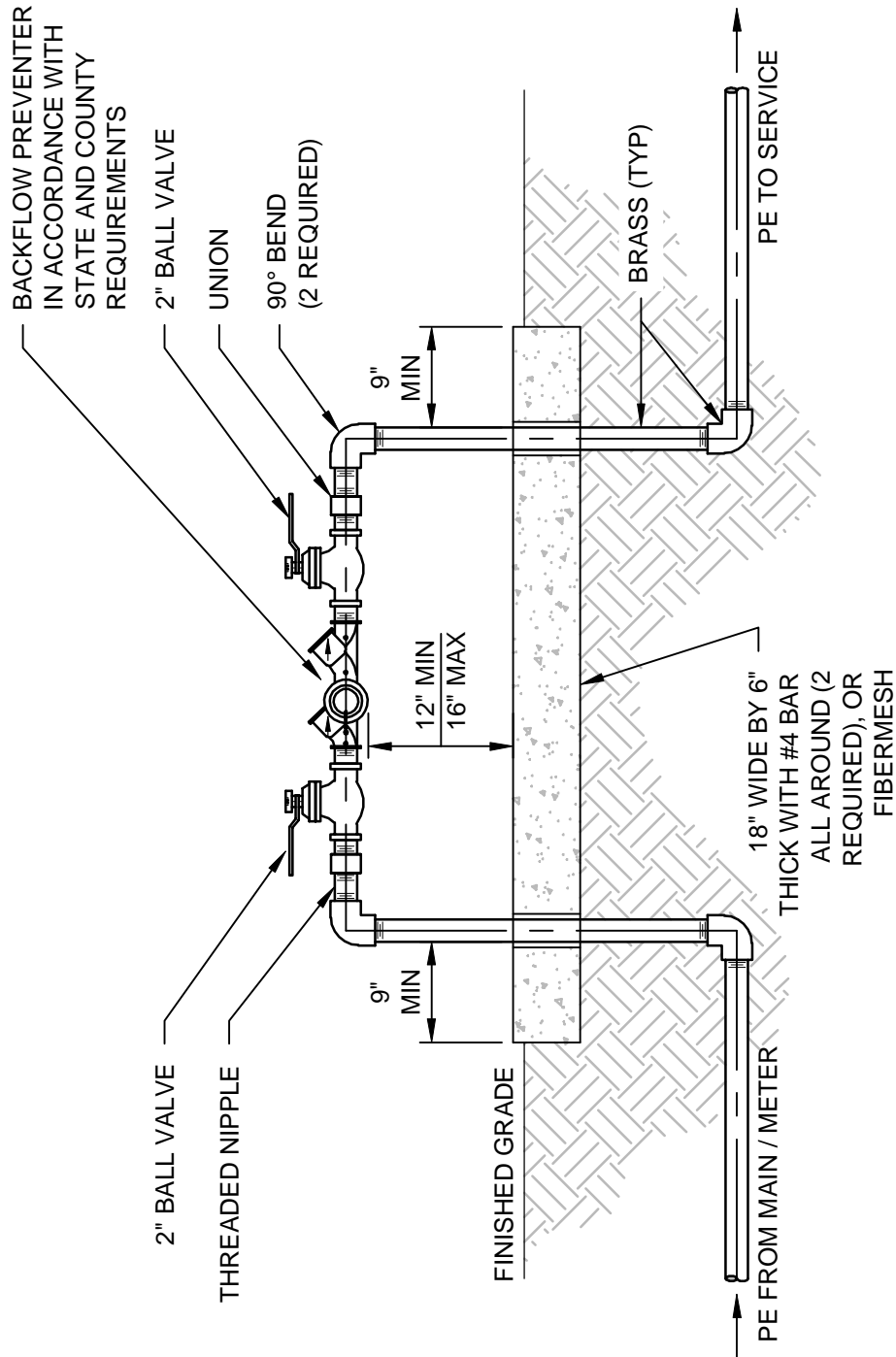
1. ALL PIPING AND FITTINGS AFTER ADAPTER SHALL BE BRASS.
2. CONNECT 2-IN PE TO EITHER 2-IN OCU METER OR 5/8-IN OUC METER.

OCU WATER PRESSURE GAUGE & REDUCED PRESSURE BACKFLOW PREVENTER, 2"



- NOTES:**
1. ALL PIPE AND FITTINGS SHALL BE BRASS STARTING AT BURIED 90° BENDS.
 2. COATING IN ACCORDANCE WITH THIS MANUAL.
 3. PRESSURE TRANSDUCER AND WATER METER ONLY REQUIRED FOR WATER SUPPLIED BY OCU.

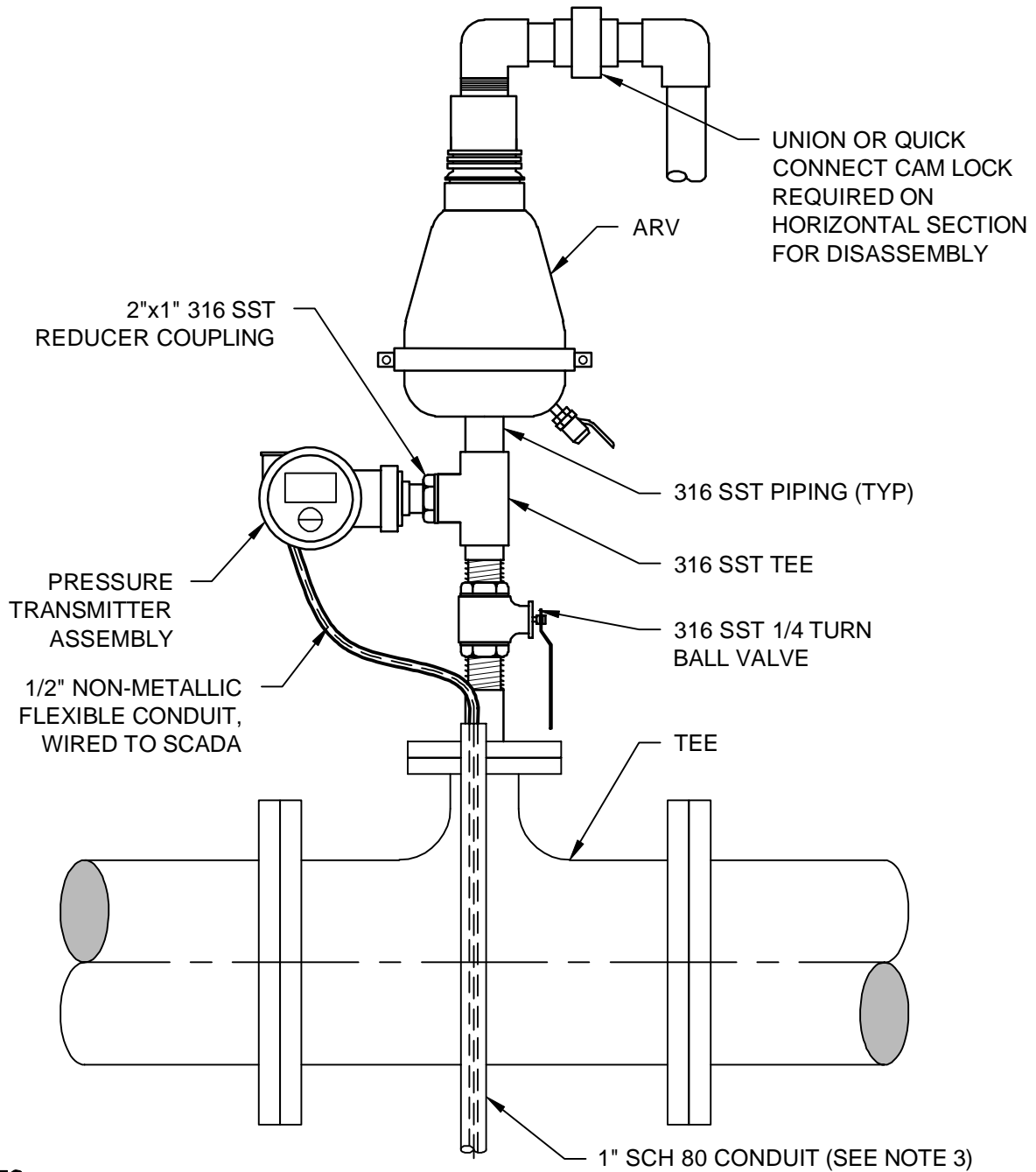
REDUCED PRESSURE BACKFLOW PREVENTER, 2" & SMALLER



NOTES:

1. ALL PIPE AND FITTINGS SHALL BE BRASS STARTING AT BURIED 90° BENDS.
2. COATING IN ACCORDANCE WITH THIS MANUAL.
3. FOR WATER SUPPLIED BY OTHER THAN OCU: BASED ON SIZE OF METER, OTHER REQUIREMENTS MAY BE APPLICABLE FOR BACKFLOW PREVENTER.

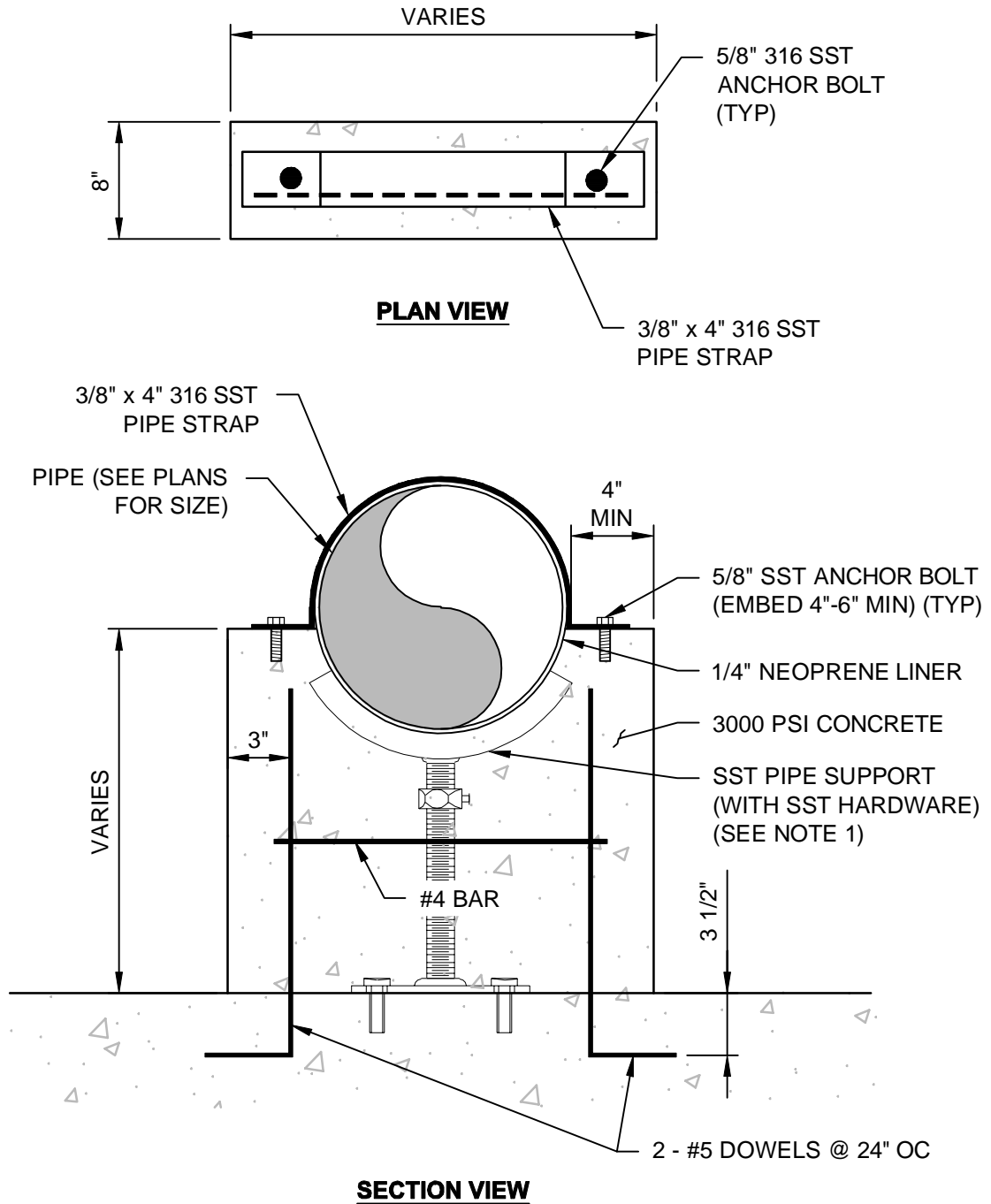
PUMP STATION PRESSURE SENSOR & TRANSMITTER ASSEMBLY



NOTES:

1. PRESSURE TRANSMITTER ASSEMBLY SHALL BE INSTALLED AT THE CLOSEST ARV FROM THE WETWELL.
2. A 1/4-TURN ISOLATION VALVE SHALL BE INSTALLED BEFORE THE TEE FOR THE PRESSURE TRANSMITTER.
3. CONDUIT TO BE ROUTED AND SUPPORTED TO THE NEAREST CONCRETE SUPPORT.

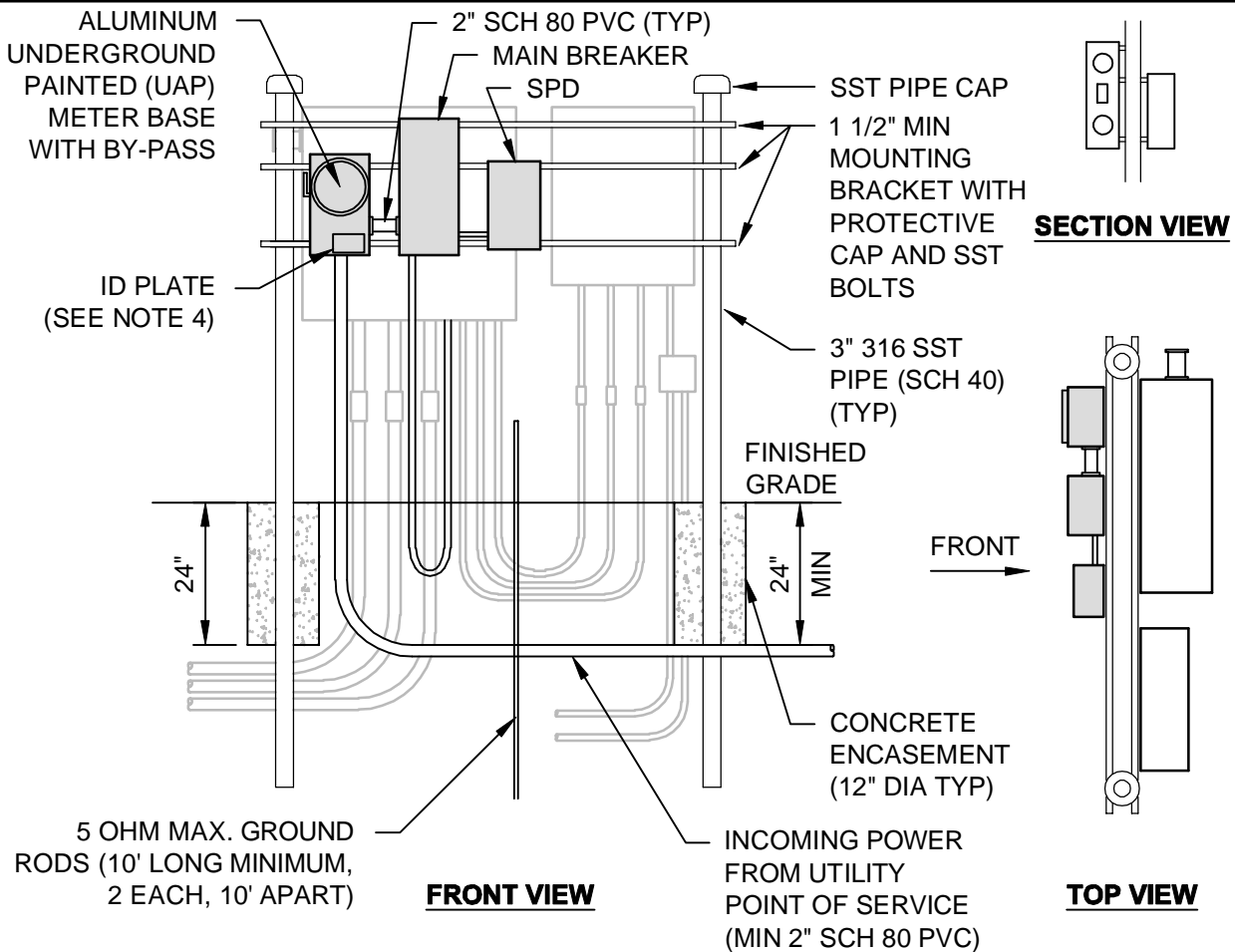
CONCRETE PIPE SUPPORT



NOTES:

1. ENCASE SST PIPE SUPPORT IN CONCRETE TO KEEP SUPPORTED FROM CONCRETE SHRINKAGE.

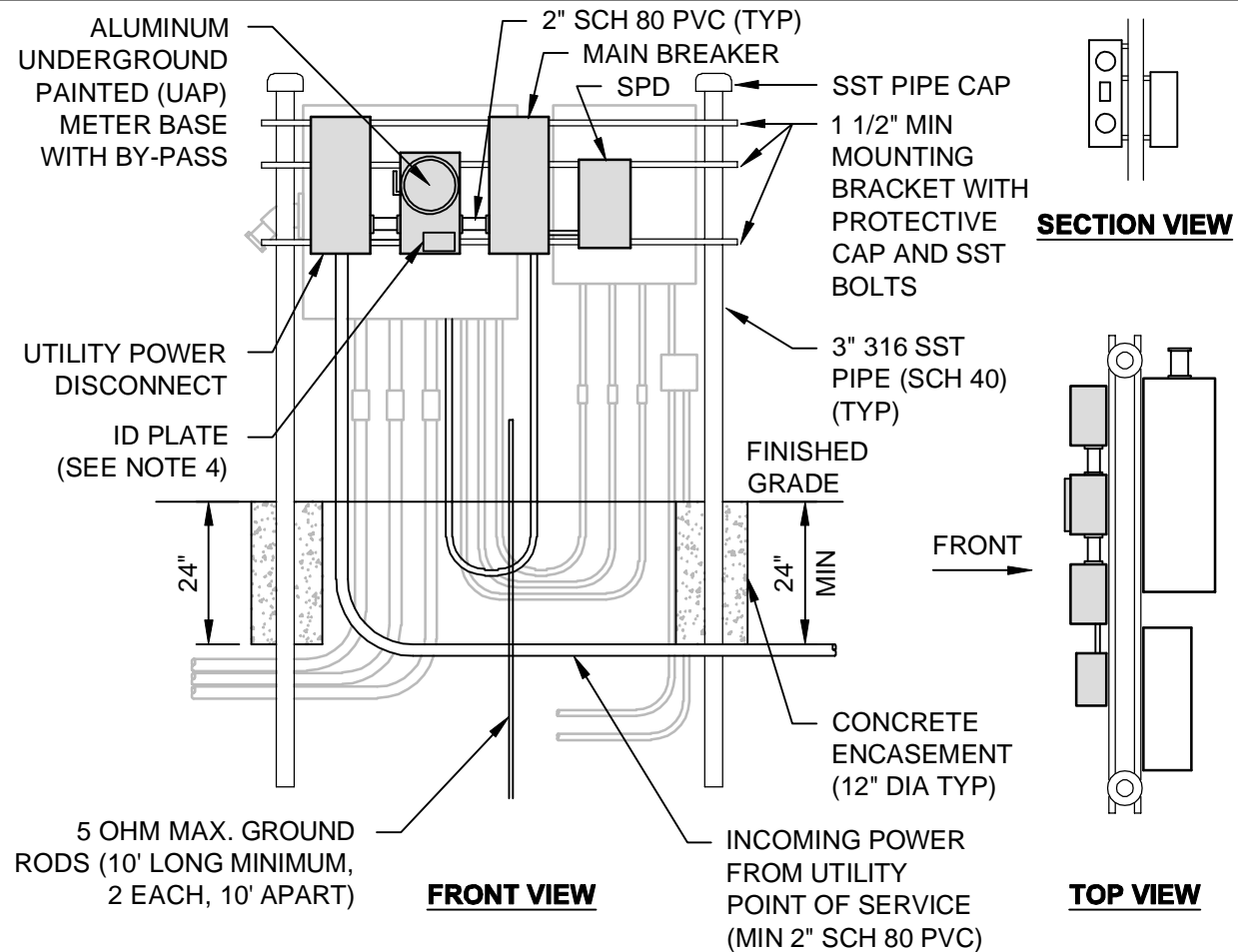
DUPLEX PUMP STATION CONTROL PANEL FRONT & PLAN VIEW (240V)



PANEL INSTALLATION NOTES:

1. PUMP MOTOR CONDUIT SHALL BE SIZE TO ACCOMMODATE 40% CONDUIT FILL. MINIMUM CONDUIT SIZE TO BE 2-IN SCH 80 PVC.
2. POWER SUPPLY SHALL BE UNDERGROUND ON THE LIFT STATION SITE AND SHALL BE 3-PHASE, 4-WIRE (OPEN DELTA OR DELTA), 100 AMP SERVICE MINIMUM.
3. AN ELECTRICAL GROUNDING SYSTEM SHALL BE INSTALLED AS PER THE NATIONAL ELECTRICAL CODE, LOCAL CODES AND ORDINANCES. AN UNDERGROUND PERIMETER CABLE GROUNDING SYSTEM SHALL BE INSTALLED WITH CONNECTIONS TO AT LEAST WET WELL COVER, CONTROL PANELS, GENERATOR, UTILITY COMPANY TRANSFORMER, AND MANUAL DISCONNECT SWITCH. REFER TO GROUNDING DETAILS.
4. THE STATION NAME, UTILITIES I.D. NUMBER AND ADDRESS SHALL BE AFFIXED TO THE FRONT OF THE METER CABINET.
5. ALL MOUNTING HARDWARE & BRACKETS AND ELECTRICAL ENCLOSURES SHALL BE 316 STAINLESS STEEL.
6. ON A 4-WIRE, DELTA SYSTEM, THE HIGH-LEG SHALL BE IDENTIFIED WITH ORANGE COLOR TAPE AT ALL CONNECTION POINTS AND SHALL BE LOCATED ON THE "B" PHASE AT THE LINE SIDE OF THE MAIN DISCONNECT.

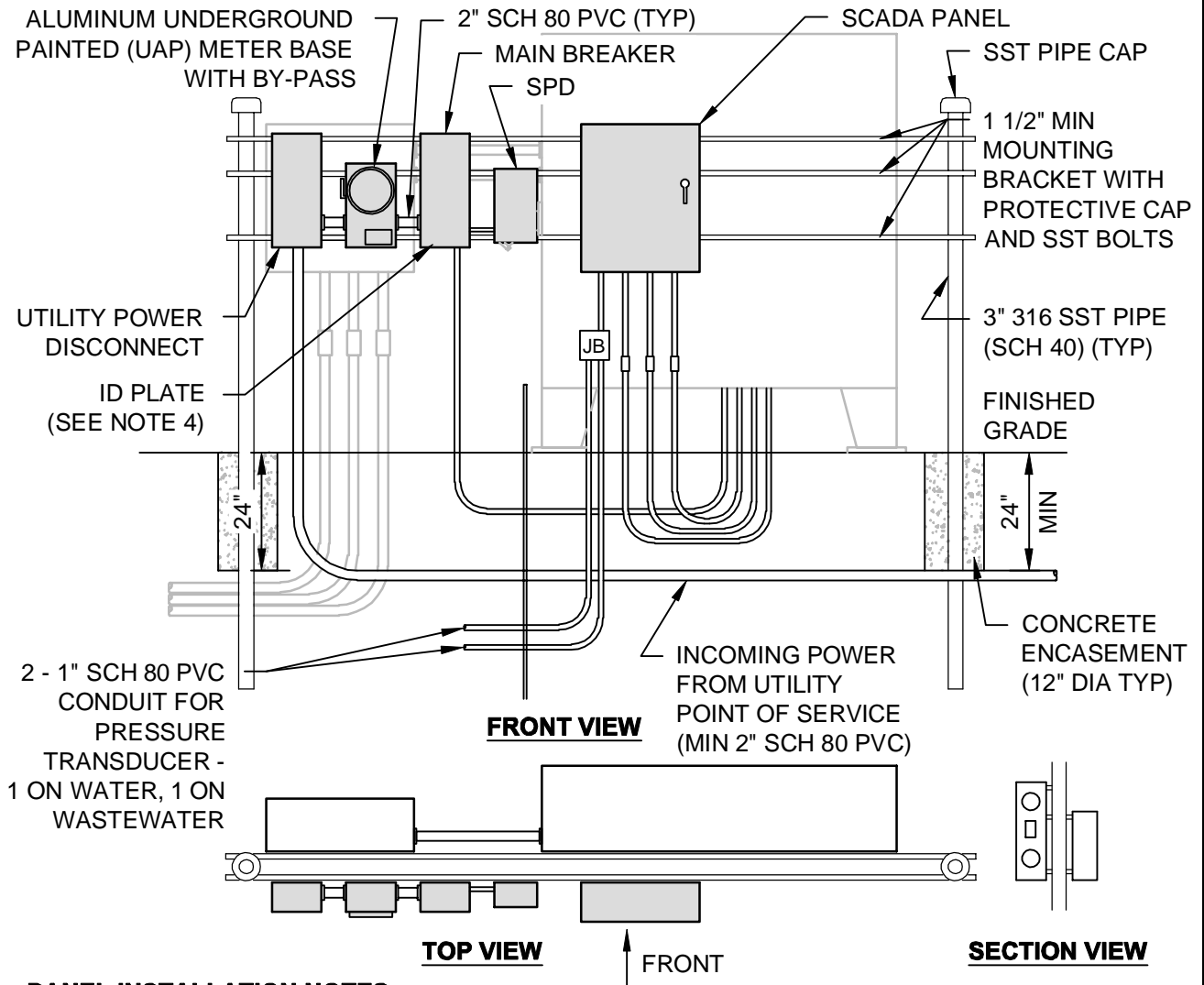
DUPLEX PUMP STATION CONTROL PANEL FRONT & PLAN VIEW (480V) (PUMPS < 25HP)



PANEL INSTALLATION NOTES:

1. PUMP MOTOR CONDUIT SHALL BE SIZE TO ACCOMMODATE 40% CONDUIT FILL. MINIMUM CONDUIT SIZE TO BE 2-IN SCH 80 PVC.
2. POWER SUPPLY SHALL BE UNDERGROUND ON THE LIFT STATION SITE AND SHALL BE 3-PHASE, 4-WIRE (WYE), FROM A 3-PHASE SOURCE ONLY, 100 AMP SERVICE MINIMUM.
3. AN ELECTRICAL GROUNDING SYSTEM SHALL BE INSTALLED AS PER THE NATIONAL ELECTRICAL CODE, LOCAL CODES AND ORDINANCES. AN UNDERGROUND PERIMETER CABLE GROUNDING SYSTEM SHALL BE INSTALLED WITH CONNECTIONS TO AT LEAST WET WELL COVER, CONTROL PANELS, GENERATOR, UTILITY COMPANY TRANSFORMER, AND MANUAL DISCONNECT SWITCH. REFER TO GROUNDING DETAILS.
4. THE STATION NAME, UTILITIES I.D. NUMBER AND ADDRESS SHALL BE AFFIXED TO THE FRONT OF THE METER CABINET.
5. ALL MOUNTING HARDWARE & BRACKETS AND ELECTRICAL ENCLOSURES SHALL BE 316 STAINLESS STEEL.

DUPLEX PUMP STATION CONTROL PANEL FRONT & PLAN VIEW (480V) (PUMPS ≥ 25HP)



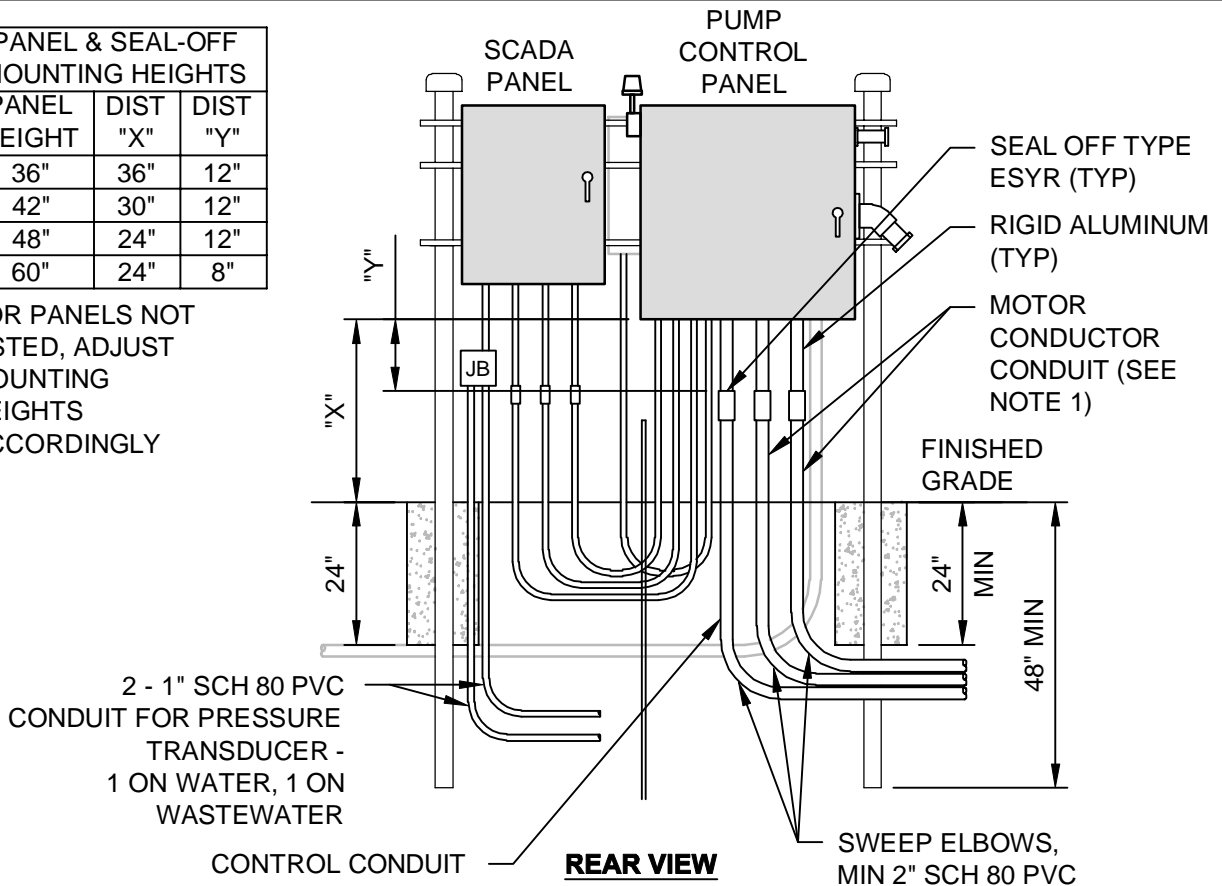
PANEL INSTALLATION NOTES:

1. PUMP MOTOR CONDUIT SHALL BE SIZE TO ACCOMMODATE 40% CONDUIT FILL. MINIMUM CONDUIT SIZE TO BE 2-IN SCH 80 PVC.
2. POWER SUPPLY SHALL BE UNDERGROUND ON THE LIFT STATION SITE AND SHALL BE 3-PHASE, 4-WIRE (WYE), FROM A 3-PHASE SOURCE ONLY, 100 AMP SERVICE MINIMUM.
3. AN ELECTRICAL GROUNDING SYSTEM SHALL BE INSTALLED AS PER THE NATIONAL ELECTRICAL CODE, LOCAL CODES AND ORDINANCES. AN UNDERGROUND PERIMETER CABLE GROUNDING SYSTEM SHALL BE INSTALLED WITH CONNECTIONS TO AT LEAST WET WELL COVER, CONTROL PANELS, GENERATOR, UTILITY COMPANY TRANSFORMER, AND MANUAL DISCONNECT SWITCH. REFER TO GROUNDING DETAILS.
4. THE STATION NAME, UTILITIES I.D. NUMBER AND ADDRESS SHALL BE AFFIXED TO THE FRONT OF THE METER CABINET.
5. ALL MOUNTING HARDWARE & BRACKETS AND ELECTRICAL ENCLOSURES SHALL BE 316 STAINLESS STEEL.

DUPLEX PUMP STATION CONTROL PANEL REAR VIEW (240V & 480V) (PUMPS < 25HP)

PANEL & SEAL-OFF MOUNTING HEIGHTS		
PANEL HEIGHT	DIST "X"	DIST "Y"
36"	36"	12"
42"	30"	12"
48"	24"	12"
60"	24"	8"

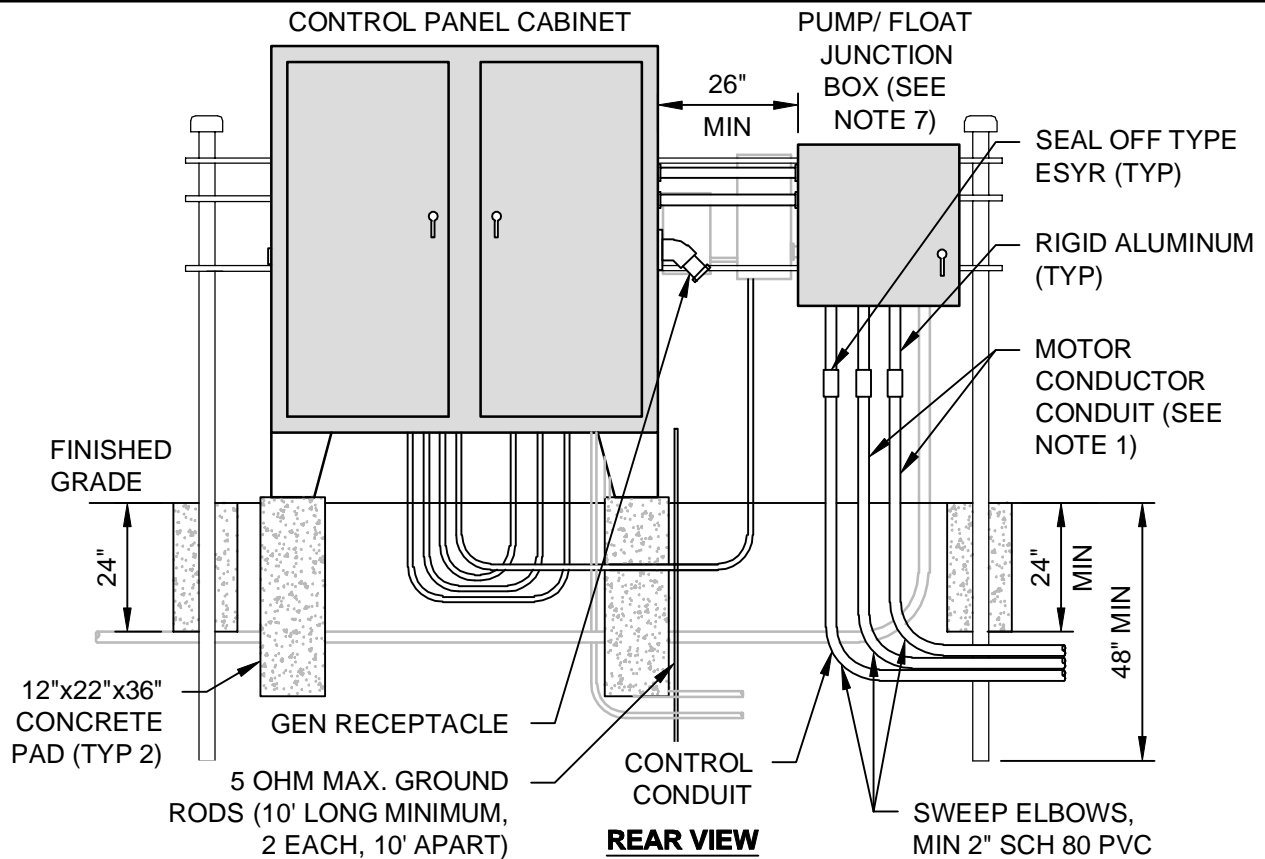
FOR PANELS NOT LISTED, ADJUST MOUNTING HEIGHTS ACCORDINGLY



PANEL INSTALLATION NOTES:

1. PUMP MOTOR CONDUIT SHALL BE SIZE TO ACCOMMODATE 40% CONDUIT FILL. MINIMUM CONDUIT SIZE TO BE 2-IN SCH 80 PVC.
2. AN ELECTRICAL GROUNDING SYSTEM SHALL BE INSTALLED AS PER THE NATIONAL ELECTRICAL CODE, LOCAL CODES AND ORDINANCES. AN UNDERGROUND PERIMETER CABLE GROUNDING SYSTEM SHALL BE INSTALLED WITH CONNECTIONS TO AT LEAST WET WELL COVER, CONTROL PANELS, GENERATOR, UTILITY COMPANY TRANSFORMER, AND MANUAL DISCONNECT SWITCH. REFER TO GROUNDING DETAILS.
3. THE STATION NAME, UTILITIES I.D. NUMBER AND ADDRESS SHALL BE AFFIXED TO THE FRONT OF THE METER CABINET.
4. ALL MOUNTING HARDWARE & BRACKETS AND ELECTRICAL ENCLOSURES SHALL BE 316 STAINLESS STEEL.
5. ON A 4-WIRE, DELTA SYSTEM, THE HIGH-LEG SHALL BE IDENTIFIED WITH ORANGE COLOR TAPE AT ALL CONNECTION POINTS AND SHALL BE LOCATED ON THE "B" PHASE AT THE LINE SIDE OF THE MAIN DISCONNECT.
6. MAIN BREAKER SHALL NOT BE HIGHER THAN 78-IN AS PER CURRENT NEC STANDARDS.
7. PUMP / FLOAT JUNCTION BOX NOT REQUIRED FOR STATIONS WITH PUMPS LESS THAN 25 HP. WHEN THE JUNCTION BOX IS NOT REQUIRED, THE CONTROL CONDUIT SHALL RUN TO THE PCP.

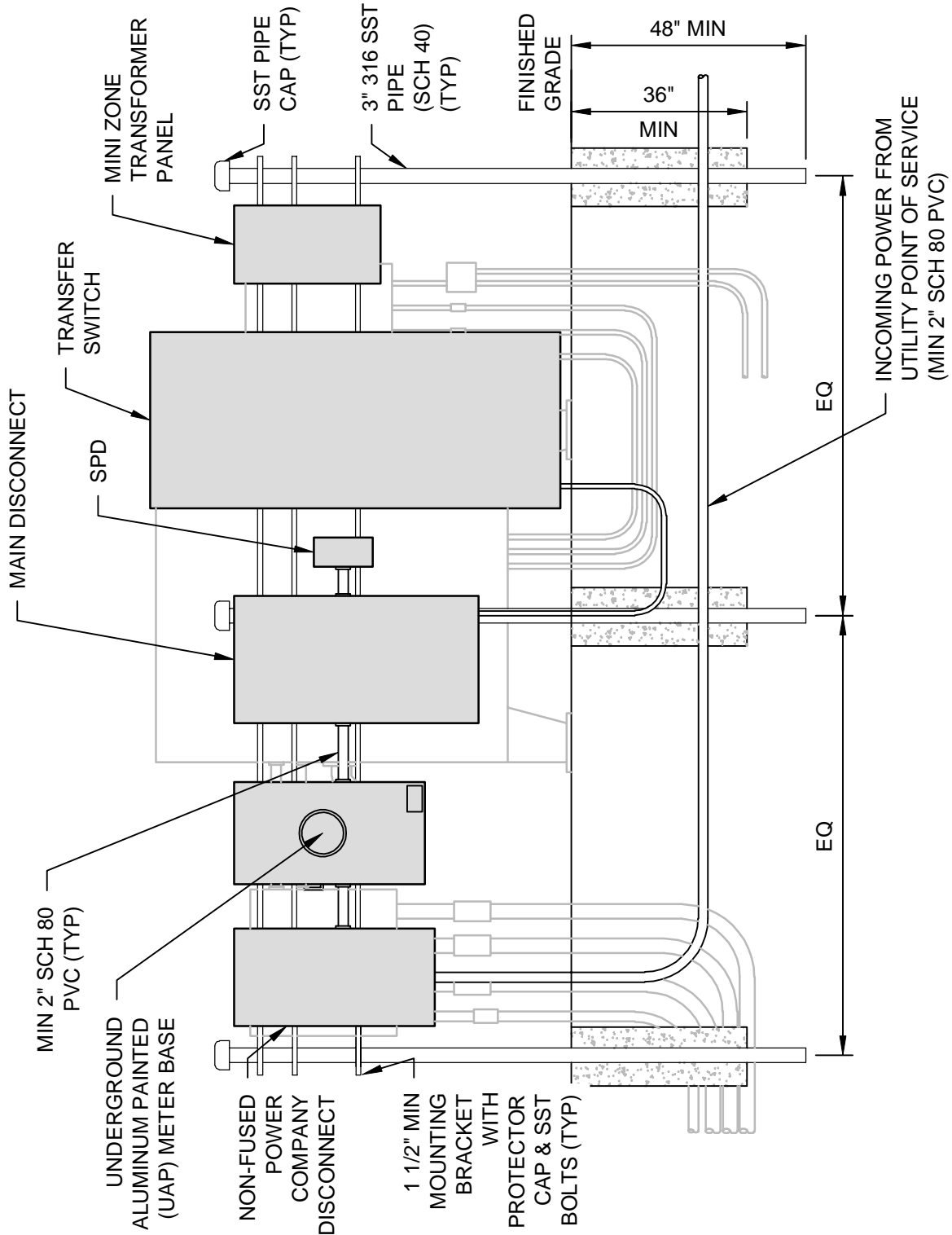
DUPLEX PUMP STATION CONTROL PANEL REAR VIEW (240V & 480V) (PUMPS ≥ 25HP)



PANEL INSTALLATION NOTES:

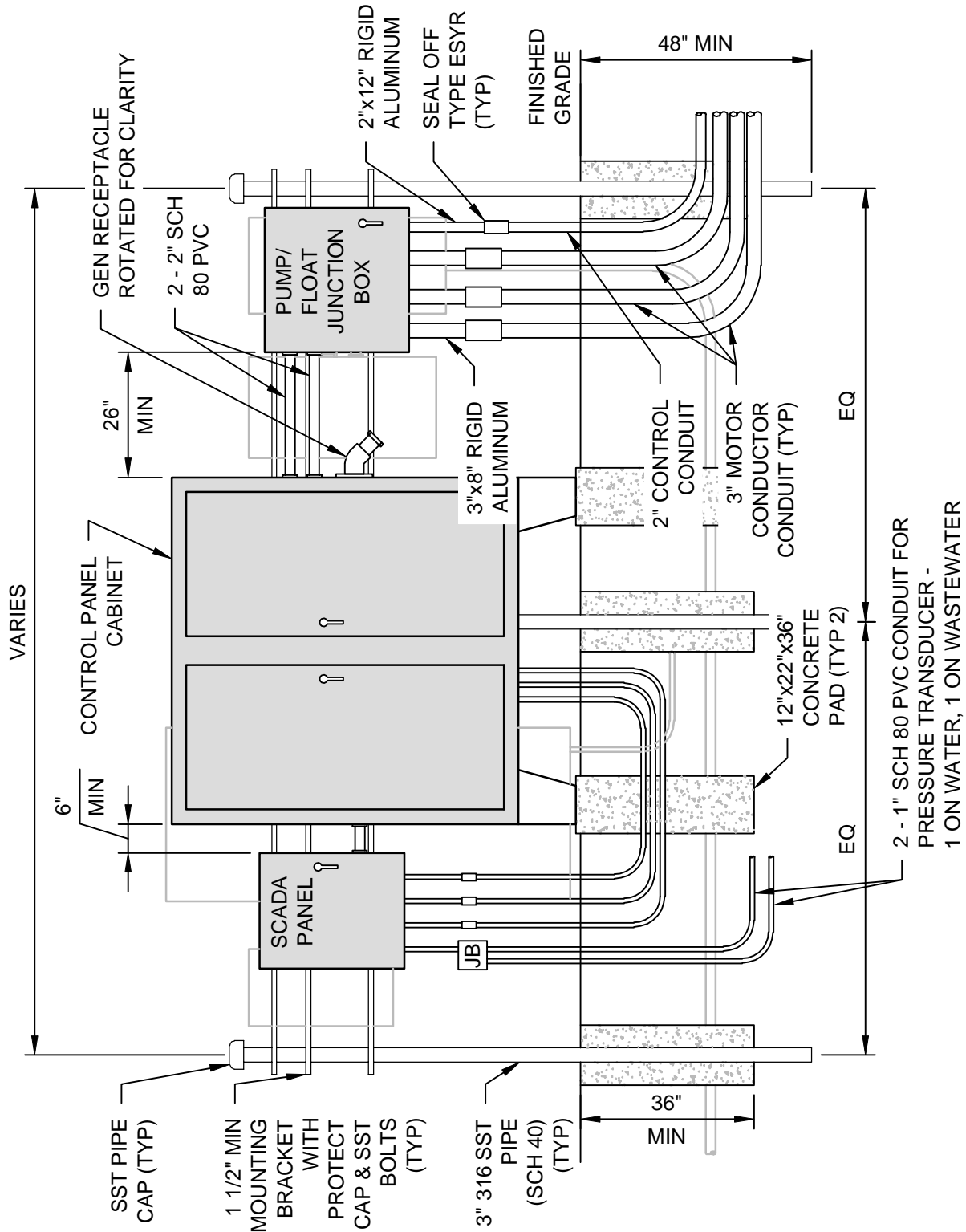
1. PUMP MOTOR CONDUIT SHALL BE SIZE TO ACCOMMODATE 40% CONDUIT FILL. MINIMUM CONDUIT SIZE TO BE 2-IN SCH 80 PVC.
2. AN ELECTRICAL GROUNDING SYSTEM SHALL BE INSTALLED AS PER THE NATIONAL ELECTRICAL CODE, LOCAL CODES AND ORDINANCES. AN UNDERGROUND PERIMETER CABLE GROUNDING SYSTEM SHALL BE INSTALLED WITH CONNECTIONS TO AT LEAST WET WELL COVER, CONTROL PANELS, GENERATOR, UTILITY COMPANY TRANSFORMER, AND MANUAL DISCONNECT SWITCH. REFER TO GROUNDING DETAILS.
3. THE STATION NAME, UTILITIES I.D. NUMBER AND ADDRESS SHALL BE AFFIXED TO THE FRONT OF THE METER CABINET.
4. ALL MOUNTING HARDWARE & BRACKETS AND ELECTRICAL ENCLOSURES SHALL BE 316 STAINLESS STEEL.
5. ON A 4-WIRE, DELTA SYSTEM, THE HIGH-LEG SHALL BE IDENTIFIED WITH ORANGE COLOR TAPE AT ALL CONNECTION POINTS AND SHALL BE LOCATED ON THE "B" PHASE AT THE LINE SIDE OF THE MAIN DISCONNECT.
6. MAIN BREAKER SHALL NOT BE HIGHER THAN 78-IN AS PER CURRENT NEC STANDARDS.
7. PUMP / FLOAT JUNCTION BOX NOT REQUIRED FOR STATIONS WITH PUMPS LESS THAN 25 HP. WHEN THE JUNCTION BOX IS NOT REQUIRED, THE CONTROL CONDUIT SHALL RUN TO THE PCP.

TRIPLEX PUMP STATION CONTROL PANEL FRONT VIEW (480V)

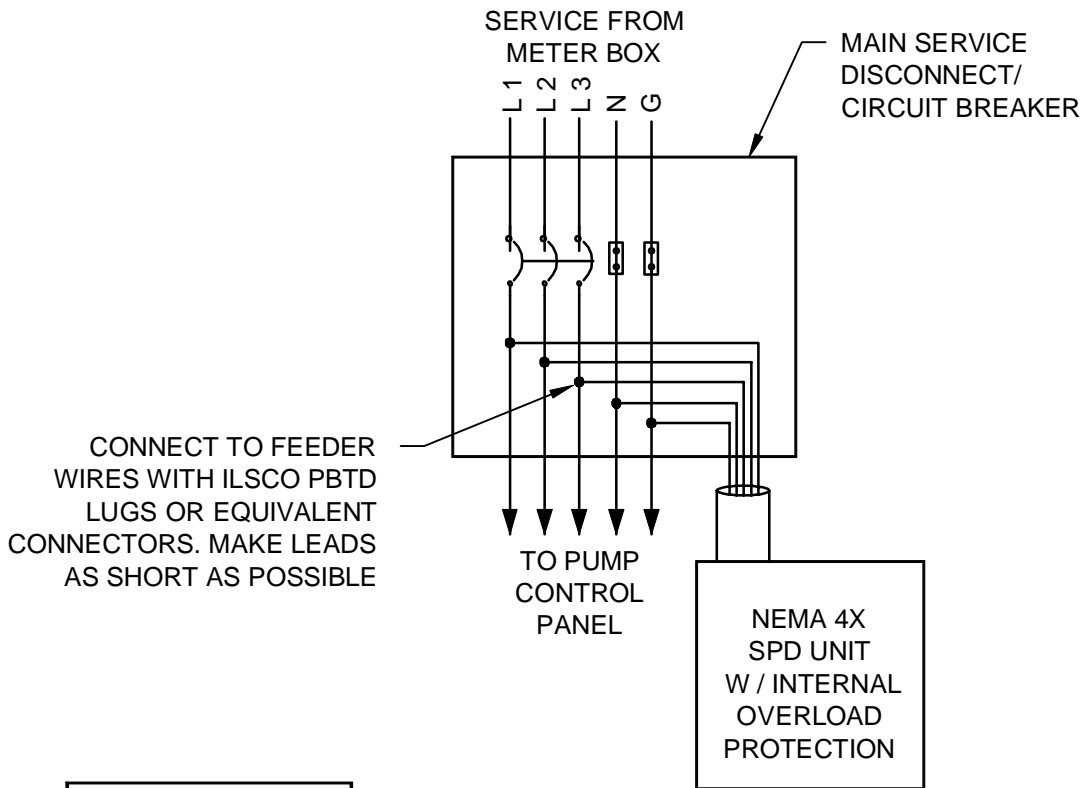


NOTE:
 1. MINIMUM 6-IN BETWEEN ALL BOXES & PANELS.

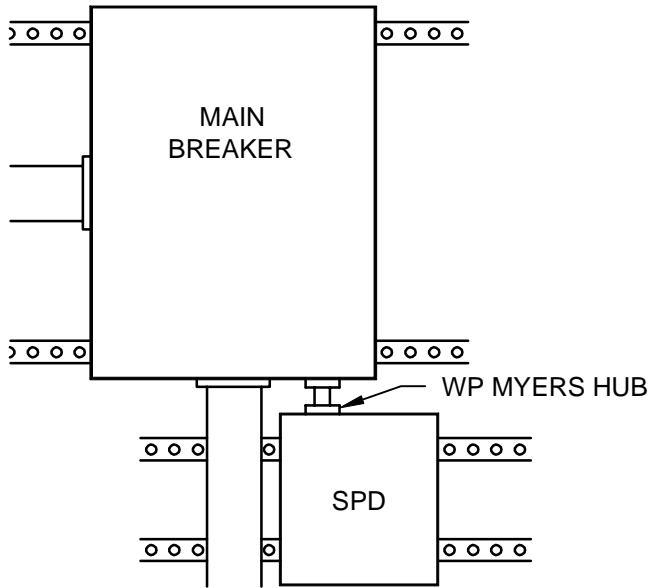
TRIPLEX PUMP STATION CONTROL PANEL REAR VIEW (480V)



SPD INSTALLATION

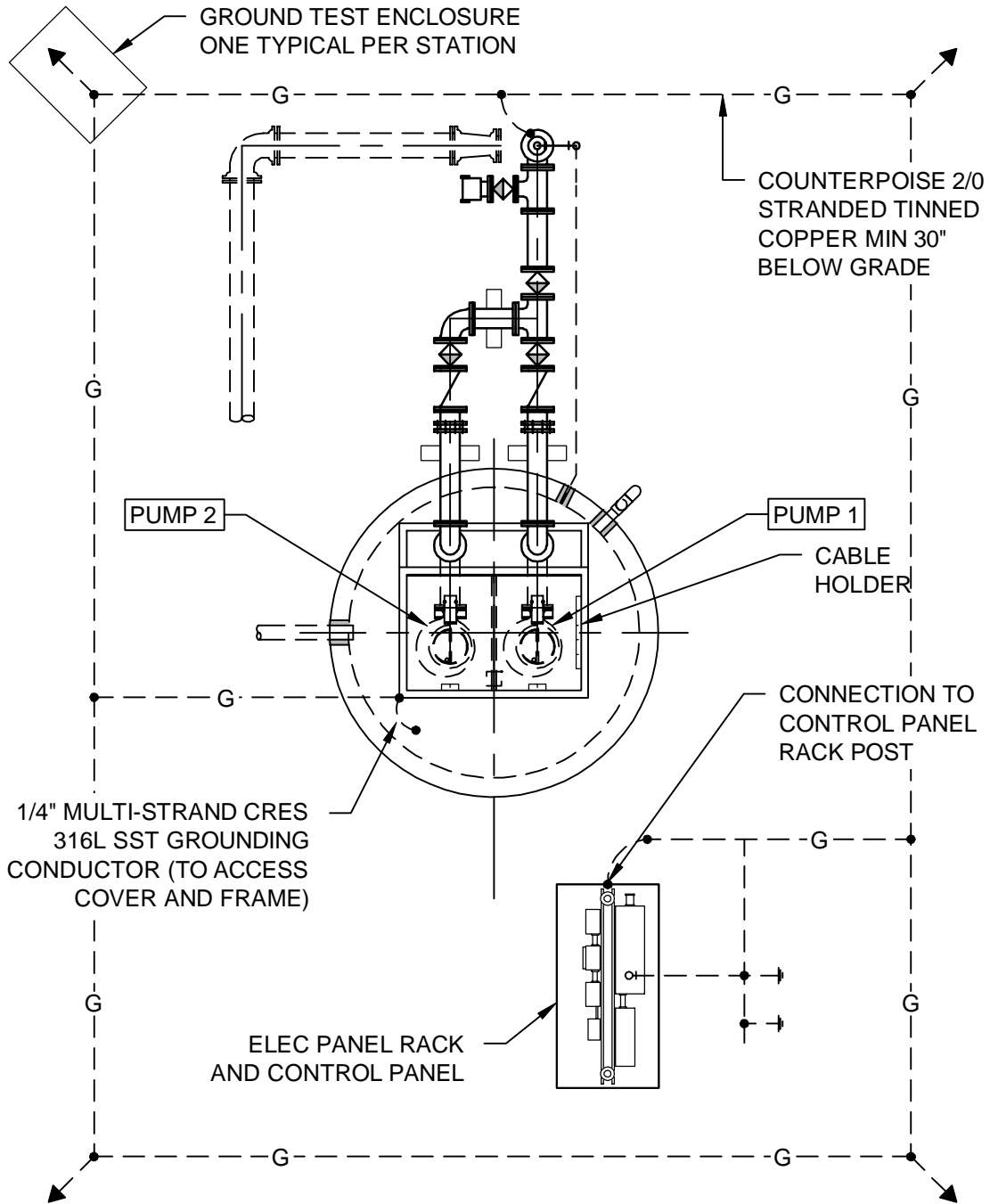


NTS



ELEVATION
NTS

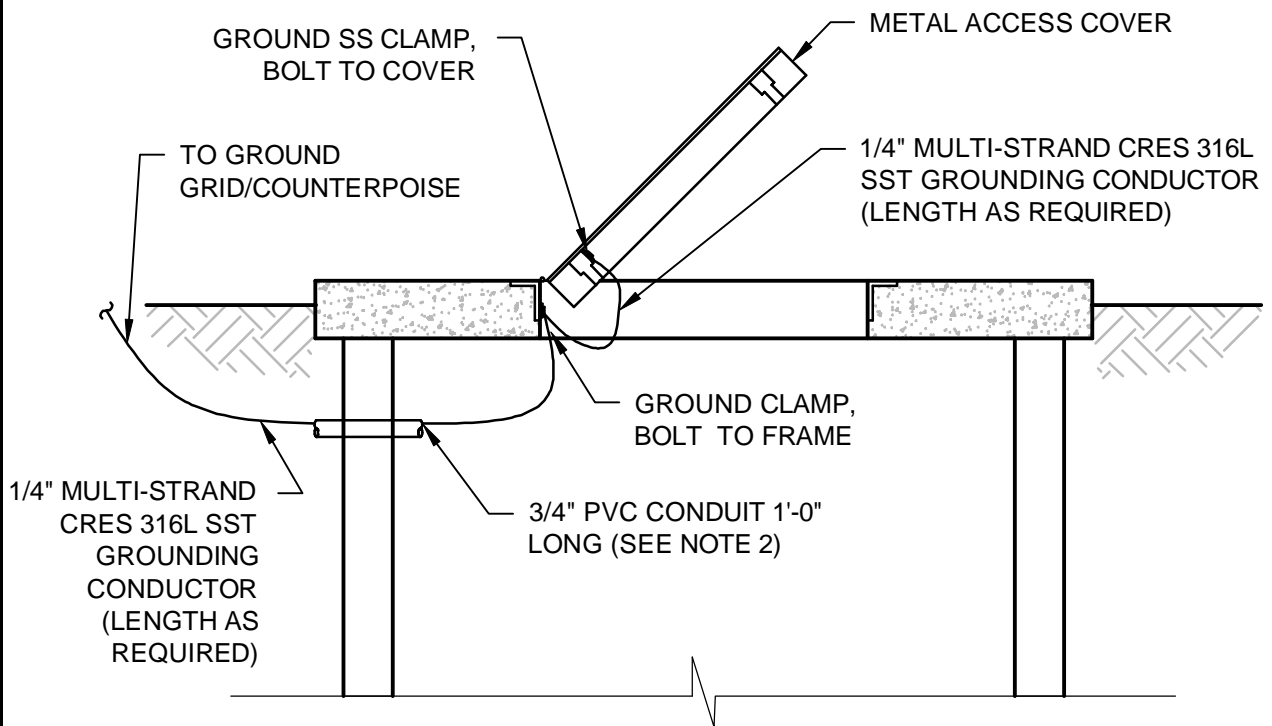
PUMP STATION GROUNDING (TYPICAL)



NOTES:

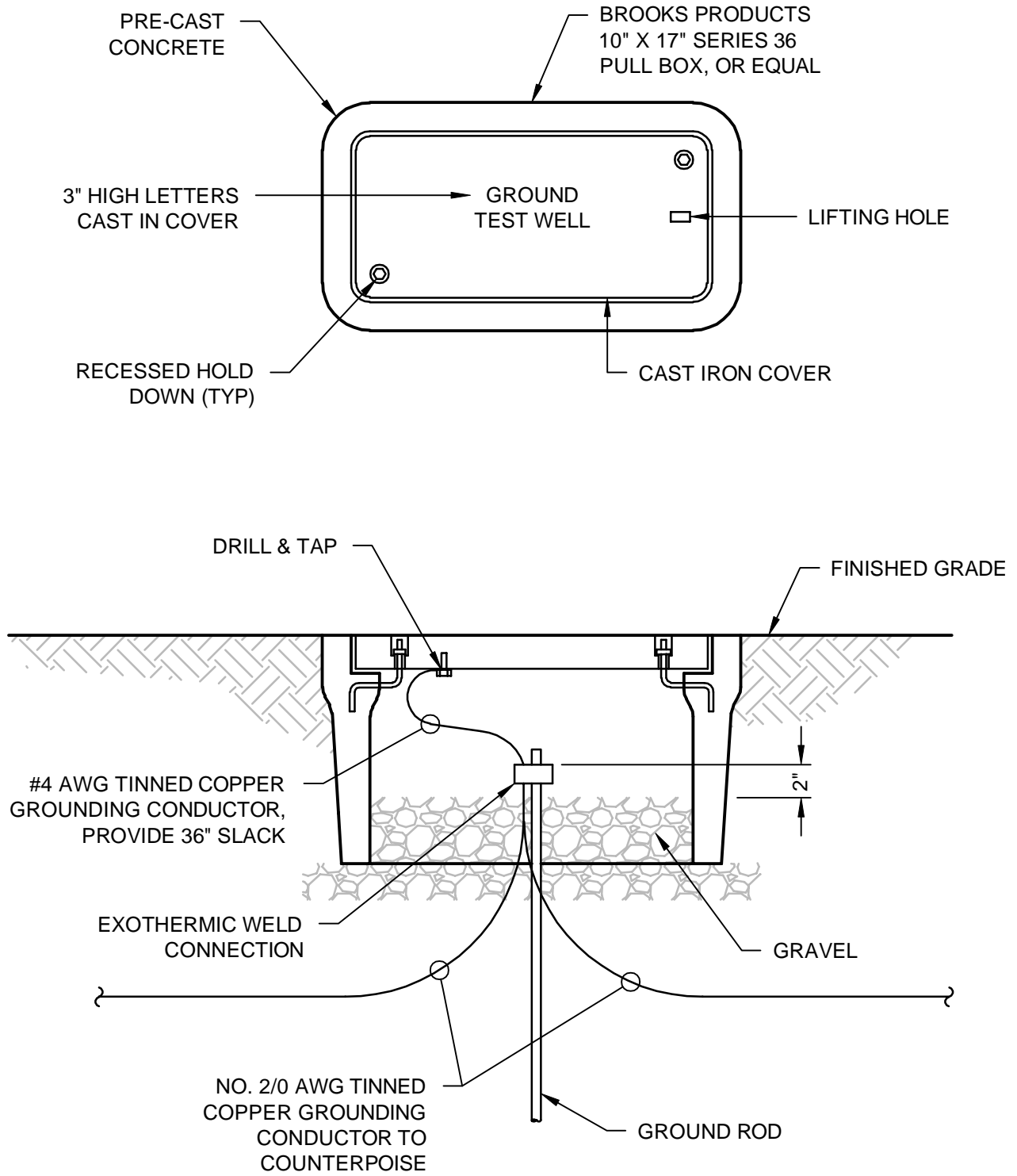
1. DETAIL IS GENERIC. SPECIFIC LOCATIONS OF EQUIPMENT MAY VARY.
2. PROVIDE EXOTHERMIC WELDS UNLESS NOTED OTHERWISE.
3. ALL GROUND CONNECTING SHALL UTILIZE MANUFACTURER'S CRIMP CONNECTORS AND/OR SPLICE CONNECTORS.

COVER & DOOR GROUNDING

**NOTES:**

1. ON COVERS WITH MULTIPLE DOORS, PROVIDE BRAID FROM FRAME TO DOOR ON EACH DOOR PROVIDE WATERPROOF CAULKING WHERE GROUND CABLE AND CONDUIT PENETRATES WETWELL TO PREVENT INTRUSION OF GROUNDWATER AND ESCAPE OF VAPORS FROM WETWELL.
2. INSTALL GROUND WIRE SO THAT IT WILL NOT CROSS CLEAR OPENING OR PREVENT OR IMPEDE NORMAL METHOD OF REMOVING FLOATS OR PUMPS.

GROUND TEST WELL



PRIVATE PUMP STATION SIGN

PRIVATE

SANITARY SEWER

PUMP STATION

IN CASE OF EMERGENCY CONTACT THE
FOLLOWING NUMBERS:

FACILITY OWNED BY:

NAME: _____

PHONE NUMBER: _____

FACILITY MAINTAINED BY:

NAME: _____

PHONE NUMBER: _____

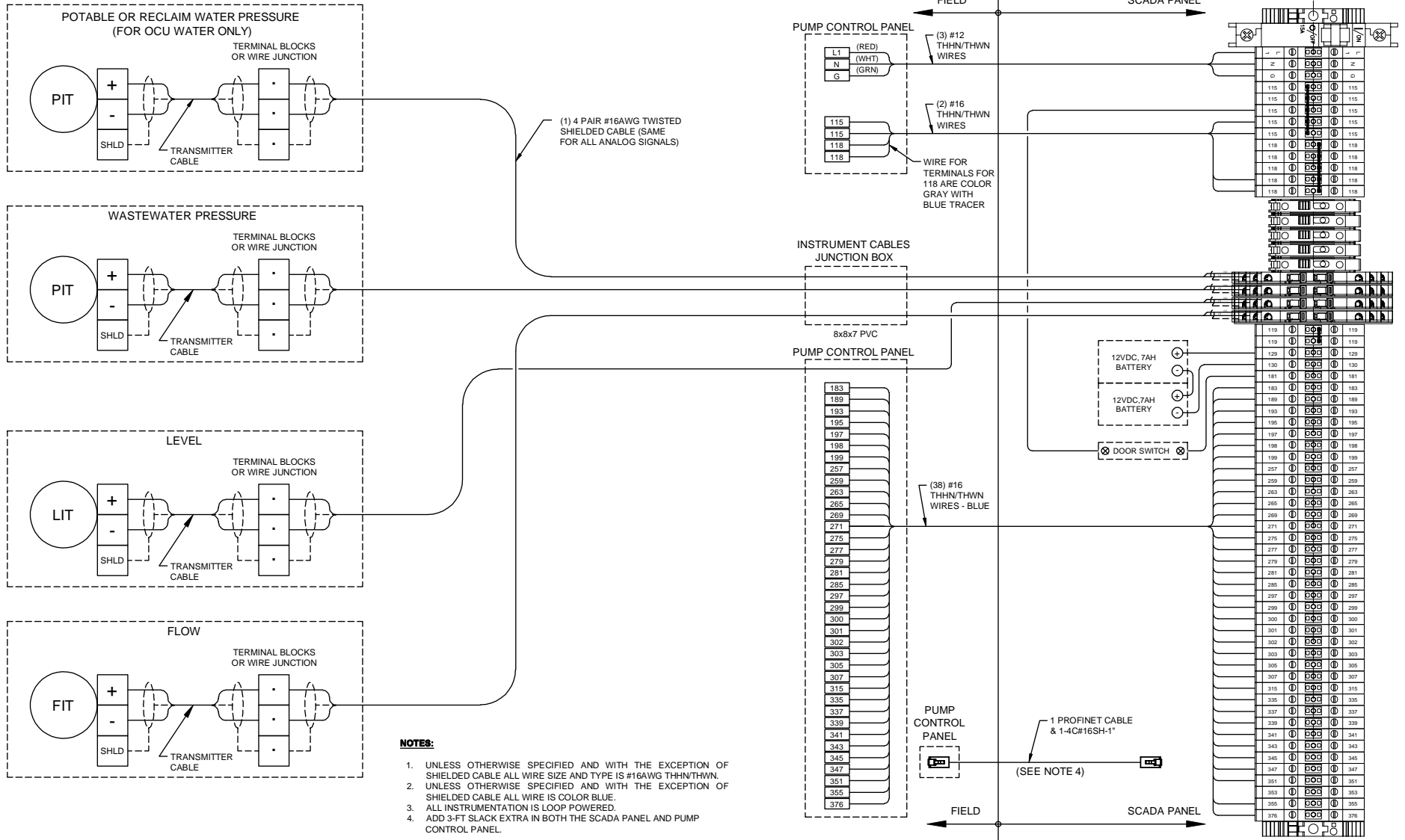
STATION NUMBER: _____

FACILITY ADDRESS: _____

NOTES:

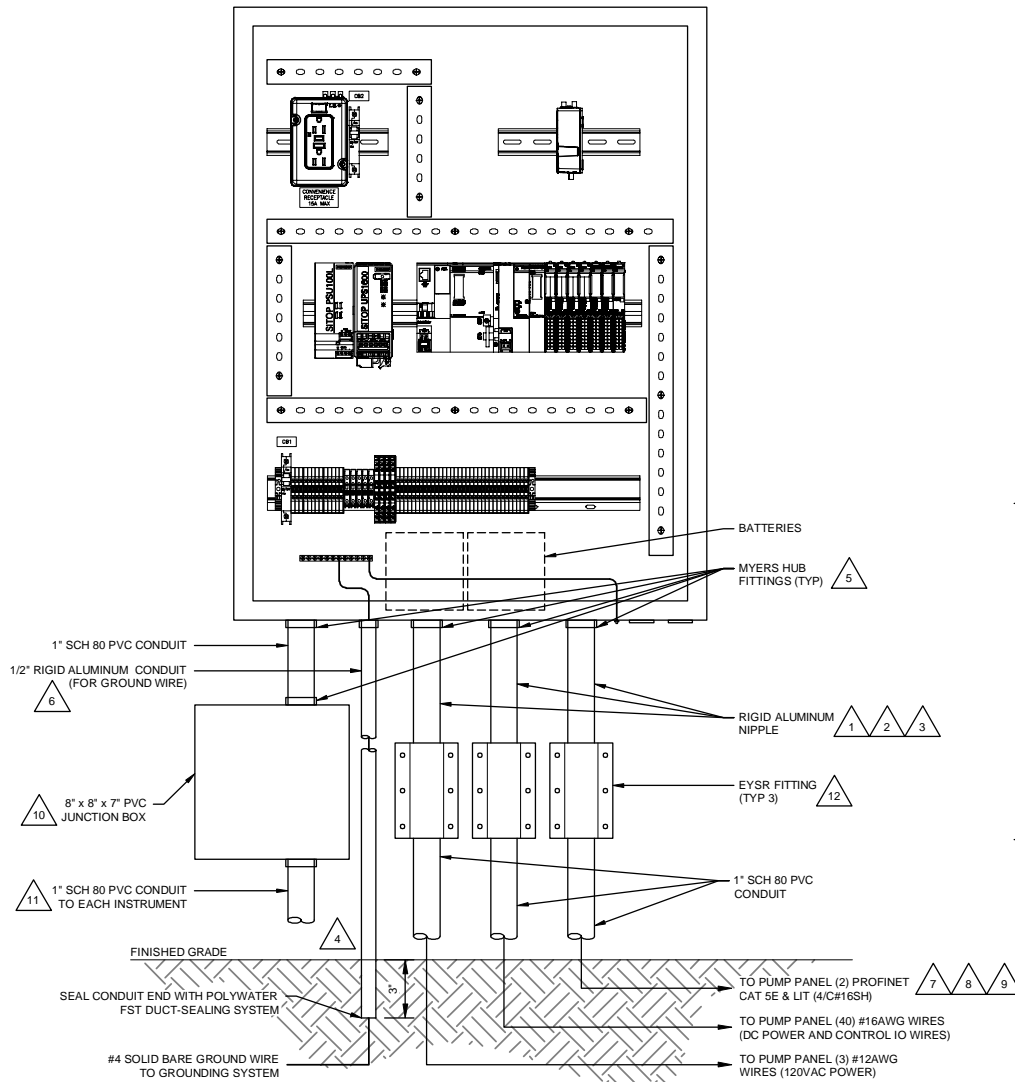
1. MINIMUM SIZE OF SIGN: 12-IN x 18-IN.
2. SIGN INSTALLATION IS A REQUIREMENT OF CHAPTER 37, ARTICLE XX, SECTION 37-754 OF THE ORANGE COUNTY CODE.
3. OBTAIN STATION NUMBER FROM ORANGE COUNTY UTILITIES.
4. SIGN SHALL BE 0.04 GAUGE ALUMINUM.

PUMP STATION SCADA PANEL FIELD WIRING DIAGRAM

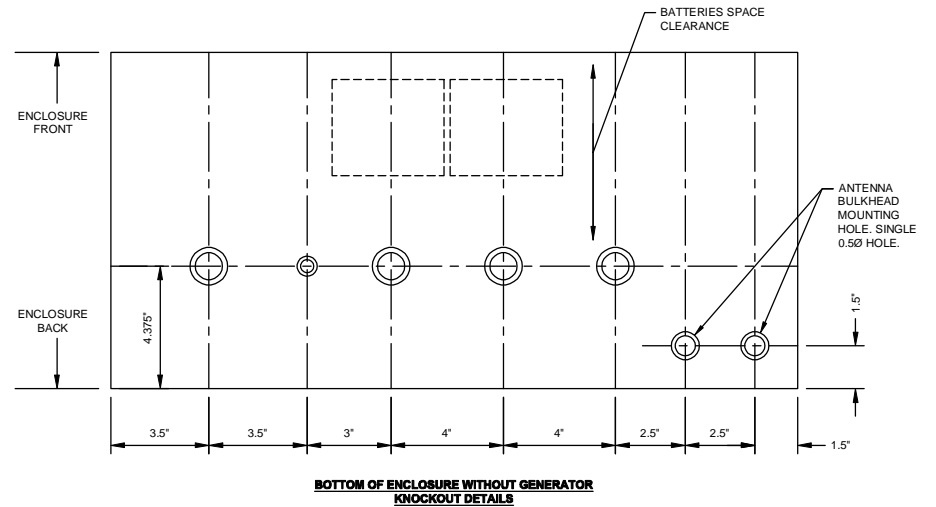


- NOTES:**
1. UNLESS OTHERWISE SPECIFIED AND WITH THE EXCEPTION OF SHIELDED CABLE ALL WIRE SIZE AND TYPE IS #16AWG THHN/THWN.
 2. UNLESS OTHERWISE SPECIFIED AND WITH THE EXCEPTION OF SHIELDED CABLE ALL WIRE IS COLOR BLUE.
 3. ALL INSTRUMENTATION IS LOOP POWERED.
 4. ADD 3-FT SLACK EXTRA IN BOTH THE SCADA PANEL AND PUMP CONTROL PANEL.

PUMP STATION SCADA PANEL INSTALLATION DETAILS

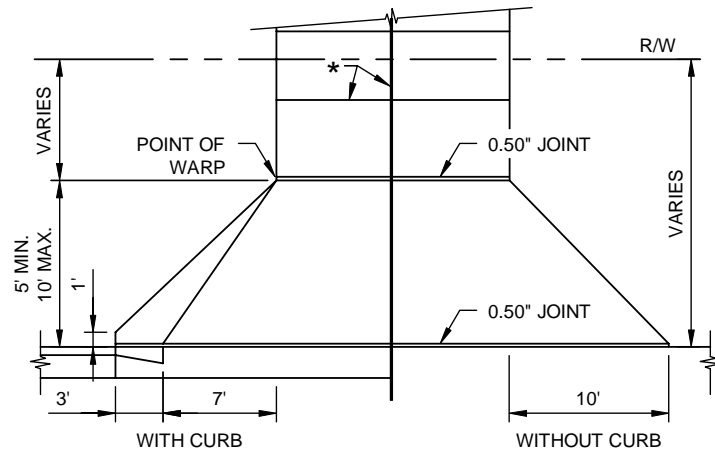


BILL OF MATERIALS		
ITEM	DESCRIPTION	QTY
1	1'0 x 12' LONG RIGID ALUMINUM NIPPLE - (FOR POWER WIRES)	1
2	1'0 x 12' LONG RIGID ALUMINUM NIPPLE - (FOR SIGNAL WIRES)	1
3	1'0 x 12' LONG RIGID ALUMINUM NIPPLE - (FOR PROFINET CABLE)	1
4	1/2"0 x 60" LONG RIGID ALUMINUM CONDUIT - (FOR GROUND WIRE)	1
5	MYERS HUB FITTING WITH GROUNDING LUG WITH GROUNDING LOCK NUT, 1"	5
6	MYERS HUB FITTING WITH GROUNDING LUG WITH GROUNDING LOCK NUT, 1/2"	1
7	PROFINET BULK CABLE, CAT 5 / PVC	1
8	RJ45 PROFINET 90° CONNECTOR	1
9	RJ45 PROFINET 180° CONNECTOR	1
10	INSTRUMENTATION PVC JUNCTION BOX 8"x8"x7"	1
11	SEPARATE 1" SCH 80 PVC CONDUIT TO EACH INSTRUMENT	-
12	EYSR FITTING SEALOFF	3

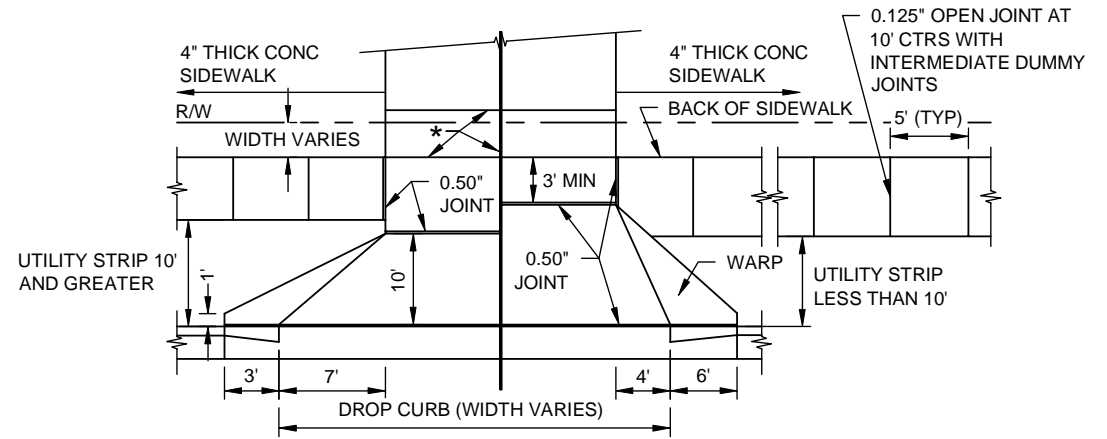


NOTE:
FOR PUMP STATIONS WITH GENERATORS, PROVIDE ADDITIONAL KNOCKOUT BETWEEN GROUND CONDUIT AND PCP CONDUIT. FOR PUMP STATIONS WITH A DIESEL PUMP, PROVIDE ADDITIONAL KNOCKOUT BETWEEN GROUND CONDUIT AND PCP CONDUIT.

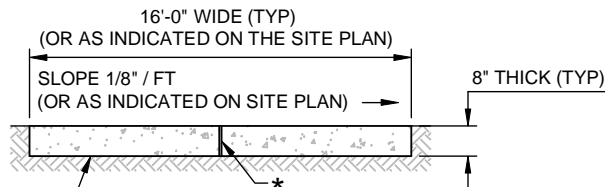
PUMP STATION DRIVEWAY, SLAB SLOPE, & EXPANSION JOINTS



PLAN (WITHOUT SIDEWALK)
(8" THICK CONCRETE DRIVEWAY)

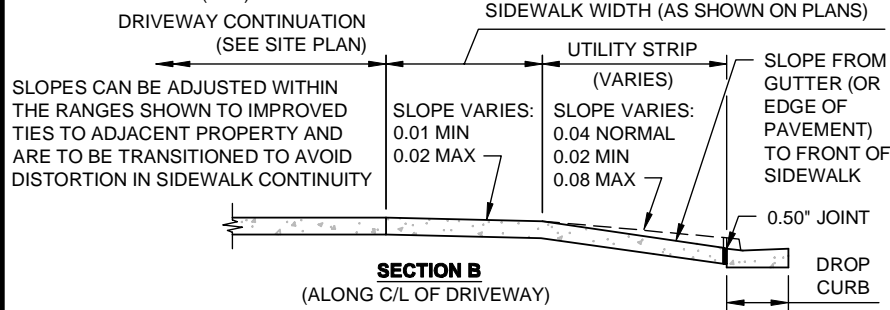


PLAN (WITH SIDEWALK)
(8" THICK CONCRETE DRIVEWAY AND SIDEWALK)



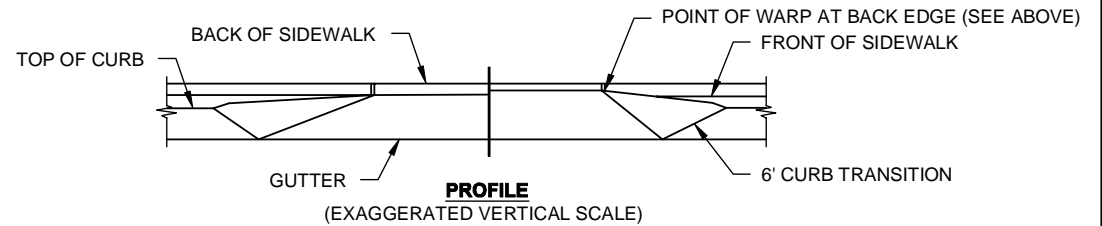
SECTION A

(ALONG WIDTH OF DRIVEWAY)



SECTION B

(ALONG C/L OF DRIVEWAY)



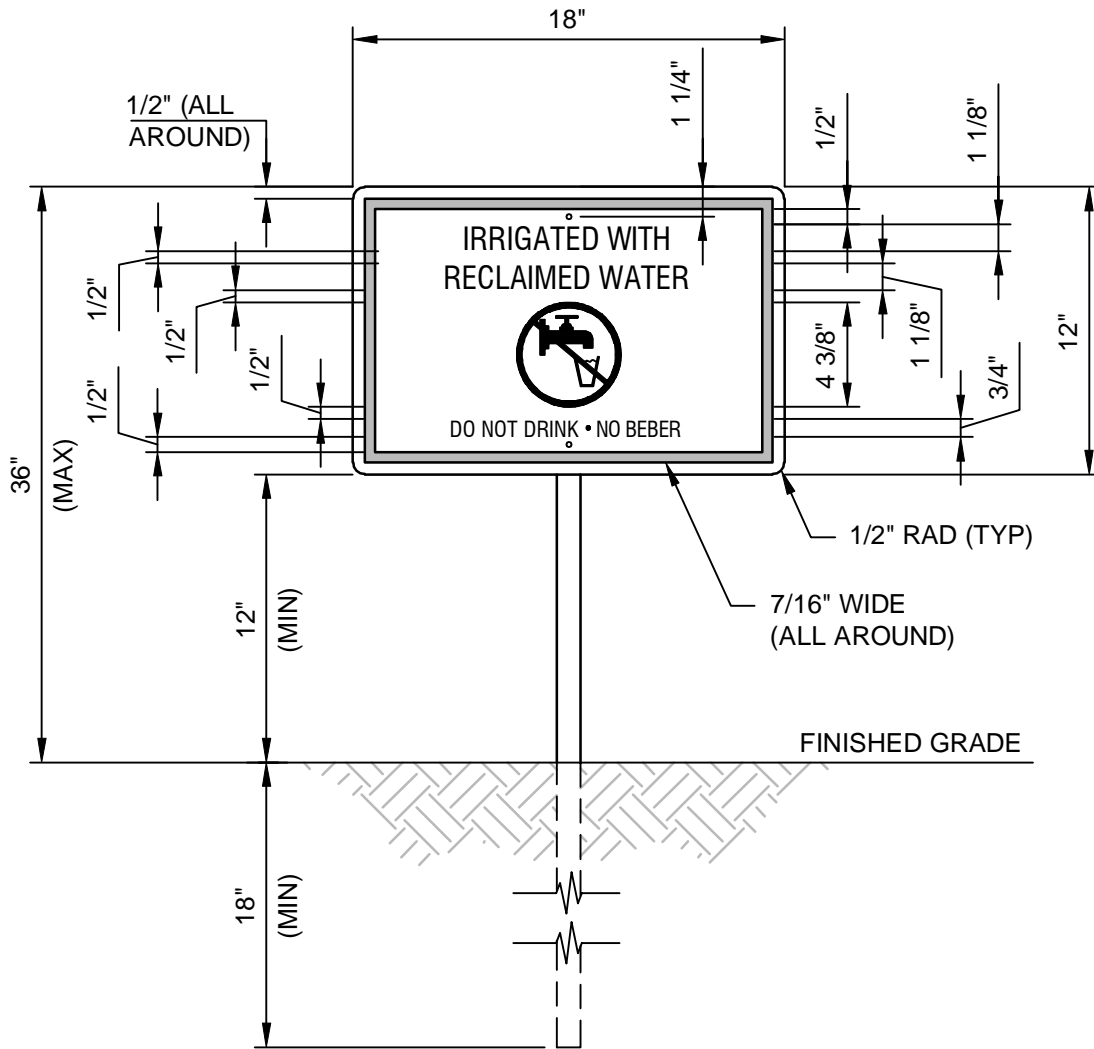
PROFILE

(EXAGGERATED VERTICAL SCALE)

NOTES:

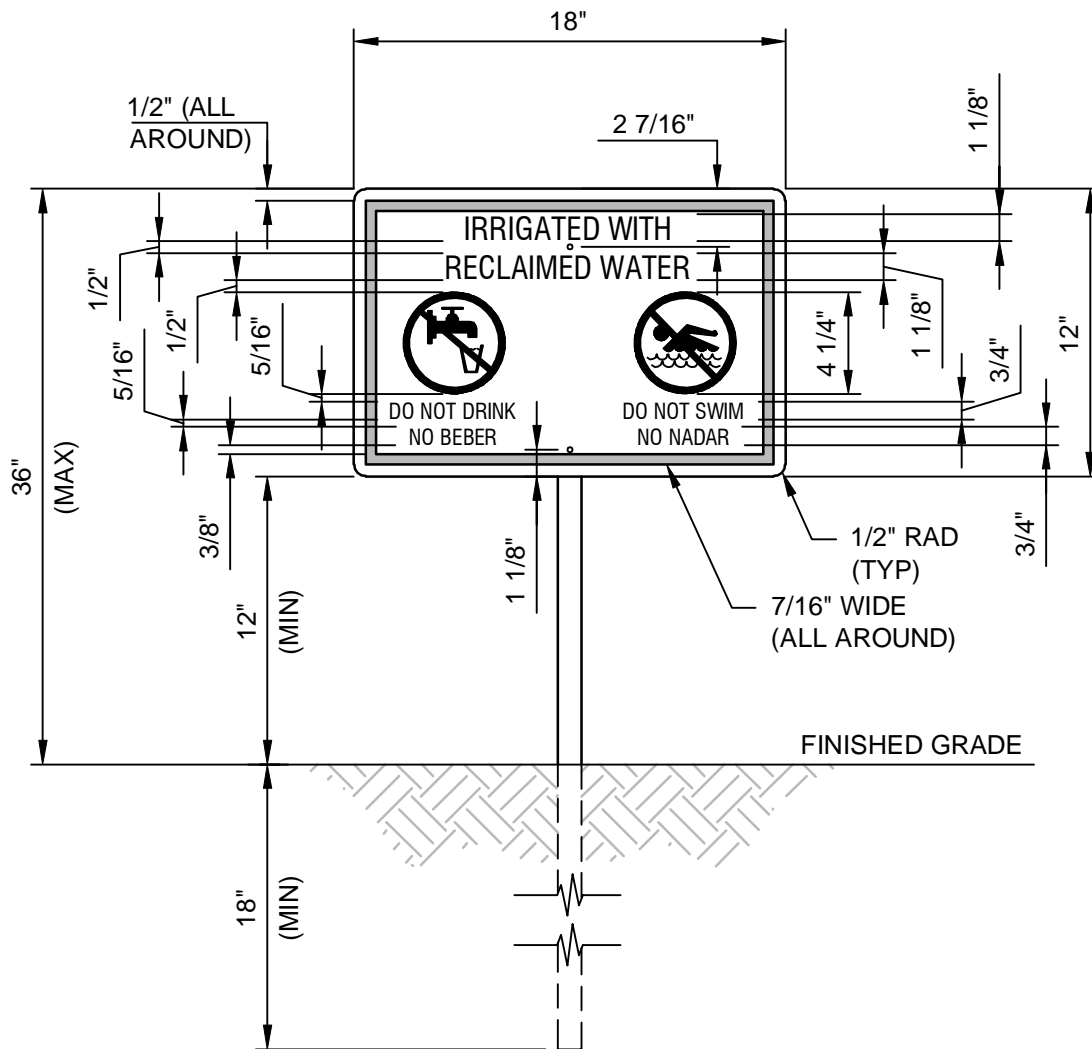
1. CONCRETE SHALL BE REINFORCED WITH FIBERMESH REINFORCEMENT FIBERS, 2 TO 3-IN COLLATED POLYPROPYLENE, PER ASTM C94, TYPE III 4.13 AND APPLICABLE BUILDING CODES.
2. CONSTRUCT DRIVEWAY ON COMPACTED SUB GRADE COMPACTED TO 98% MAX DENSITY AS DETERMINED BY AASHTO T-180.
3. WHERE TURNOUTS ARE CONSTRUCTED WITHIN EXISTING CURB AND GUTTER, THE EXISTING CURB AND GUTTER SHALL BE REMOVED EITHER TO THE NEAREST JOINT BEYOND THE FLARE POINT OR TO THE EXTENT THAT NO REMAINING SECTION IS LESS THAN 5-FT LONG.
4. REFER TO SITE PLANS FOR LIMITS OF CONCRETE DRIVEWAY, CONSTRUCTION OF CONCRETE WET WELL APRON AND/OR EQUIPMENT PADS SHALL BE IN ACCORDANCE WITH THE ABOVE DETAILS.
5. ALL 0.50-IN JOINTS SHALL BE CONSTRUCTED WITH PERFORMED JOINT FILLER. 0.50-IN JOINT FILLER SHALL BE PLACED IN JOINTS BETWEEN DRIVEWAY AND CONCRETE APRONS, WET WELLS, OR ANY OTHER CONCRETE STRUCTURE.
6. JOINTS IN CURB AND GUTTER ARE TO BE PLACED TO MATCH JOINTS IN DRIVEWAY.
7. DRIVEWAYS SHALL BE OF A UNIFORM WIDTH FROM THE POINT OF WARP TO THE RIGHT OF WAY LINE.
8. WHERE NOTED (*) OPEN JOINTS ARE TO BE 0.125-IN WIDE AND PLACED AT 5-FT CENTERS. IF REQUIRED, THE 5TH JOINT IS TO BE 0.50-IN WIDE.

RECLAIMED WATER SIGNAGE "DO NOT DRINK WATER"

**NOTES:**

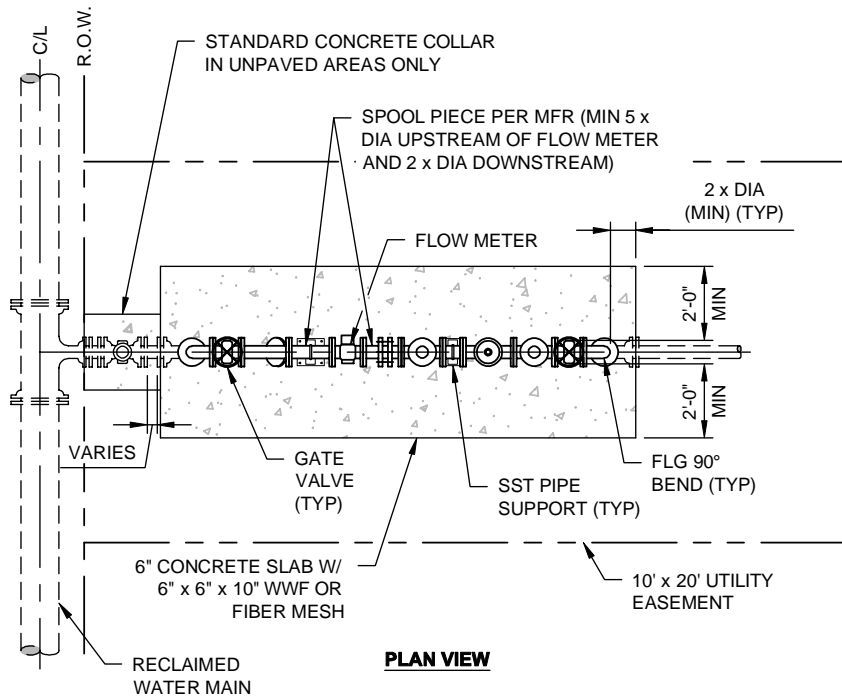
1. SIGN TO BE PROVIDED BY OCU.
2. HEIGHT OF SIGN WILL DEPEND ON LOCATION AND SURROUNDING LANDSCAPE PLANT TYPES. IN ALL CASES, THE SIGN SHALL BE VISIBLE TO THE PUBLIC.
3. BACKGROUND SHALL BE WHITE, LETTERS SHALL BE BLACK (HELVETICA, SWISS 721 COREL OR ACCEPTABLE EQUAL) AND BORDER SHALL BE PANTONE PURPLE 522C.
4. ENGINEERING GRADE REFLECTIVE MATERIALS SHALL BE USED.
5. SIGN MATERIAL SHALL BE 0.040 GAUGE METAL.
6. POST SHALL BE 2.375-IN OD ALUMINUM PIPE, HOT DIP GALVANIZED PER ASTM A-123. POST TO BE PROVIDED BY CUSTOMER.
7. MOUNTING HARDWARE SHALL BE STAINLESS STEEL.
8. SIGNS SHALL BE PLACED BY THE CONTRACTOR IN ACCORDANCE WITH CHAPTER 62-610 "ACCESS CONTROL AND ADVISORY SIGNS", FAC, THE COUNTY APPROVED ENGINEERING PLANS AND / OR AS APPROVED BY THE UTILITIES.

RECLAIMED WATER SIGNAGE "DO NOT SWIM"

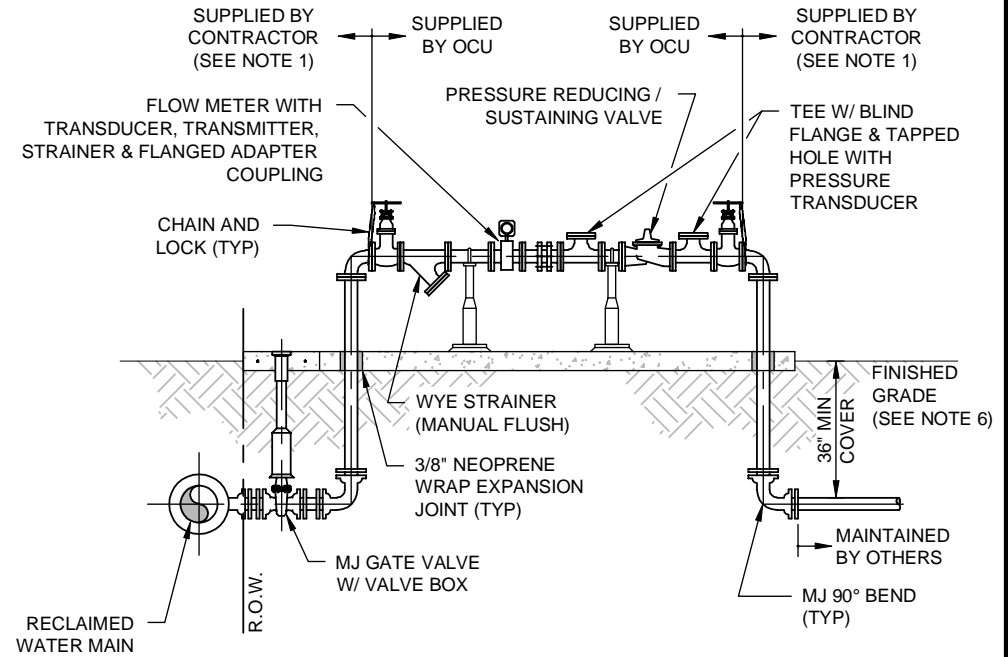
**NOTES:**

1. SIGN TO BE PROVIDED BY OCU.
2. HEIGHT OF SIGN WILL DEPEND ON LOCATION AND SURROUNDING LANDSCAPE PLANT TYPES. IN ALL CASES, THE SIGN SHALL BE VISIBLE TO THE PUBLIC.
3. BACKGROUND SHALL BE WHITE, LETTERS SHALL BE BLACK (HELVETICA, SWISS 721 COREL OR ACCEPTABLE EQUAL) AND BORDER SHALL BE PANTONE PURPLE 522C.
4. ENGINEERING GRADE REFLECTIVE MATERIALS SHALL BE USED.
5. SIGN MATERIAL SHALL BE 0.040 GAUGE METAL.
6. POST SHALL BE 2.375-IN OD ALUMINUM PIPE, HOT DIP GALVANIZED PER ASTM A-123. POST TO BE PROVIDED BY CUSTOMER.
7. MOUNTING HARDWARE SHALL BE STAINLESS STEEL.
8. SIGNS SHALL BE PLACED BY THE CONTRACTOR IN ACCORDANCE WITH CHAPTER 62-610 "ACCESS CONTROL AND ADVISORY SIGNS", FAC, THE COUNTY APPROVED ENGINEERING PLANS AND / OR AS APPROVED BY THE UTILITIES.

RECLAIMED WATER MASTER METER ASSEMBLY, (COUNTY USE AGREEMENT REQUIRED), (4" & LARGER)



PLAN VIEW

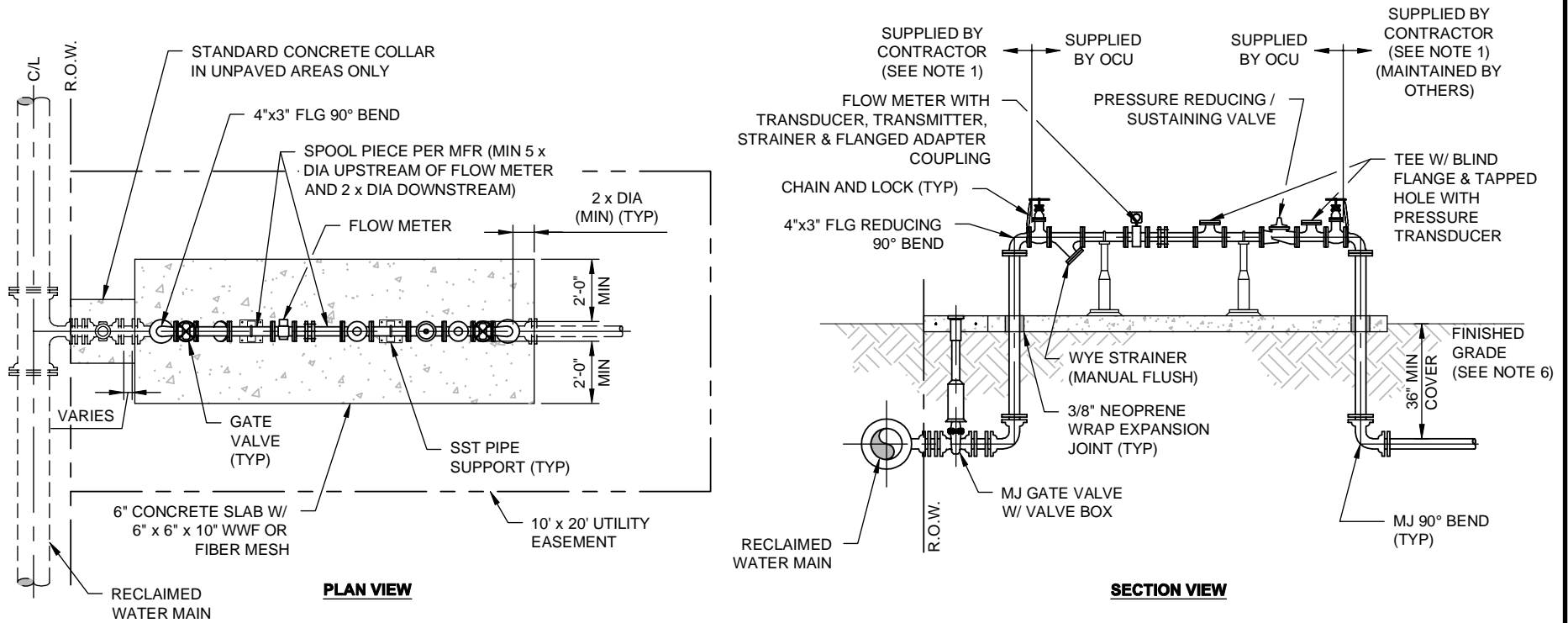


SECTION VIEW

NOTES:

1. CONTRACTOR TO CONSTRUCT RISER AFTER ASSEMBLY IS RECEIVED FROM OCUC.
2. INSTALLATION SHALL COMPLY WITH ALL REQUIREMENTS OF CHAPTER 62-610 FAC.
3. PIPING AND APPURTENANCES SHALL BE PAINTED PANTONE PURPLE 522C. PVC PIPE SHALL BE COLORED FROM THE FACTORY WITH PANTONE PURPLE 522C USING LIGHT STABLE COLORANTS. PIPE SHALL BE MARKED TO UTILITIES SPECIFICATIONS. ASSEMBLY SHALL BE PAINTED IN ACCORDANCE WITH SECTION 3119 OF THIS MANUAL
4. METER SHALL BE CAPABLE OF ACCURATELY MEASURING THE ENTIRE RANGE OF EXPECTED FLOWS AND THE TYPE AND MANUFACTURER SHALL BE APPROVED BY UTILITIES.
5. SERVICES 4-IN AND LARGER SHALL BE DIP FROM THE POINT OF CONNECTION AT THE MAIN TO THE METER ASSEMBLY IF THE MAINS IS ON THE SAME SIDE OF THE STREET AS THE ASSEMBLY. IF THE MAIN IS ON THE OPPOSITE SIDE OF THE STREET AS THE ASSEMBLY, A MINIMUM OF ONE SEGMENT OF PIPE IMMEDIATELY UPSTREAM FROM THE METER ASSEMBLY SHALL BE DIP.
6. FINISH GRADE AROUND METER ASSEMBLY SLAB SHALL ENSURE A SAFE WORK ENVIRONMENT. GRADING SLOPE DROP OFF SHALL NOT EXCEED 6-IN WITHIN 5-FT OF SLAB.

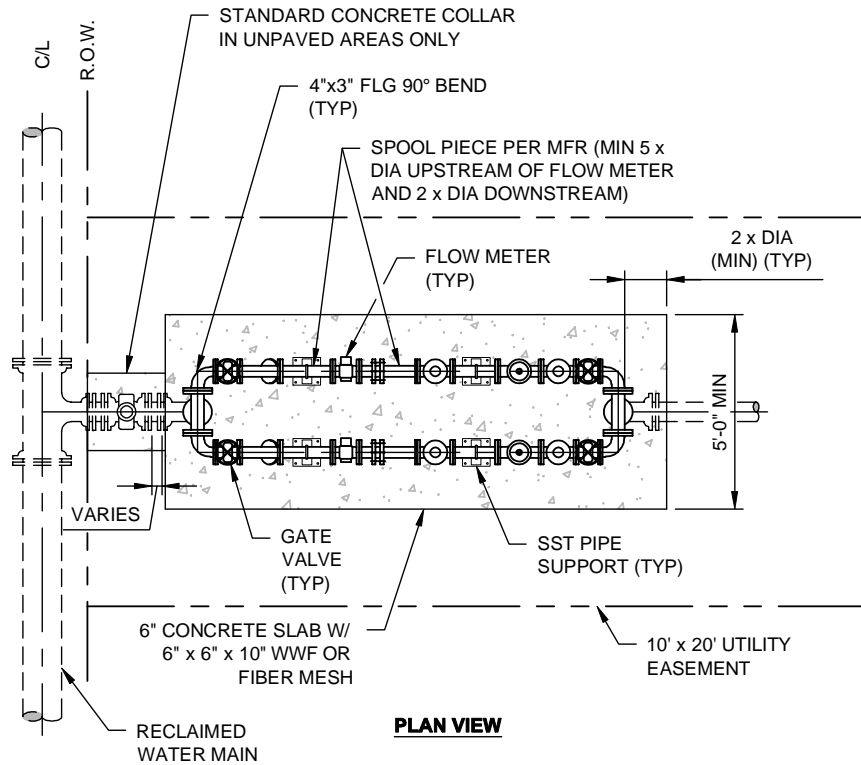
SINGLE RECLAIMED WATER MASTER METER ASSEMBLY, (3" METER)



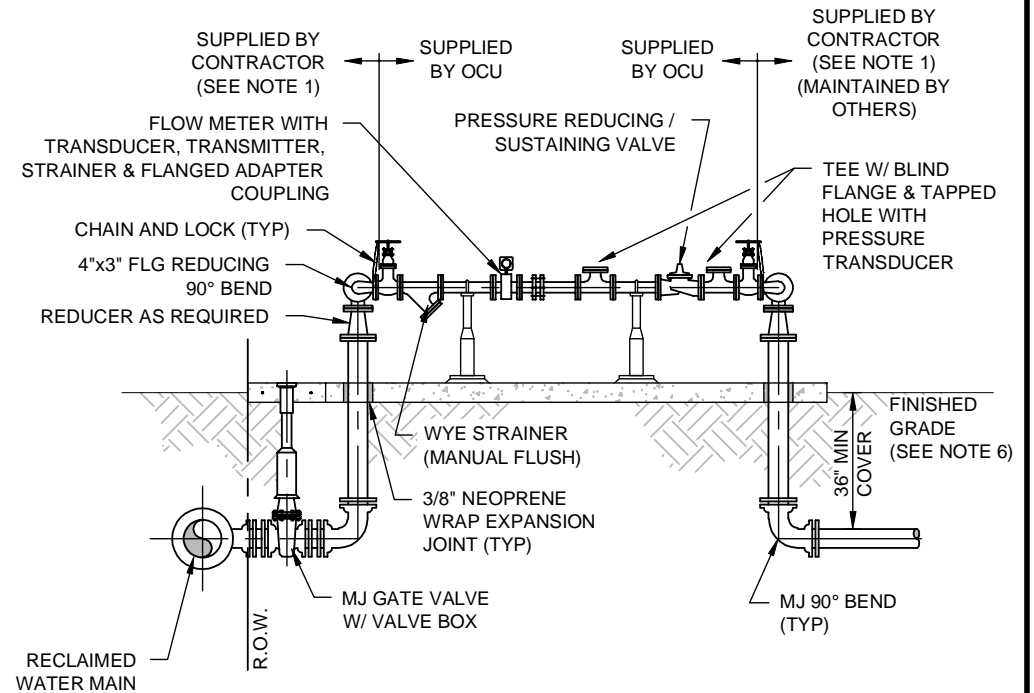
NOTES:

1. CONTRACTOR TO CONSTRUCT RISER AFTER ASSEMBLY IS RECEIVED FROM OCU.
2. INSTALLATION SHALL COMPLY WITH ALL REQUIREMENTS OF CHAPTER 62-610 FAC.
3. PIPING AND APPURTENANCES SHALL BE PAINTED PANTONE PURPLE 522C. PVC PIPE SHALL BE COLORED FROM THE FACTORY WITH PANTONE PURPLE 522C USING LIGHT STABLE COLORANTS. PIPE SHALL BE MARKED TO UTILITIES SPECIFICATIONS. ASSEMBLY SHALL BE PAINTED IN ACCORDANCE WITH SECTION 3119 OF THIS MANUAL
4. METER SHALL BE CAPABLE OF ACCURATELY MEASURING THE ENTIRE RANGE OF EXPECTED FLOWS AND THE TYPE AND MANUFACTURER SHALL BE APPROVED BY UTILITIES.
5. SERVICES 4-IN AND LARGER SHALL BE DIP FROM THE POINT OF CONNECTION AT THE MAIN TO THE METER ASSEMBLY IF THE MAINS IS ON THE SAME SIDE OF THE STREET AS THE ASSEMBLY. IF THE MAIN IS ON THE OPPOSITE SIDE OF THE STREET AS THE ASSEMBLY, A MINIMUM OF ONE SEGMENT OF PIPE IMMEDIATELY UPSTREAM FROM THE METER ASSEMBLY SHALL BE DIP.
6. FINISH GRADE AROUND METER ASSEMBLY SLAB SHALL ENSURE A SAFE WORK ENVIRONMENT. GRADING SLOPE DROP OFF SHALL NOT EXCEED 6-IN WITHIN 5-FT OF SLAB.

DOUBLE RECLAIMED WATER MASTER METER ASSEMBLY, (3" METER)



PLAN VIEW

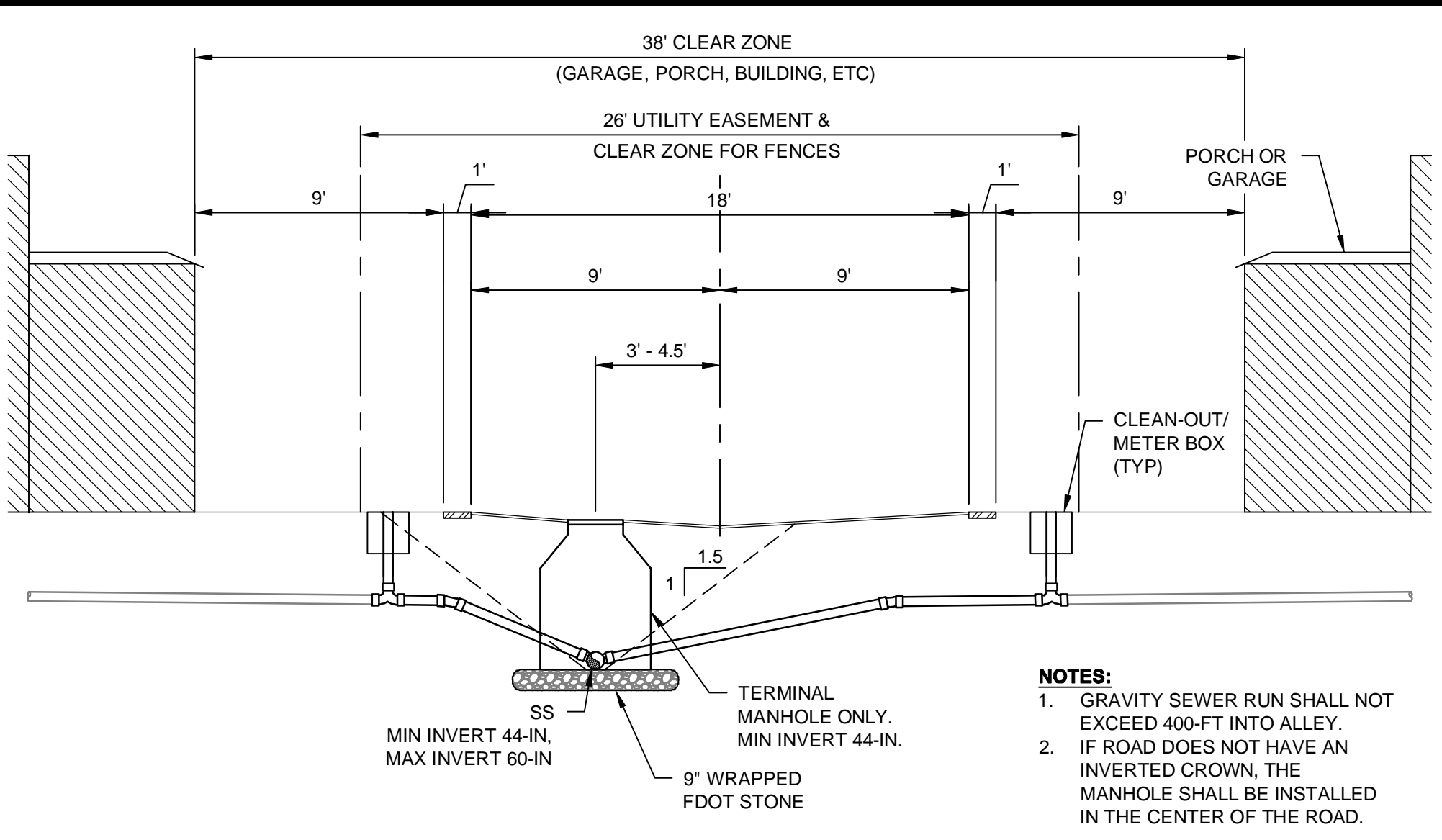


SECTION VIEW

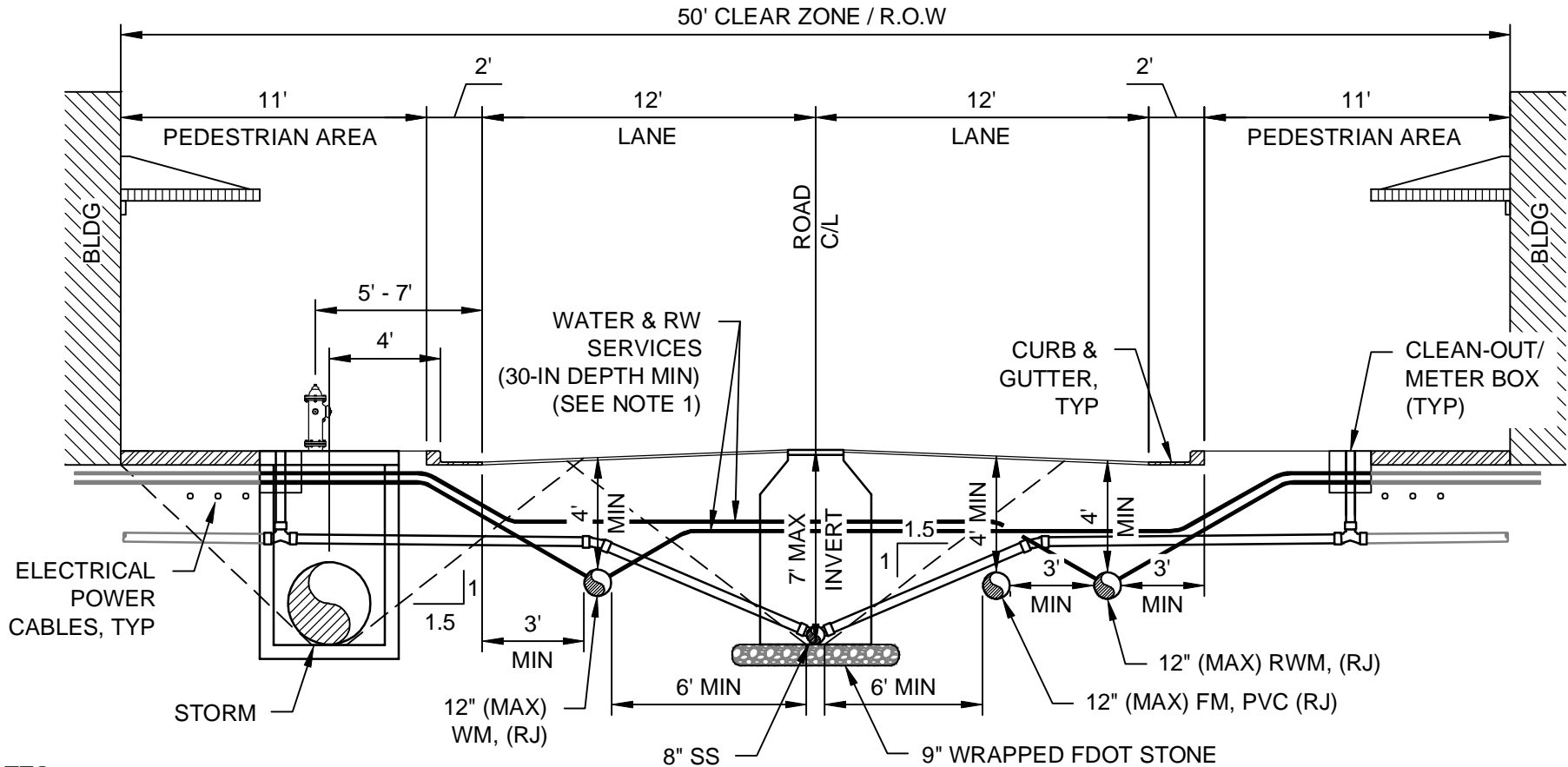
NOTES:

1. CONTRACTOR TO CONSTRUCT RISER AFTER ASSEMBLY IS RECEIVED FROM OCU.
2. INSTALLATION SHALL COMPLY WITH ALL REQUIREMENTS OF CHAPTER 62-610 FAC.
3. PIPING AND APPURTENANCES SHALL BE PAINTED PANTONE PURPLE 522C. PVC PIPE SHALL BE COLORED FROM THE FACTORY WITH PANTONE PURPLE 522C USING LIGHT STABLE COLORANTS. PIPE SHALL BE MARKED TO UTILITIES SPECIFICATIONS. ASSEMBLY SHALL BE PAINTED IN ACCORDANCE WITH SECTION 3119 OF THIS MANUAL
4. METER SHALL BE CAPABLE OF ACCURATELY MEASURING THE ENTIRE RANGE OF EXPECTED FLOWS AND THE TYPE AND MANUFACTURER SHALL BE APPROVED BY UTILITIES.
5. SERVICES 4-IN AND LARGER SHALL BE DIP FROM THE POINT OF CONNECTION AT THE MAIN TO THE METER ASSEMBLY IF THE MAINS IS ON THE SAME SIDE OF THE STREET AS THE ASSEMBLY. IF THE MAIN IS ON THE OPPOSITE SIDE OF THE STREET AS THE ASSEMBLY, A MINIMUM OF ONE SEGMENT OF PIPE IMMEDIATELY UPSTREAM FROM THE METER ASSEMBLY SHALL BE DIP.
6. FINISH GRADE AROUND METER ASSEMBLY SLAB SHALL ENSURE A SAFE WORK ENVIRONMENT. GRADING SLOPE DROP OFF SHALL NOT EXCEED 6-IN WITHIN 5-FT OF SLAB.

38-FT CLEAR ZONE (26-FT MINIMUM PRIVATE ALLEY)



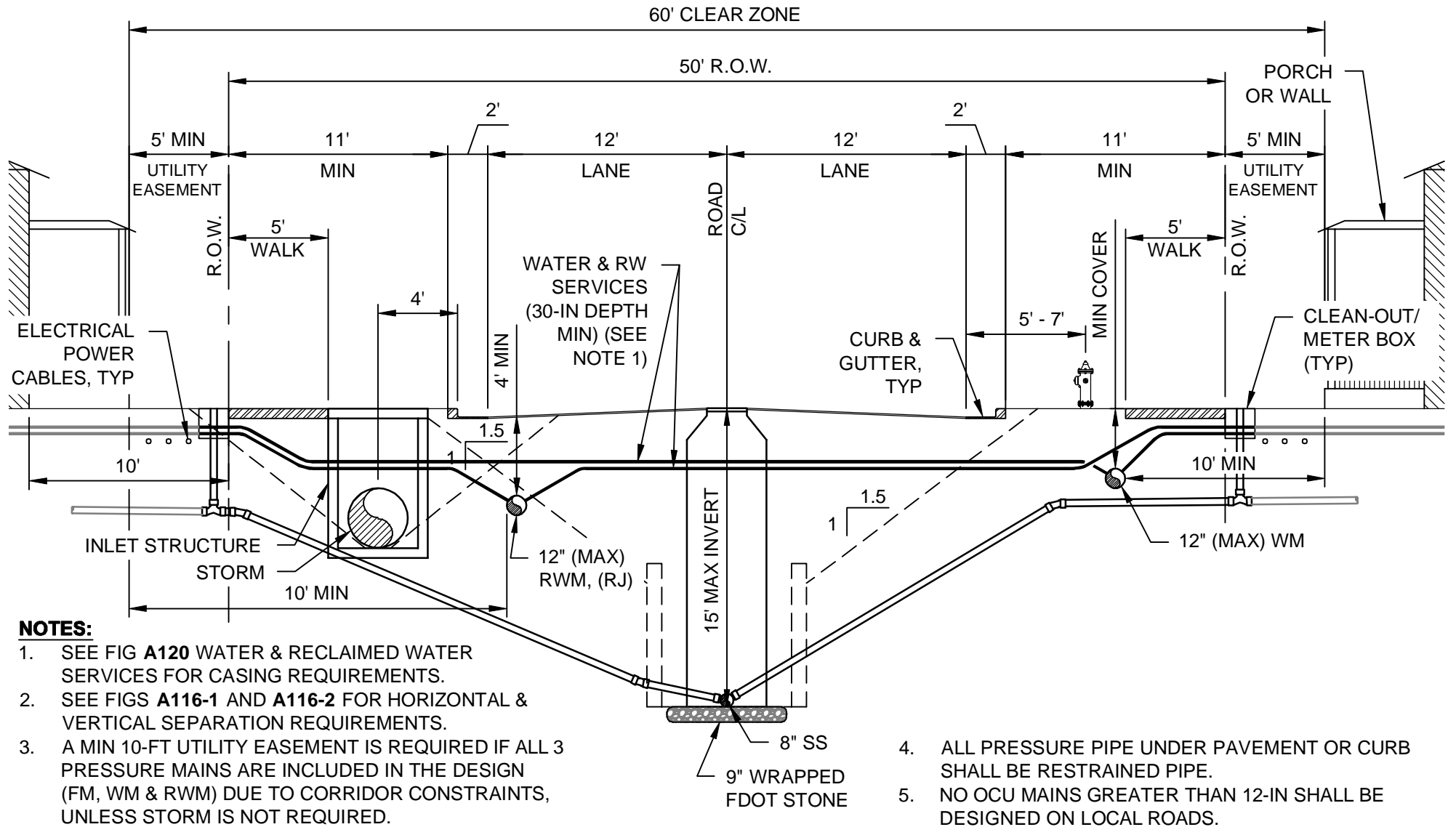
50-FT CLEAR ZONE (50-FT MINIMUM PUBLIC RIGHT-OF-WAY, 0-FT SETBACK)



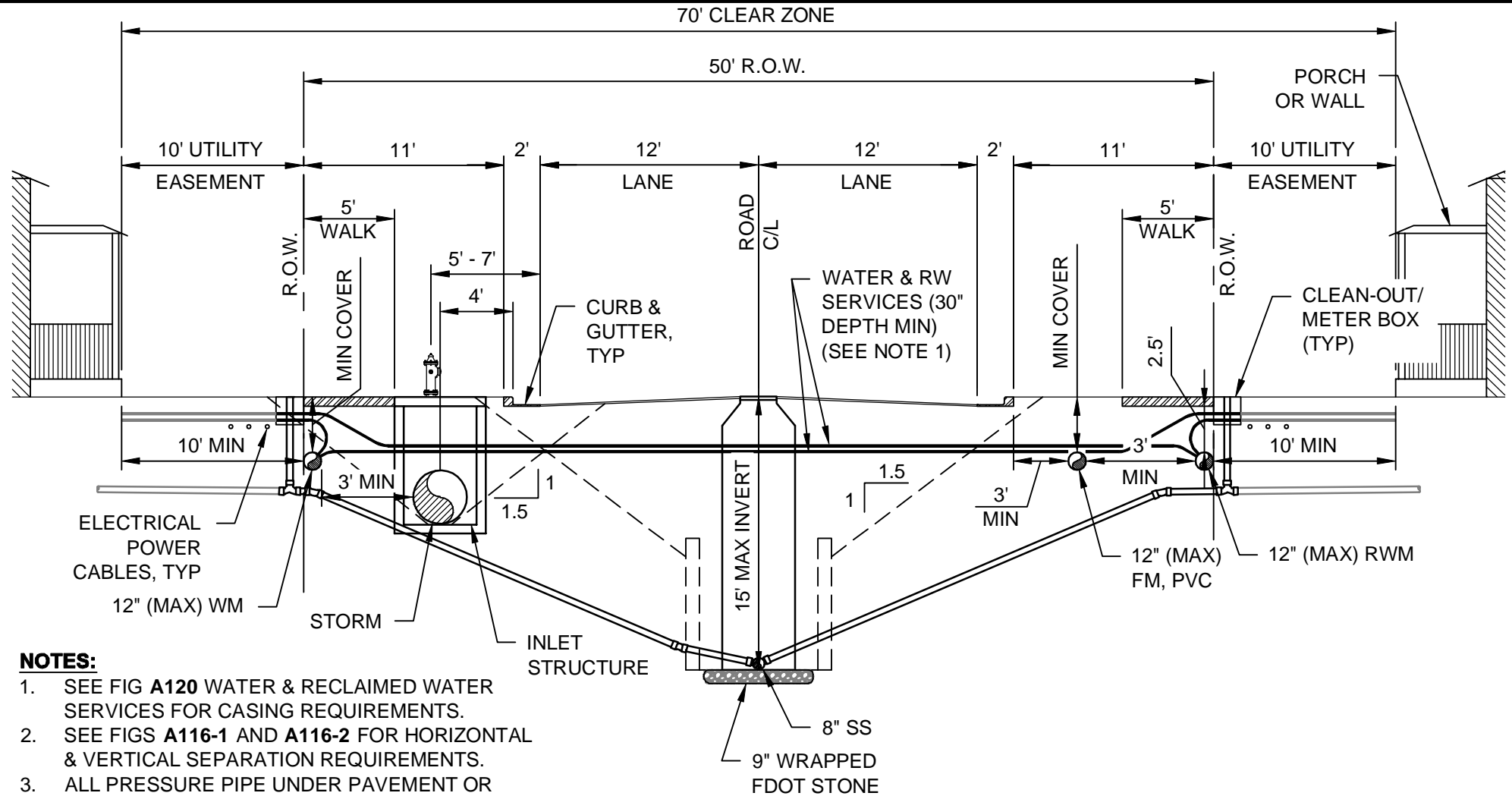
NOTES:

1. SEE FIG A120 WATER & RECLAIMED WATER SERVICES FOR CASING REQUIREMENTS.
2. SEE FIGS A116-1 AND A116-2 FOR HORIZONTAL & VERTICAL SEPARATION REQUIREMENTS.
3. ALL PRESSURE PIPE UNDER PAVEMENT OR CURB SHALL BE RESTRAINED PIPE.
4. OCU MAINS ARE LIMITED TO 12-IN AND SMALLER. DEPTH OF SANITARY SEWER SHALL BE LIMITED TO 7-FT MAXIMUM DEPTH.
5. OCU PRESSURE MAINS SHALL NOT BE INSTALL UNDER THE PEDESTRIAN AREA.

60-FT CLEAR ZONE (50-FT PUBLIC RIGHT-OF-WAY, 10-FT SETBACK) (RESIDENTIAL < 30 MPH)



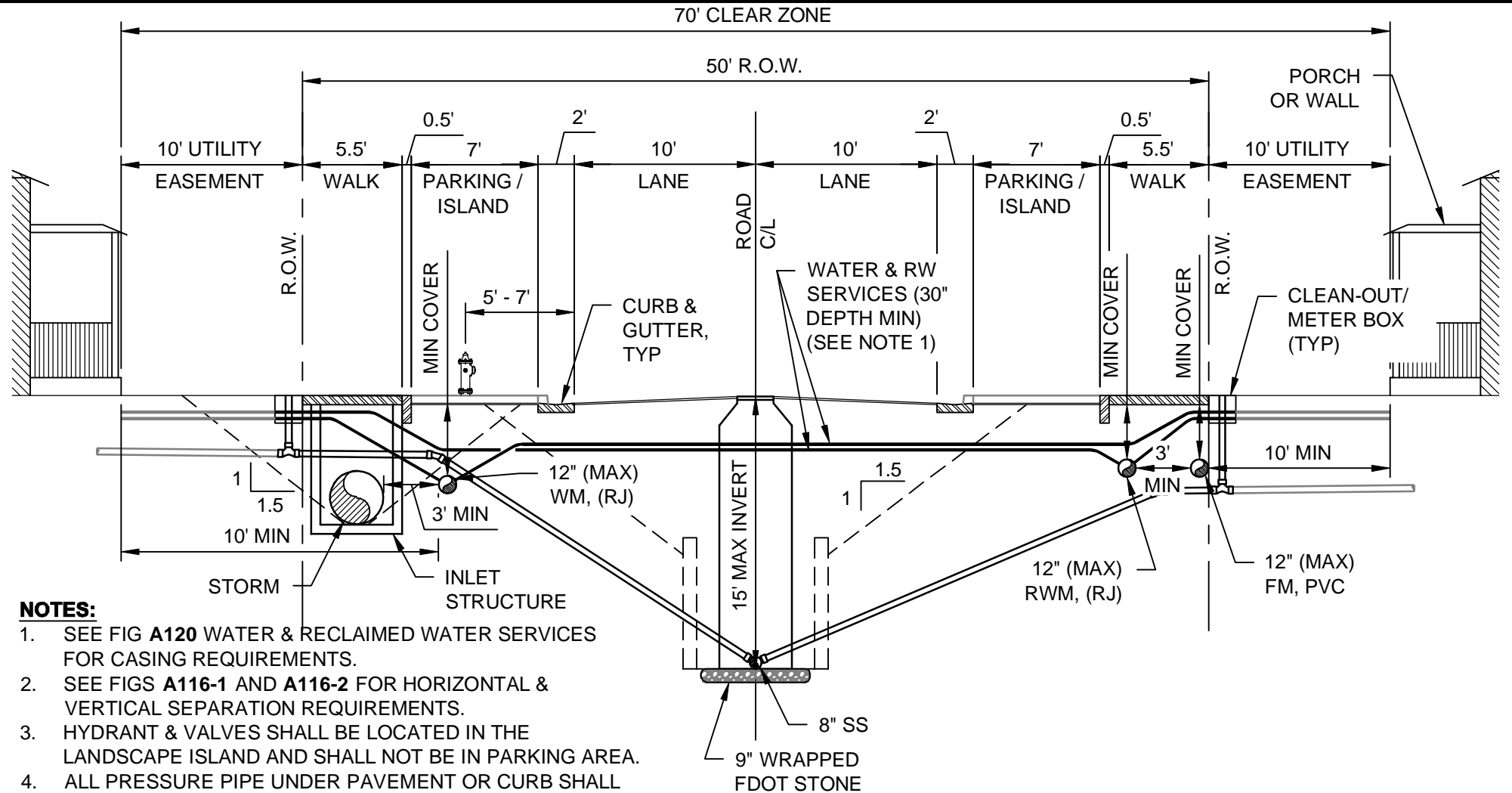
70-FT CLEAR ZONE (50-FT MINIMUM PUBLIC RIGHT-OF-WAY, 15-FT SETBACK) (RESIDENTIAL < 30 MPH)



NOTES:

1. SEE FIG **A120** WATER & RECLAIMED WATER SERVICES FOR CASING REQUIREMENTS.
2. SEE FIGS **A116-1** AND **A116-2** FOR HORIZONTAL & VERTICAL SEPARATION REQUIREMENTS.
3. ALL PRESSURE PIPE UNDER PAVEMENT OR CURB SHALL BE RESTRAINED PIPE.
4. NO OCU MAINS GREATER THAN 12-IN SHALL BE DESIGNED ON LOCAL ROADS.

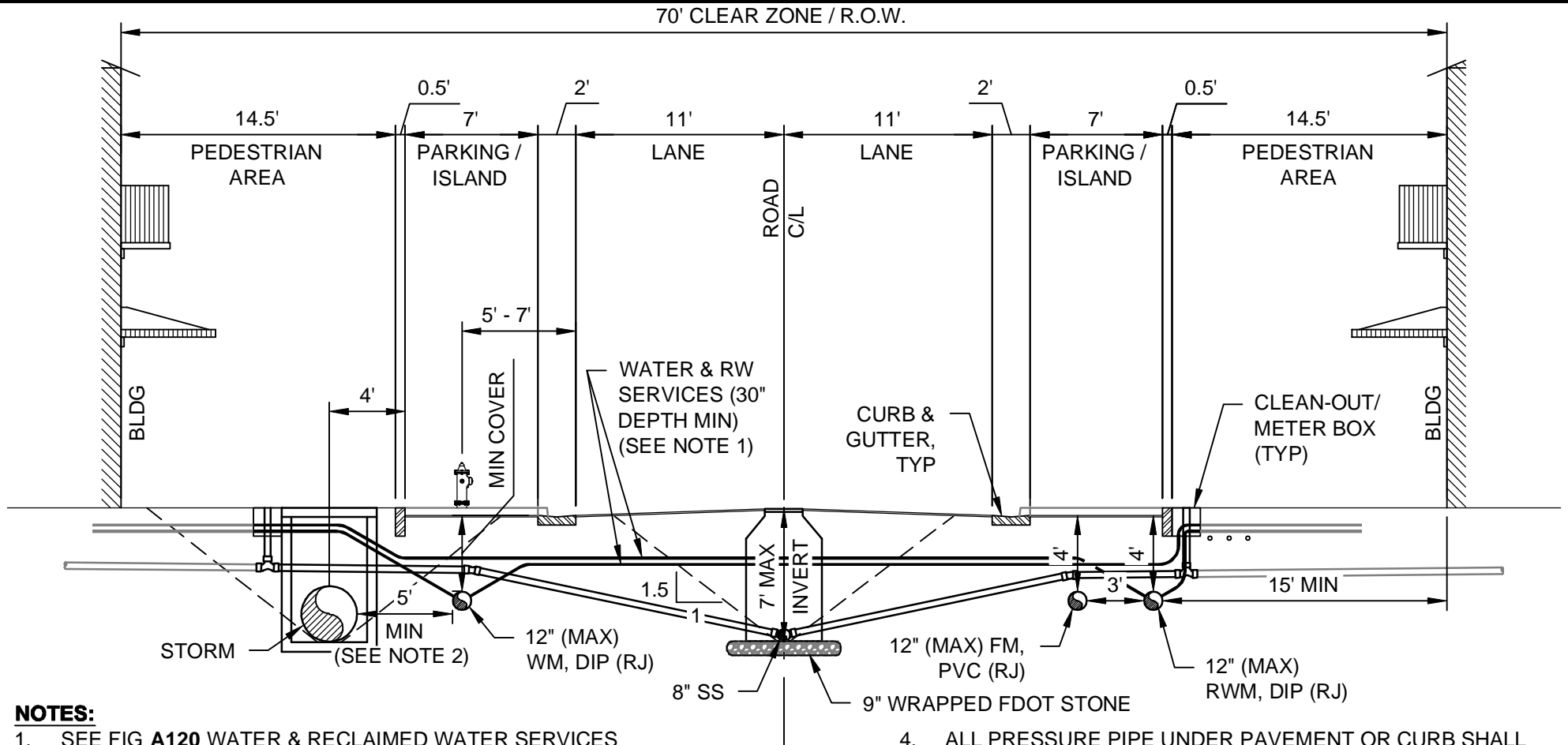
70-FT CLEAR ZONE (50-FT MINIMUM PUBLIC RIGHT-OF-WAY, 2-LANE STREET WITH PARKING) (RESIDENTIAL)



NOTES:

1. SEE FIG A120 WATER & RECLAIMED WATER SERVICES FOR CASING REQUIREMENTS.
2. SEE FIGS A116-1 AND A116-2 FOR HORIZONTAL & VERTICAL SEPARATION REQUIREMENTS.
3. HYDRANT & VALVES SHALL BE LOCATED IN THE LANDSCAPE ISLAND AND SHALL NOT BE IN PARKING AREA.
4. ALL PRESSURE PIPE UNDER PAVEMENT OR CURB SHALL BE RESTRAINED PIPE.
5. NO OCU MAINS GREATER THAN 12-IN SHALL BE DESIGNED ON LOCAL ROADS.

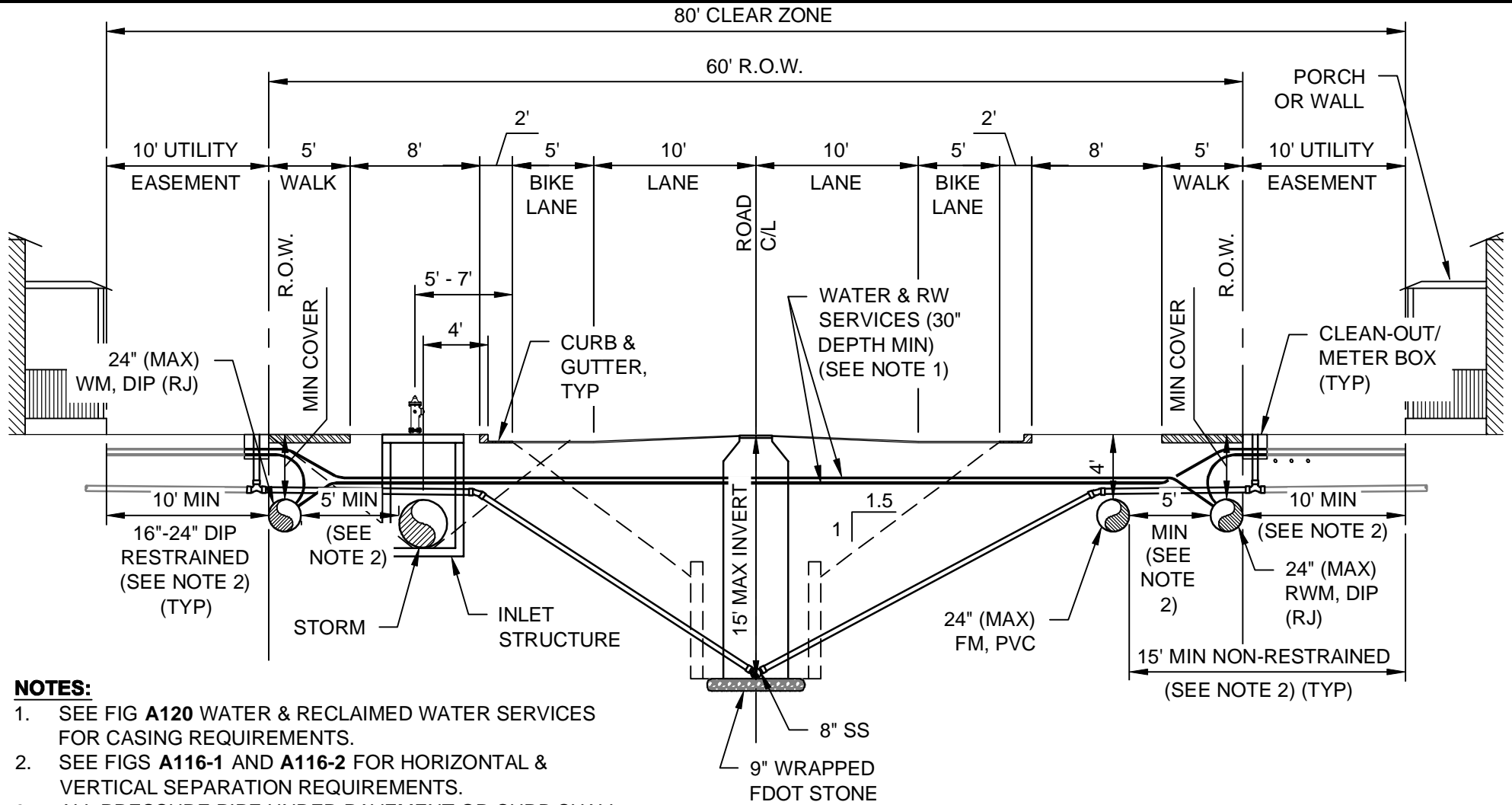
70-FT CLEAR ZONE (70-FT MINIMUM PUBLIC RIGHT-OF-WAY, 2-LANE STREET WITH PARKING)



NOTES:

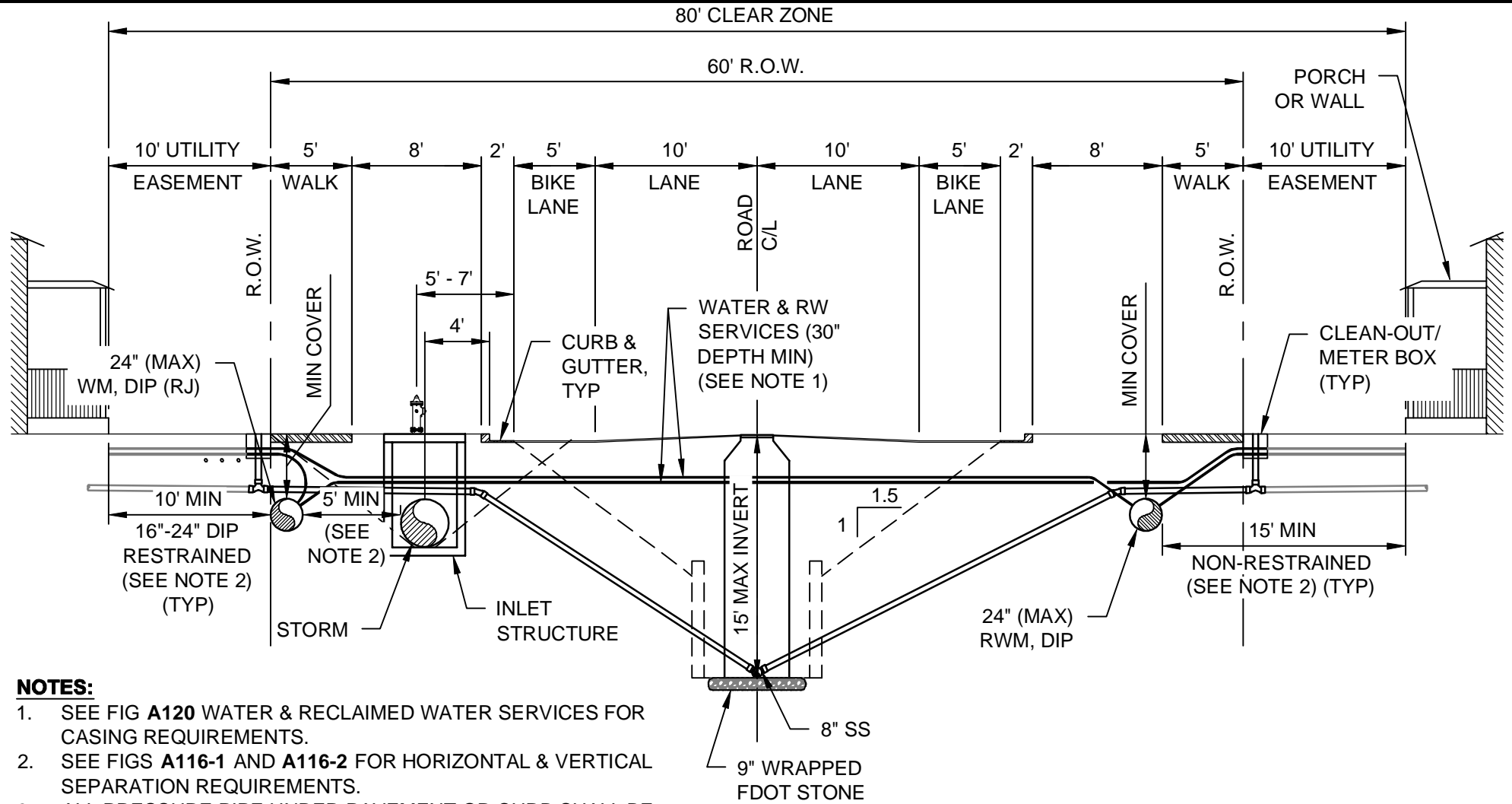
1. SEE FIG **A120** WATER & RECLAIMED WATER SERVICES FOR CASING REQUIREMENTS.
2. SEE FIGS **A116-1** AND **A116-2** FOR HORIZONTAL & VERTICAL SEPARATION REQUIREMENTS.
3. HYDRANTS & VALVES SHALL BE LOCATED IN THE LANDSCAPE ISLAND AND SHALL NOT BE IN PARKING AREA.
4. ALL PRESSURE PIPE UNDER PAVEMENT OR CURB SHALL BE RESTRAINED PIPE.
5. OCU MAINS ARE LIMITED TO 12-IN AND SMALLER. DEPTH OF SANITARY SEWER SHALL BE LIMITED TO 7-FT MAXIMUM DEPTH.
6. OCU PRESSURE MAINS SHALL NOT BE INSTALLED UNDER THE PEDESTRIAN AREA LIMITS.

80-FT CLEAR ZONE (60-FT MINIMUM PUBLIC RIGHT-OF-WAY, 2-LANE STREET WITH BIKE LANES) (RESIDENTIAL)



- NOTES:**
1. SEE FIG **A120** WATER & RECLAIMED WATER SERVICES FOR CASING REQUIREMENTS.
 2. SEE FIGS **A116-1** AND **A116-2** FOR HORIZONTAL & VERTICAL SEPARATION REQUIREMENTS.
 3. ALL PRESSURE PIPE UNDER PAVEMENT OR CURB SHALL BE RESTRAINED PIPE.
 4. OCU MAINS ARE LIMITED TO 24-IN AND SMALLER.

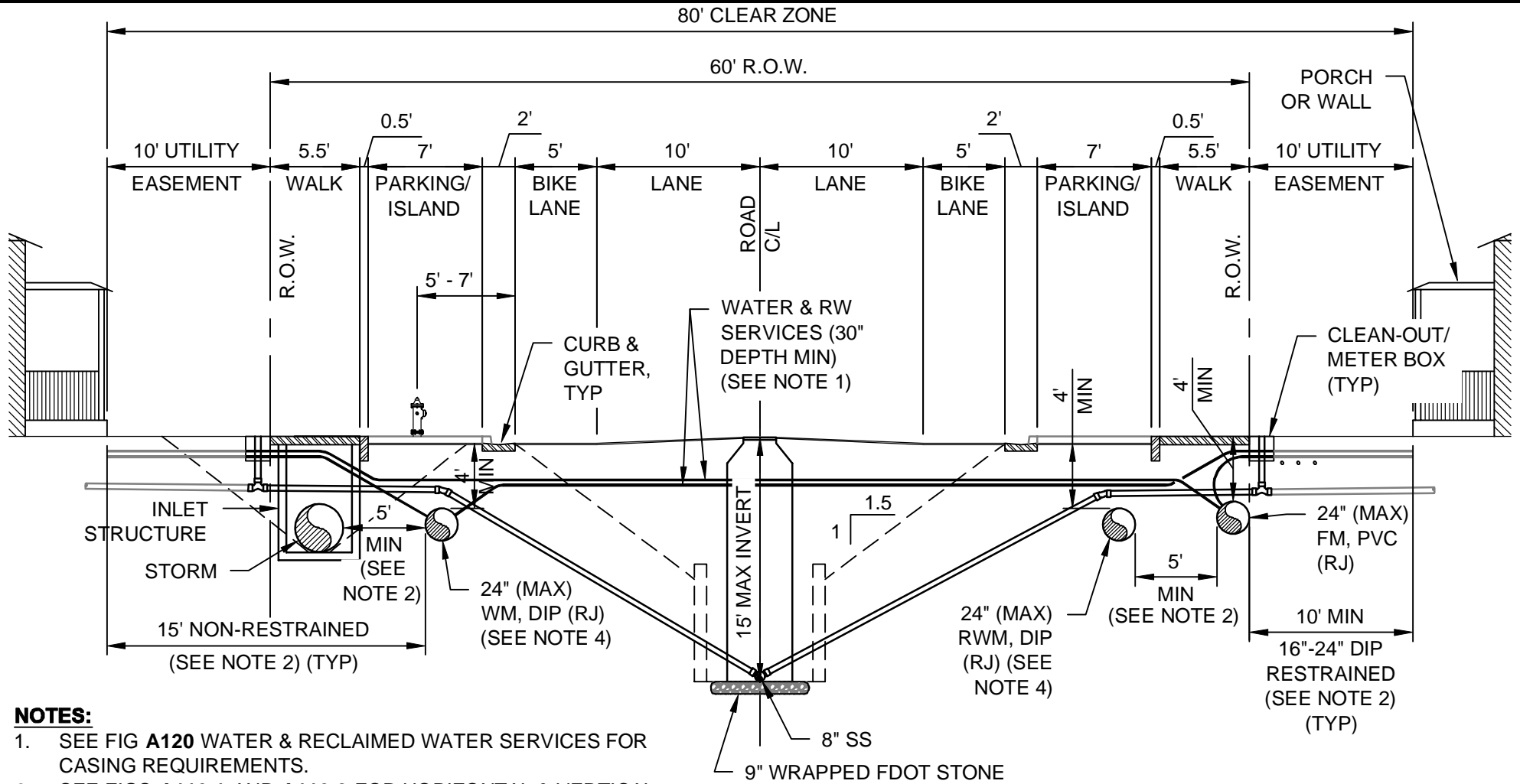
80-FT CLEAR ZONE (60-FT MINIMUM PUBLIC RIGHT-OF-WAY, 2-LANE STREET WITH BIKE LANES) (RESIDENTIAL)



NOTES:

1. SEE FIG **A120** WATER & RECLAIMED WATER SERVICES FOR CASING REQUIREMENTS.
2. SEE FIGS **A116-1** AND **A116-2** FOR HORIZONTAL & VERTICAL SEPARATION REQUIREMENTS.
3. ALL PRESSURE PIPE UNDER PAVEMENT OR CURB SHALL BE RESTRAINED PIPE.
4. OCU MAINS ARE LIMITED TO 24-IN AND SMALLER.

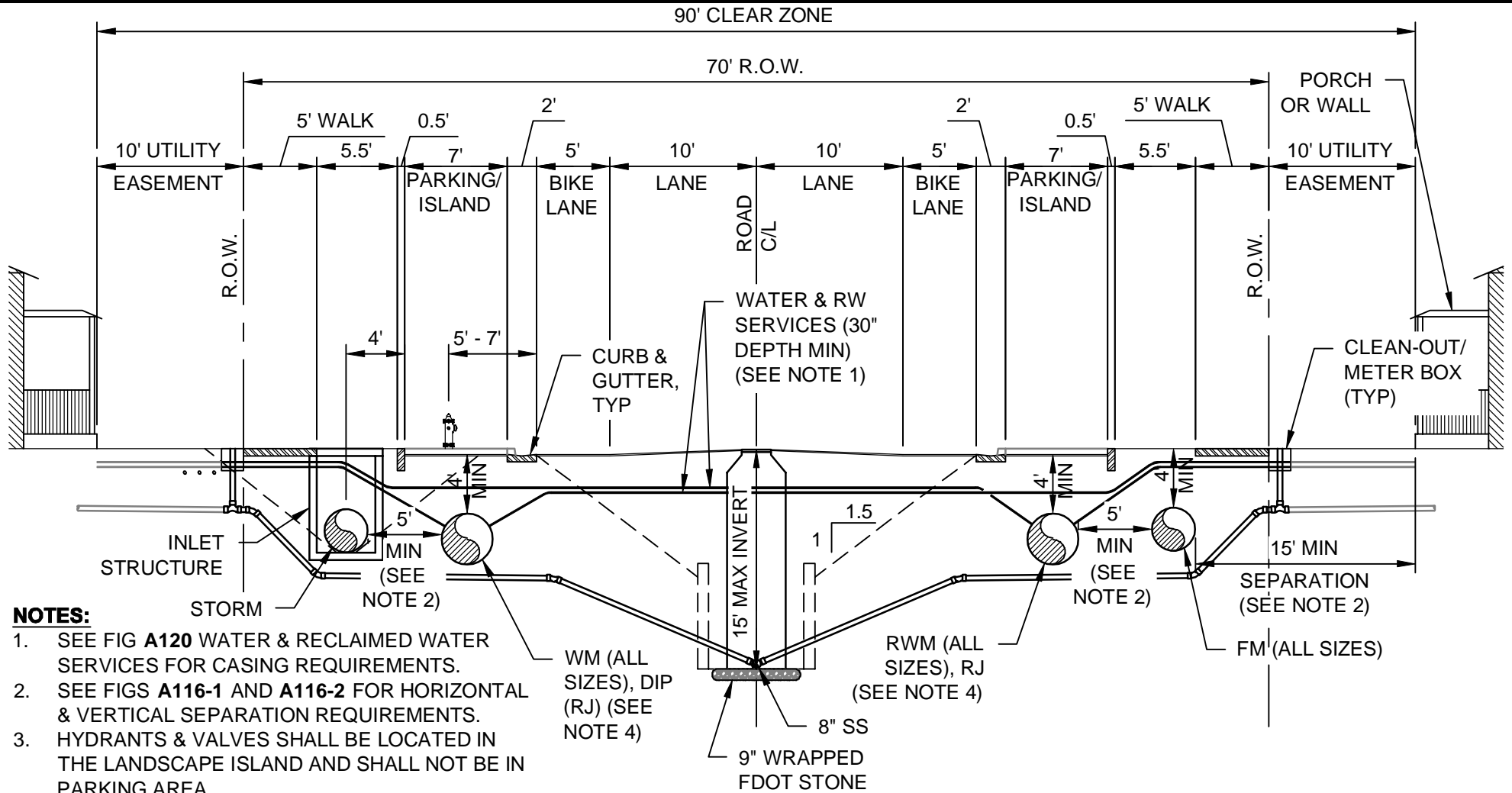
80-FT CLEAR ZONE (60-FT MIN PUBLIC RIGHT-OF-WAY, 2-LANE ST W/ BIKE LANES & PARKING) (RESIDENTIAL)



NOTES:

1. SEE FIG **A120** WATER & RECLAIMED WATER SERVICES FOR CASING REQUIREMENTS.
2. SEE FIGS **A116-1** AND **A116-2** FOR HORIZONTAL & VERTICAL SEPARATION REQUIREMENTS.
3. HYDRANTS & VALVES SHALL BE LOCATED IN THE LANDSCAPE ISLAND AND SHALL NOT BE IN PARKING AREA.
4. ALL PRESSURE PIPE UNDER PAVEMENT OR CURB SHALL BE RESTRAINED PIPE.
5. OCU MAINS ARE LIMITED TO 24-IN AND SMALLER.

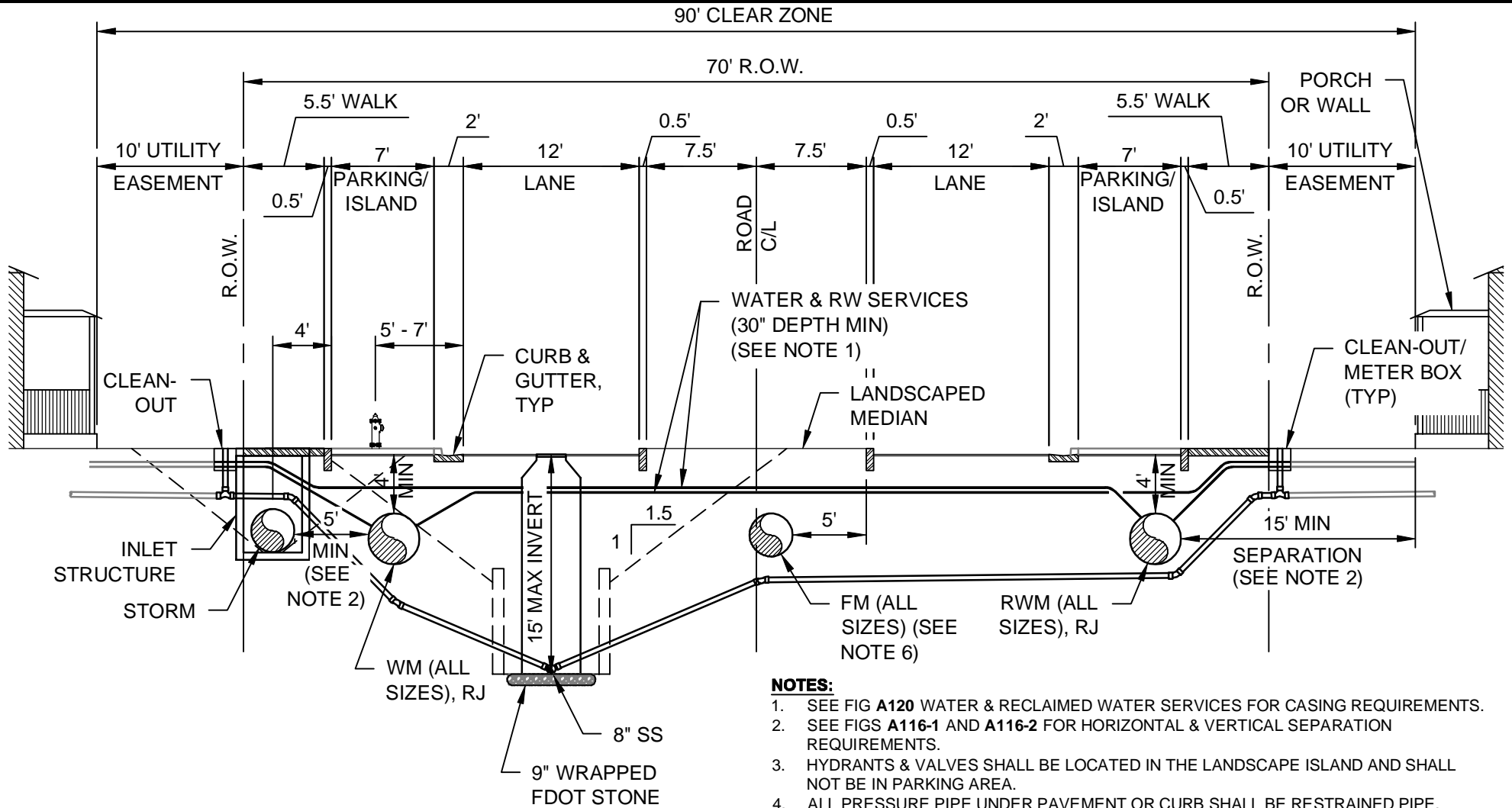
90-FT CLEAR ZONE (70-FT MIN PUBLIC RIGHT-OF-WAY, 2-LANE ST W/ BIKE LANES & PARKING) (RESIDENTIAL)



NOTES:

1. SEE FIG **A120** WATER & RECLAIMED WATER SERVICES FOR CASING REQUIREMENTS.
2. SEE FIGS **A116-1** AND **A116-2** FOR HORIZONTAL & VERTICAL SEPARATION REQUIREMENTS.
3. HYDRANTS & VALVES SHALL BE LOCATED IN THE LANDSCAPE ISLAND AND SHALL NOT BE IN PARKING AREA.
4. ALL PRESSURE PIPE UNDER PAVEMENT OR CURB SHALL BE RESTRAINED PIPE.
5. NO LIMIT ON OCU PRESSURE PIPE DIAMETERS.

90-FT CLEAR ZONE (70-FT MIN PUBLIC RIGHT-OF-WAY, 2-LANE DIVIDED ST/AVE W/ PARKING) (RESIDENTIAL)



NOTES:

1. SEE FIG **A120** WATER & RECLAIMED WATER SERVICES FOR CASING REQUIREMENTS.
2. SEE FIGS **A116-1** AND **A116-2** FOR HORIZONTAL & VERTICAL SEPARATION REQUIREMENTS.
3. HYDRANTS & VALVES SHALL BE LOCATED IN THE LANDSCAPE ISLAND AND SHALL NOT BE IN PARKING AREA.
4. ALL PRESSURE PIPE UNDER PAVEMENT OR CURB SHALL BE RESTRAINED PIPE.
5. NO LIMIT ON OCU PRESSURE PIPE DIAMETERS.
6. FM SHALL NOT BE INSTALLED UNDER TREES. MOVE FM BASED ON LANDSCAPE REQUIREMENTS.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX B

FORMS

Pump Station Start-Up

October 10, 2021

Prior to the pump station start-up, the following shall be complete:

- A walk through letter of acceptance issued;
- All wire checks, video inspections and valve locates complete;
- FDEP Water Clearance received; and
- FDEP placard for fuel tank issued if applicable. †

Utility billing transfer from Contractor to OCU: After start-up and punch list items are complete, email scanned copies of the power and water bills to the Utilities Field Services Division along with a statement on company letterhead requesting that the accounts be transferred to OCU.

ATTACH MANUFACTURER’S PUMP CURVE – With high head and low head design operating points – From design submittal

TYPE OF PROJECT:	<input type="checkbox"/> Development Project	<input type="checkbox"/> Engineering CIP R/R
<input type="checkbox"/> FS Mechanical Rehab	<input type="checkbox"/> FS Electrical Rehab	<input type="checkbox"/> FS Structural Rehab
<input type="checkbox"/> Stationary Backup Pump Installation		<input type="checkbox"/> Soft Start Installation
Project Name _____	File # _____	
PS #: _____	Service Area: _____	
Station Type: _____	Startup Work Order#: _____	
Startup Inspection Date: _____	Acceptance Date: _____	

THIS SECTION TO BE COMPLETED BY PUMPING SUPERVISOR

Pump Station Name: _____

Address: _____

Station Pumps To: _____ Tankers Needed for Bypass: _____

Maintenance Route #: _____ Route Placement: After: _____ Before: _____

Emergency Route #: _____ Route Placement: After: _____ Before: _____

Station Tract or Site Area (sq.feet): _____

Latitude: _____ Longitude: _____

SSO High Impact Potential? (Y/N): _____ If Y, to Bldg. or Surface Water? _____

Notes: _____

APPENDIX B

FORMS

Pump Station Start-Up

October 10, 2021

PRESENT AT START- UP

Contractor Name: _____ Phone Number: _____
Consulting Engineer: _____ Phone Number: _____
Pump Manufacturer Rep: _____ Phone Number: _____
OCU Inspector: _____ Phone Number: _____
OCU Transmission Reps: _____

MISCELLANEOUS

Subdivision: _____ Gate Code: _____
Power Company: _____ Meter Number: _____
Water Company: _____ Meter Number: _____
Water Meter Size: _____
Water Service Backflow Manufacturer: _____ Size: _____
Backflow Model Number: _____
Potable Water Pressure Transducer Manufacturer: _____ Model: _____
Rain Gauge (Y/N): _____
ARV Manufacturer: _____ Model #: _____
ARV Size (typically 2"): _____ Number of ARVs: _____
Wastewater Pressure Transducer Manufacturer: _____ Model: _____
Wastewater Flow Meter Manufacturer: _____
Wastewater Flow Meter Model Number: _____
Project Includes Gravity System Rehab (Y/N) _____ Description: _____

PUMP EQUIPMENT

Pump Manufacturer: _____ Model: _____
Pump Voltage: _____ Phase: _____ Pump F.L.A: _____ **Pump HP:** _____
Impeller Size: _____ Discharge Size: _____

APPENDIX B

FORMS

Pump Station Start-Up

October 10, 2021

Pump #1 SN: _____ Pump #2 SN: _____

Pump #3 SN _____

ELECTRICAL EQUIPMENT

Control Panel Enclosure Mfg.: _____ Control Panel Built By: _____

Control Panel SN: _____ Date of Manufacture: _____

Main Service Voltage: _____ Amperage: _____

Main Disconnect Breaker Model: _____ Amperage: _____

Control Panel Main Breaker Model: _____ Amperage: _____

Emergency Circuit Breaker Model: _____ Amperage: _____

Pump Breaker Model #: _____ Amperage: _____

Control Breaker Model #: _____ Amperage: _____

SPD Type: _____ Model: _____ Receipt Received: _____

Transformer Model: _____ Primary: _____ Secondary: _____ KVA: _____

Transformer Model: _____ Primary: _____ Secondary: _____ KVA: _____

Alternator Name: _____ Model: _____

Phase Monitor: _____ Model: _____

Alarm Horn Manufacturer: _____ Model: _____

Hour Meter Manufacturer: _____ Model: _____

Starter Name: _____ Starter Size: _____ Heater Size: _____

Starter Coil Part Number: _____

Main/Emer Breaker AUX Contacts (Y/N): _____ HOA Switch Position Contacts (Y/N): _____

Generator Receptacle Mfg: _____ Model: _____

SOFT START & SCADA

Soft Start: (Y/N): _____ If N - Room to Install (Y/N): _____ SIMOCODE (Y/N): _____

Soft Start Manufacturer: _____ Model: _____

SCADA Installed (Y/N): _____ Manufacturer: _____

APPENDIX B

FORMS

Pump Station Start-Up

October 10, 2021

LEVEL TRANSDUCER

Manufacturer: _____ Model: _____

	Design Elev.	Design Depth*	Transducer Design Setting†	Transducer Startup Setting†	Measured Depth*
Wet Well Floor			0		0
Pumps Off					
Lead On					
Gravity Invert					
Lag 1 On					
Lag 2 On (Triplex)					
High Level					
High High Float					
Top of Wet Well		0			0

Lowest Manhole – MH ID: _____ MH Elevation: _____

* Measured in feet and inches, from top of hatch.

† Transducer settings are measured from the floor up. Use feet with decimals.

MECHANICAL - STRUCTURAL

Valve Vault Cover Mfg: _____ Vault Cover Size: _____

Wet Well Cover Manufacturer: _____ Wet Well Cover Size: _____

Wet Well Lining or Coating Type: _____ Wet Well Diameter** : _____

Gravity Pipe Size Entering Wet Well: _____ Guide Rail Size: _____

Base Elbow Size: _____ Riser Pipe Size: _____ Riser Pipe Material: _____

Plug Valve: Manufacturer _____ Size _____ Lay Length _____

Check Valve: Manufacturer _____ Size _____ Lay Length _____

** Inside diameter measured in feet and inches. If lined, measure surface of liner to surface of liner.

APPENDIX B

FORMS

Pump Station Start-Up

October 10, 2021

STATIONARY BACKUP PUMP

Pump Mfg: _____ Model: _____

Pump SN: _____ Pump HP: _____

Pump Design Operating Point - Flow Rate: _____ TDH (ft): _____

Pump Suction Size: _____ Discharge Size: _____

Type of Pump Connection – Camlock (Y/N): _____ Other: _____

Fuel Tank Manufacturer: _____ Fuel Tank Capacity: _____

Fuel Tank Model: _____

Engine Manufacturer: _____ Year of Manufacture: _____

Engine Model #: _____ Engine SN: _____

STATIONARY GENERATOR

Transfer Switch Mfg: _____ Model: _____

Fuel Tank Manufacturer: _____ Fuel Tank Capacity: _____

Fuel Tank Model: _____ Fuel Tank SN: _____

Fuel Tank Leak Detection Device Mfg: _____ Model: _____

Generator Manufacturer: _____ KVA: _____ KW: _____

Generator Model Number: _____

Generator Serial Number: _____

Engine Manufacturer: _____ Year of Manufacture: _____

Engine Model Number: _____ Engine SN: _____

BIOFILTER

Biofilter Manufacturer: _____ Biofilter Model: _____

Biofilter Media Type: _____ Carbon Polishing Unit (Y/N): _____

Blower Motor Manufacturer: _____

Blower Motor Model: _____ Blower Motor SN: _____

Blower Motor Belt Size: _____ Number of Belts: _____

Blower Horsepower: _____ Blower Voltage: _____

APPENDIX B

FORMS

Pump Station Start-Up

October 10, 2021

DESIGN CRITERIA – From Design Submittals			
Average Design Inflow (GPM): _____			
Peak Design Inflow (GPM): _____			
Service Area Notes: _____			
Pump Design Operating Point (High Head): _____ GPM At _____ Ft TDH			
Minimum Head Condition: _____ GPM At _____ Ft TDH			

	Pump # 1	Pump # 2	Pump # 3
GPM at Startup:			
TDH at Startup (ft):			
PSI at Startup:			

ELECTRICAL DATA AT STARTUP						
	PHASE A:		PHASE B:		PHASE C:	
Pump # 1 Amps at Startup						
Pump # 2 Amps at Startup						
Pump # 3 Amps at Startup						
Pump Megs Phase to Ground	Pump # 1:		Pump # 2:		Pump # 3:	
Incoming Service Voltage	A to GND:		B to GND:		C to GND:	
	A to B:		A to C:		B to C:	

APPENDIX B

FORMS

Pump Station Start-Up

October 10, 2021

CONTROL PANEL SPARE PARTS TRANSMITTAL

Project Name: _____

Project Number: _____

Quantity	Spec. Section	Manufacturer	Part Number	Part Description
1 set				Fuses, one set of each different size and type
1 set				All special tools required for normal operation and maintenance

Comments:

Delivered by: _____ Date: _____
Contractor

Witnessed by: _____ Date: _____
Construction Observation

Received by: _____ Date: _____
Field Services Division

APPENDIX B

FORMS

Pump Station Start-Up

October 10, 2021

GENERATOR SPARE PARTS TRANSMITTAL

Project Name: _____

Project Number: _____

Quantity	Spec. Section	Manufacturer	Part Number	Part Description
				One SPCC spill kit containing proper quantities and sizes of spill booms, pads, pillows, etc. to control spills
1 set				Fuses, one set of each different size and type
1 set				All special tools required for normal operation and maintenance

Comments: _____

Delivered by: _____ Date: _____
Contractor

Witnessed by: _____ Date: _____
Construction Observation

Received by: _____ Date: _____
Field Services Division

APPENDIX B

FORMS

Pump Station Start-Up

October 10, 2021

PUMP SPARE PARTS TRANSMITTAL

Project Name: _____

Project Number: _____

Quantity	Spec. Section	Manufacturer	Part Number	Part Description
1				Impeller wear ring or bottom wear plate
1 set				All special tools required for normal operation and maintenance

Comments:

Delivered by: _____ Date: _____
Contractor

Witnessed by: _____ Date: _____
Construction Observation

Received by: _____ Date: _____
Field Services Division

APPENDIX B

FORMS

Pump Station Start-Up

October 10, 2021

BIOFILTER SPARE PARTS TRANSMITTAL

Project Name: _____

Project Number: _____

Quantity	Spec. Section	Manufacturer	Part Number	Part Description
1 set				Belts (One set of each type)
1 set				Pillar block bearings if applicable.
1 set				Fuses, one set of each different size and type
1 set				Grease mist eliminator filters
1 year supply				Supplemental nutrient
1 set				Any specialty tools for normal operation and maintenance

Comments: _____

Delivered by: _____ Date: _____
Contractor

Witnessed by: _____ Date: _____
Construction Observation

Received by: _____ Date: _____
Field Services Division

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX B

FORMS

Water Main Disinfection Certification

October 10, 2021

This form is required to schedule and document the disinfection of newly installed water mains to AWWA C-651 – latest revision. The CONTRACTOR shall complete the top portion of this form to document the subject water main, disinfection method and amount of chlorine applied. The UTILITIES inspector will document the residuals at each sample point on the bottom portion of this form.

Date Requested: _____
 CONTRACTOR's Name: _____
 Project Name: _____
 Project Number: _____
 Location: _____ Plan Sheet No.(s): _____
 Starting Location: _____ Ending Location: _____
 Line Length: _____ Line Size: _____
 Pipe Material: _____ Type of Joint(s): _____
 Gallons to Fill Pipe: _____ Pounds of Chlorine Applied: _____
 Method of Disinfection Used: _____
 CONTRACTOR's Signature: _____ Date: _____

For COUNTY Use Only

Certification Information

Start Time: _____ Start PSI: _____
 Stop Time: _____ Stop PSI: _____

<i>Sample Point Number</i>	<i>Sample Point Location</i>	<i>Initial Chlorine Reading, Minimum 25 ppm Required</i>	<i>24 Hr Chlorine Reading, Minimum 10 ppm Required</i>

Lab Test Results

Passed: _____ Failed: _____ Incomplete: _____

Comments:

Inspector's Signature: _____ Date: _____

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX B

FORMS

System Connection

October 10, 2021

Project Name: _____

COUNTY Project #: _____

Location: _____

Utility CONTRACTOR's Name: _____

Address: _____

Contact #: _____

If the CONTRACTOR making the connection is different than the one specified above, please complete the information below.

Connection CONTRACTOR's Name: _____

Address: _____

Contact #: _____

Connection Information Commercial Pressure Connection: (attach sketch on back as required)

Type of Connection Requested:

Pressure:

Non-Pressure:

Water:

Wastewater:

Reclaimed Water:

Existing Pipe Information:

Size: _____ Material: _____ Class/DR: _____

Tapping Machine Manufacturer: _____

CUTTER Size: _____ Type: _____

Per Section 3117 of the MANUAL, "After the tapping procedure is complete, the CONTRACTOR shall submit the coupon to UTILITIES".

Internal Use:

OCU Inspector: _____ Signature: _____

Date of Connection: _____

Coupon Retrieved: Y / N


THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX B

FORMS

Pressure Test Log

October 10, 2021

WATER MAIN PRESSURE TEST LOG													
		TYPE OF MAIN & MATERIAL: _____						CONTRACT NO. _____					
		PROJECT NAME: _____						SEQUENCE NO. _____					
		CONTRACTOR: _____						AMANDA (Permit) NO. _____					
		INSPECTOR: _____						Inspector: Signature & Date: _____					
AWWA C600 AWWA STANDARD FOR INSTALLATION OF DUCTILE-IRON WATER MAINS AND THEIR APPURTENANCES.						$L = \frac{SD (P)^{12}}{148000}$		FORMULA: For Pressure Test Using Overall Pipe Length with a 2 Hour Test.					
AWWA C605 AWWA STANDARD FOR UNDERGROUND INSTALLATION OF POLYVINYL CHLORIDE (PVC) PRESSURE PIPE AND FITTINGS FOR WATER.													
L= Allowable leakage in gallons per hour S= Length of Pipe tested, in feet. (FT) D= Nominal Diameter of Pipe in inches (In) P= Average test Pressure during leakage test in PSI gauge (PSI)				Minimum Test Pressure Water Main (P) min. 150 psi Reclaim Main (P) min. 150 psi Force Main (P) min. 150 psi				Notes: _____					
DATE	STREET / LOCATION / DESCRIPTION	STATION OR LOT #		Pipe Length Feet (S)	Pipe Diameter Inches (D)	START		END		LOSS (GAL.)		STATUS	Re-Test
		FROM	TO			Time (12 hr clock)	PSI (P)	Time (12 hr clock)	PSI (P)	Allowable (L) (2 Hours)	Actual Loss (Makeup Water Added)		
1										0.00			
2										0.00			
3										0.00			
4										0.00			
5										0.00			
6										0.00			
7										0.00			
8										0.00			
9										0.00			
10										0.00			
11										0.00			
12										0.00			
13										0.00			
14										0.00			
15										0.00			
16										0.00			
17										0.00			
18										0.00			

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX B

FORMS

Fee Simple Conveyances to OCU by Separate Instrument

October 10, 2021

Guidelines for Fee Simple Conveyances to OCU by Separate Instrument

Public utility parcels shown on construction permit drawings must be conveyed to Orange County prior to Construction Plan approval for offsite parcels, and prior to requesting an FDEP clearance for on-site parcels, for the new utilities located in the parcel area(s). The conveyance process typically takes several months to complete.

The procedure described below applies only to fee simple parcels to be conveyed by separate instrument to Orange County.

A. Process

Process for conveying a fee simple parcel:

1. Owner provides the documents, listed in Section B below, to Orange County Utilities Engineering Division, Development Section (OCU).
2. OCU Plan Reviewer and OCU Licensed Surveyor review and provide comments, or approve the sketch(es) of description.
3. OCU sends the documents to Orange County Real Estate Management Division (REM).
4. REM reviews the Title Work (as detailed in Section B below) and, if acceptable, prepares the necessary conveyance documents. REM calculates the recording fees and provides the conveyance documents and recording fees payment amount to OCU.
5. OCU provides the conveyance documents and recording fees payment amount to Owner.
6. Owner signs the conveyance documents in front of a notary public and two witnesses, obtains releases, and/or other required documents, as necessary, signed by appropriate parties, and provides a recording fees check made payable to the Orange County Comptroller to OCU, for transmittal to REM.
7. REM reviews signed documents to ensure accuracy/completeness and updates the Title Work to ensure no unacceptable changes have occurred. REM prepares the conveyance package for County approval according to standard procedures. Ad valorem property taxes will be pro-rated through the County approval date and must be paid by the Owner. This amount is calculated by the Orange County Tax Collector's Office and will be provided to the Owner by REM. Evidence of payment of the aforesaid tax payment (or a property taxes check payable to the Orange County Tax Collector) shall be provided to REM prior to recordation of the conveyance documents.

B. Required Documents

Please submit the documents listed below. Printed hardcopies are required and double-sided is acceptable. Include the Orange County Permit Number on all correspondence:

1. Acceptable Title Work: A current title search report, title commitment, title insurance policy, opinion of title, or ownership and encumbrance report prepared by a Title Company and/or licensed attorney. The title work must be **dated within the last 90 days and must include all encumbrances that affect the subject parcel, including but not limited to any existing**

APPENDIX B

FORMS

Fee Simple Conveyances to OCU by Separate Instrument

October 10, 2021

easements. Therefore, the research cannot be limited to a 30 year search and must include the earliest public records.

2. Copies of ownership deed(s) and all encumbrances as evidenced on the Title Work (deed(s), mortgage(s), easement(s), agreement(s), restrictions, etc.).
3. Sketch of Description (3 originals) signed, sealed and dated by a Professional Surveyor & Mapper. For detailed requirements, please refer to *Orange County Utilities Requirements for Sketch of Description*, attached.
4. A current Phase 1 Environmental Site Assessment (ESA), meeting Orange County criteria, will be required for the parcel being conveyed in fee simple to Orange County. The ESA will be reviewed by Orange County Risk Management. The requirements of the ESA include, but are not limited to the following:
 - a) The property of the proposed conveyance must be included within the legal description of the ESA report;
 - b) User reliance must be provided to Orange County;
 - c) The ESA must be current;
 - An ESA less than 6 months old is acceptable.
 - If the ESA is between 6 months and 1 year old, an update can be provided/obtained to the original.
 - If the ESA is older than 1 year, then a new ESA is required.
 - d) Potential concerns identified within the ESA have to be addressed to Risk Management's satisfaction; and
 - e) A digital copy is preferred by Risk Management.
5. Provide the Owner's contact information:

Property Owner: _____

Address: _____

Phone Number: _____

Email Address: _____

Orange County Permit #: _____

Project name as it appears on permit documentation: _____

6. Provide a Contact Person for the Owner/Developer:

Name: _____

Phone Number: _____

APPENDIX B

FORMS

Granting Easements to OCU by Separate Instrument

October 10, 2021

Guidelines for Granting Easements to OCU by Separate Instrument

Public utility easements shown on construction permit drawings must be conveyed to Orange County prior to Construction Plan approval for offsite easements, and prior to requesting an FDEP clearance for on-site easements, for the new utilities located in the easement area(s). The easement process typically takes several months to complete.

The procedure described below applies only to easements to be granted by separate instrument. If this project will be platted, apply this procedure to any easements located outside of the proposed plat boundaries.

A. Process

Process for granting an easement:

1. Owner provides the documents, listed in Section B below, to Orange County Utilities Engineering Division, Development Section (OCU).
2. OCU Plan Reviewer and OCU Licensed Surveyor review and provide comments, or approve the sketch(es) of description.
3. OCU sends the documents to Orange County Real Estate Management Division (REM).
4. REM reviews the Title Work (as detailed in Section B below) and, if acceptable, prepares the necessary easement document(s), including any subordination(s). REM calculates the recording fees and provides the easement document(s) and recording fees payment amount to OCU.
5. OCU provides the easement document(s) and recording fees payment amount to Owner.
6. Owner executes the easement document(s) in front of a notary public and two witnesses, obtains executed subordination and other required documents as necessary, and provides a recording fee check made payable to the Orange County Comptroller to OCU, for transmittal to REM.
7. REM reviews the executed easement document(s) to ensure accuracy/completeness and updates the Title Work to ensure that no unacceptable changes have occurred. **(If you plan to sell or further encumber your property, please let OCU know.)** REM prepares the easement package for County approval according to standard procedures. REM records the easement document(s) after County approval. **The developer shall not record the documents.**

APPENDIX B

FORMS

Granting Easements to OCU by Separate Instrument

October 10, 2021

B. Required Documents

Please submit the documents listed below. Printed hardcopies are required and double-sided is acceptable. Include the Orange County Permit Number on all correspondence:

1. Acceptable Title Work: A current title search report, title commitment, title insurance policy, opinion of title, or ownership and encumbrance report prepared by a Title Company and/or licensed attorney. The title work must be **dated within the last 90 days and must include all encumbrances that affect the subject parcel, including but not limited to any existing easements. Therefore, the research cannot be limited to a 30 year search and must include the earliest public records.**
2. Copies of ownership deed(s) and all encumbrances as evidenced on the Title Work (deed(s), mortgage(s), easement(s), agreement(s), restrictions, etc.).
3. Sketch of Description (3 originals) signed, sealed and dated by a Professional Surveyor & Mapper. For detailed requirements, please refer to *Orange County Utilities Requirements for Sketch of Description*, attached.

4. Provide the Owner's contact information:

Property Owner: _____

Address: _____

Phone Number: _____

Email Address: _____

Orange County Permit #: _____

Project name as it appears on permit documentation: _____

5. Provide a Contact Person for the Owner/Developer:

Name: _____

Phone Number: _____

APPENDIX B

FORMS

Bill of Sale (Water, Wastewater, and Water Reclamation Systems)

October 10, 2021

NOTE: *This form to be reproduced on Seller’s official letterhead prior to submittal.

_____, a Florida corporation, located at _____, State of Florida, Seller, for and in consideration of the sum of one (\$1.00) dollar and other valuable consideration paid to Seller by Orange County, a charter county and political subdivision of the State of Florida, Buyer, receipt of which is hereby acknowledged does grant, sell, transfer, convey and deliver to Buyer all pipes, lines, valves, valve boxes, fittings, thrust blocks, hydrants, equipment, manholes, lift stations and other goods which comprise the water, wastewater, and reclaimed water system installed by Seller and located on the County easements or rights-of-way as shown on the record drawings, more specifically described as follows:

NOTE: *The above language shall be modified as appropriate to describe only those assets that are to be included in this Bill of Sale.

PROJECT: _____

Exhibit “A” Legal
Description Attached

Buyer shall have all rights and title to the goods in itself and its assigns.

Seller warrants that it is the lawful owner of the goods and the goods are free from all liens and encumbrances. Seller has good right to sell the goods and will warrant and defend the right against the lawful claims and demands of all persons.

IN WITNESS WHEREOF, Seller has executed this Agreement at _____, Florida on _____, 20__.

SIGNED, SEALED AND DELIVERED IN THE PRESENCE OF:

By: _____

Seller Signature

Notary Signature

Print Seller Name and Date

Print Notary Name and Date

Print Company Title

STATE OF _____
COUNTY OF _____

The foregoing instrument was acknowledged before me by means of [_____] physical presence or [_____] online notarization, this ____ day of _____, 20__ by _____, of _____, a _____, on behalf of the company, who is [_____] personally known to me or [_____] has produced _____ as identification.

NOTE: Must be an Officer of Company authorized to sign on Company’s behalf

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX B

FORMS

Surety Sample (Bond Template)

October 10, 2021

*This text is to be reproduced and completed on Surety's official letterhead.
Print NAIC Number on the bond.*

KNOW ALL THESE PERSONS BY THESE PRESENTS, THAT _____
_____ of _____ of
Orange County, Florida, referred to as a Developer and _____ of
_____ of Orange County, Florida, hereinafter called
Surety, are held and firmly bound unto ORANGE COUNTY, a political subdivision of the State
of Florida, as, in the full and just sum of _____ DOLLARS, lawful money
of the United States of America, to the payment of which sum, well and truly to be made, the
Developer and Surety bind themselves, their heirs, executors, administrators, successors and
assigns, jointly and severally, firmly by these presents.

WHEREAS, the developer has constructed _____ facilities in
Orange County, Florida, known and identified as follows: _____
_____ and in connection therewith has installed with the
approval of the County Utilities Department sewerage systems, water systems, and reclaimed
water systems and/or related improvements under the provisions, conditions and requirements of
the construction plan approval granted the _____ day of _____, 20__ by Orange
County Utilities.

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH that if the
Developer shall maintain all improvements required as a condition of the construction plan
approval, including but not limited to the sewerage, water and reclaimed water systems, in first
class condition for a period of one (1) year from the date of issuance of Certificate of
Completion, and that if the Developer shall replace other improvements, including but not
limited to the sewerage, water, and reclaimed water systems, or other public utilities, the
materials, workmanship or structural integrity of which shall be found not to comply with said
construction plan approval for a one (1) year period following issuance of the sewerage, water,
and reclaimed water systems Certificate of Completion by the County and shall pay any and all
costs of expenses incidental to the performance of any work required to be performed hereunder,
then this obligation shall be void; otherwise, to be and remain in full force and effect.

FURTHERMORE, if at any time during the one (1) year period following the issuance of the
sewerage, water, and reclaimed water systems Certificate of Completion the County notifies the
Developer and Surety, in writing, of any deficiency or fault in materials, workmanship or
structural integrity of the required improvements including but not limited to the sewer, water,
and reclaimed water systems, then this bond shall continue in full force and effect until such
deficiency or fault is corrected.

Signed, sealed and dated this the _____ day of _____, 20_____.

DEVELOPER

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX B **FORMS**
Surety Sample (Letter of Credit "LOC" Template)

October 10, 2021

IRREVOCABLE STANDBY LETTER OF CREDIT NO. [REDACTED]

DATE: [REDACTED], 20 [REDACTED]

BENEFICIARY:
ORANGE COUNTY, FLORIDA
C/O ORANGE COUNTY UTILITIES
9150 CURRY FORD ROAD
ORLANDO, FLORIDA 32825
ATTN: MANAGER, FIELD SERVICES DIVISION

APPLICANT:
[REDACTED]
[REDACTED]
[REDACTED]
ATTN: _[NAME AND TITLE] [REDACTED]

PROJECT NAME: [REDACTED]

AMOUNT: \$ [REDACTED].00 ([REDACTED] THOUSAND AND 00/100 U.S. DOLLARS)

DATE OF EXPIRY: [REDACTED], 20 [REDACTED]

AT THE REQUEST AND FOR THE ACCOUNT OF APPLICANT, WE, [REDACTED] ("ISSUER"), HEREBY ESTABLISH OUR IRREVOCABLE STANDBY LETTER OF CREDIT NO. [REDACTED], IN FAVOR OF ORANGE COUNTY, A CHARTER COUNTY AND POLITICAL SUBDIVISION OF THE STATE OF FLORIDA ("BENEFICIARY"), AND AUTHORIZE YOU TO DRAW ON ISSUER, IN THE MAXIMUM AGGREGATE AMOUNT OF \$ [REDACTED].00 ([REDACTED] THOUSAND AND 00/100 U.S. DOLLARS), IN UNITED STATES FUNDS, WHICH IS PAYABLE AT SIGHT AGAINST PRESENTATION OF YOUR DEMAND, WHEN ACCOMPANIED BY THIS LETTER OF CREDIT AND ANY OF THE FOLLOWING DOCUMENTS:

1. A STATEMENT SIGNED BY THE ORANGE COUNTY MAYOR OR AUTHORIZED REPRESENTATIVE READING AS FOLLOWS: "THE PERFORMANCE OF APPLICANT'S OBLIGATION HAS NOT BEEN COMPLETED YET AND THE LETTER OF CREDIT WILL EXPIRE WITHIN 45 DAYS FROM THE DATE OF DRAWING WITHOUT BEING EXTENDED OR REPLACED TO THE COUNTY'S SATISFACTION;" OR
2. A STATEMENT SIGNED BY THE ORANGE COUNTY MAYOR OR AUTHORIZED REPRESENTATIVE READING AS FOLLOWS: "ISSUER [CONFIRMER] HAS LOST ITS DESIGNATION AS A 'QUALIFIED PUBLIC DEPOSITORY' PURSUANT TO FLORIDA STATUTES, CHAPTER 280, AND AN ACCEPTABLE REPLACEMENT LETTER OF CREDIT HAS NOT BEEN RECEIVED BY THE COUNTY FOLLOWING NOTICE TO APPLICANT;" OR
3. A STATEMENT SIGNED BY THE ORANGE COUNTY MAYOR OR AUTHORIZED REPRESENTATIVE READING AS FOLLOWS: THE DRAWING IS DUE TO APPLICANT'S FAILURE TO HAVE PROPERLY CONSTRUCTED THE WATER, RECLAIMED WATER, AND WASTEWATER IMPROVEMENTS FOR THE [REDACTED] PROJECT (HEREINAFTER THE "IMPROVEMENTS") AND MAINTAIN SAID IMPROVEMENTS FOR A ONE (1) YEAR PERIOD FOLLOWING ISSUANCE OF A CERTIFICATE OF COMPLETION FOR SUCH IMPROVEMENTS. SPECIFICALLY, THE STATEMENT SHALL BE TO THE EFFECT THAT: "THE MATERIALS, WORKMANSHIP, STRUCTURAL INTEGRITY, FUNCTIONING, AND/OR MAINTENANCE (MAINTENANCE REQUIRED TO ENSURE PROPER OPERATION) OF THE IMPROVEMENTS HAS BEEN DETERMINED TO BE UNACCEPTABLE, AND SUCH CONDITION(S) HAS NOT BEEN CORRECTED DESPITE NOTIFICATION TO THE DEVELOPER," AND

APPENDIX B **FORMS**
Surety Sample (Letter of Credit “LOC” Template)

October 10, 2021

FURTHER STATING THE SUMS DUE AS A RESULT OF SUCH DEFAULT TO DEFRAY THE ESTIMATED COST OF REPAIRS TO THE IMPROVEMENTS.

A SUM NOT TO EXCEED \$____.00 (____ THOUSAND AND 00/100 U.S. DOLLARS) SHALL BE AVAILABLE FOR PARTIAL OR FULL DRAW BY PRESENTATION OF YOUR DEMAND AT SIGHT IF ACCOMPANIED BY A WRITTEN STATEMENT AS DESCRIBED IN THE PRECEDING PARAGRAPHS.

THIS LETTER OF CREDIT SHALL BE IN FULL FORCE AND EFFECT UNTIL _____, 20____, [ONE YEAR FROM DATE OF ISSUANCE OF CERTIFICATE OF COMPLETION] AND WILL BE AUTOMATICALLY EXTENDED WITHOUT AMENDMENT FOR ONE NINETY (90) DAY PERIOD, UNLESS WE PROVIDE THE BENEFICIARY WITH WRITTEN NOTICE OF OUR INTENT TO TERMINATE THE CREDIT HEREIN EXTENDED, WHICH NOTICE MUST BE PROVIDED AT LEAST THIRTY (30) DAYS PRIOR TO THE EXPIRATION DATE OF THE ORIGINAL TERM HEREOF OR ANY EXTENDED TERM.

[IF A CONFIRMING BANK IS TO BE USED, INSERT THIS LANGUAGE: ISSUER NOMINATES _____ [NAME AND ADDRESS OF NOMINATED CONFIRMING BANK] TO CONFIRM THIS STANDBY LETTER OF CREDIT.]

DRAWS MUST BE PRESENTED NO LATER THAN _____, 20____, [EXPIRATION DATE] OR ANY EXTENDED EXPIRATION DATE AND MUST BEAR THE CLAUSE: “DRAWN UNDER LETTER OF CREDIT NO. _____ OF [ISSUER], DATED _____, 20____.”

PARTIAL AND MULTIPLE DRAWINGS ARE PERMITTED; PROVIDED, HOWEVER, THAT ANY PAYMENT MADE UNDER THIS LETTER OF CREDIT SHALL REDUCE THE AMOUNT AVAILABLE UNDER IT.

WE, ISSUER, HEREBY AGREE THAT ALL DRAWS PRESENTED UNDER AND IN COMPLIANCE WITH THE TERMS OF THIS LETTER OF CREDIT SHALL BE DULY HONORED UPON PRESENTATION TO ISSUER [CONFIRMER] AT: (note: must have tri-county street address (Orange, Osceola, Seminole).)

THIS LETTER OF CREDIT WILL BE CONSIDERED AS CANCELLED UPON RECEIPT BY US OF THE ORIGINAL LETTER OF CREDIT OR UPON ANY PRESENT OR FUTURE EXPIRY DATE HEREUNDER, WHICHEVER SHALL OCCUR FIRST.

THIS LETTER OF CREDIT IS SUBJECT TO THE INTERNATIONAL STANDBY PRACTICES 1998 (ISP98) (INTERNATIONAL CHAMBER OF COMMERCE PUBLICATION NO. 590) AND TO THE PROVISIONS OF FLORIDA LAW. IF A CONFLICT BETWEEN THE ISP98 AND FLORIDA LAW SHOULD ARISE, FLORIDA LAW SHALL PREVAIL. IF A CONFLICT BETWEEN FLORIDA LAW AND THE LAW OF ANY OTHER STATE OR COUNTRY SHALL ARISE, FLORIDA LAW SHALL PREVAIL.

VERY TRULY YOURS,

AUTHORIZED SIGNATURE

ISSUER

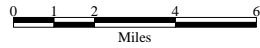
AUTHORIZED SIGNATURE

ISSUER



Water Service Areas

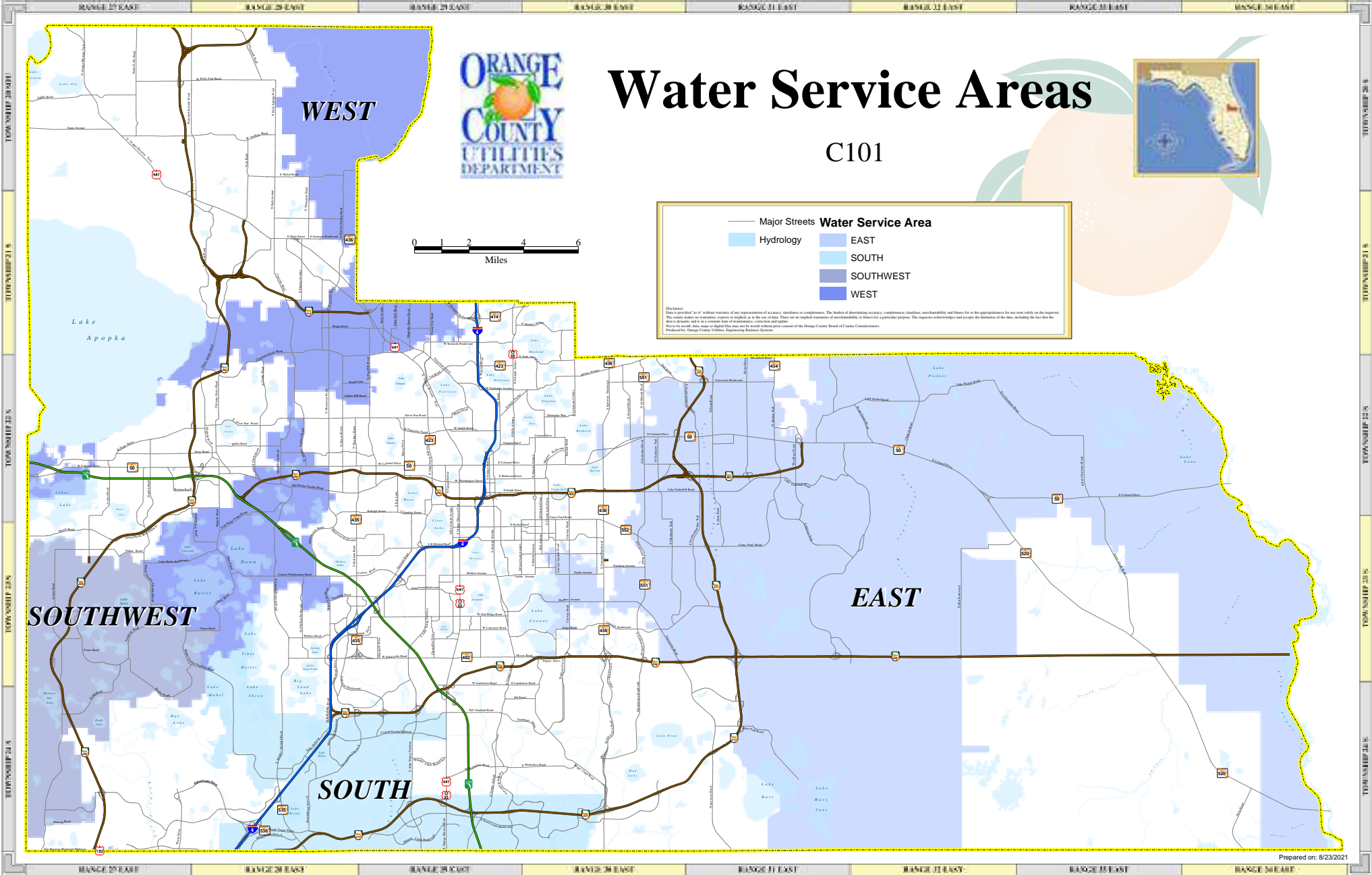
C101



— Major Streets **Water Service Area**

	Hydrology		EAST
			SOUTH
			SOUTHWEST
			WEST

Disclaimer:
Data is provided "as is" without warranty of any representation of accuracy, timeliness or completeness. The burden of assuring accuracy, completeness, timeliness, marketability and fitness for use rests solely on the requester. The County makes no warranty, express or implied, as to the use of data. There are no implied warranties of merchantability or fitness for a particular purpose. The requester acknowledges and accepts the limitation of the data, including the fact that the data is derived and used as a coverage map of administrative, collection and rights.
Data is provided as a service to the public and is not to be used for any other purpose without the prior consent of the Orange County Board of County Commissioners.
Produced by Orange County Utilities, Engineering Business System.

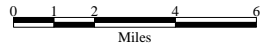


THIS PAGE INTENTIONALLY LEFT BLANK



Wastewater Service Areas

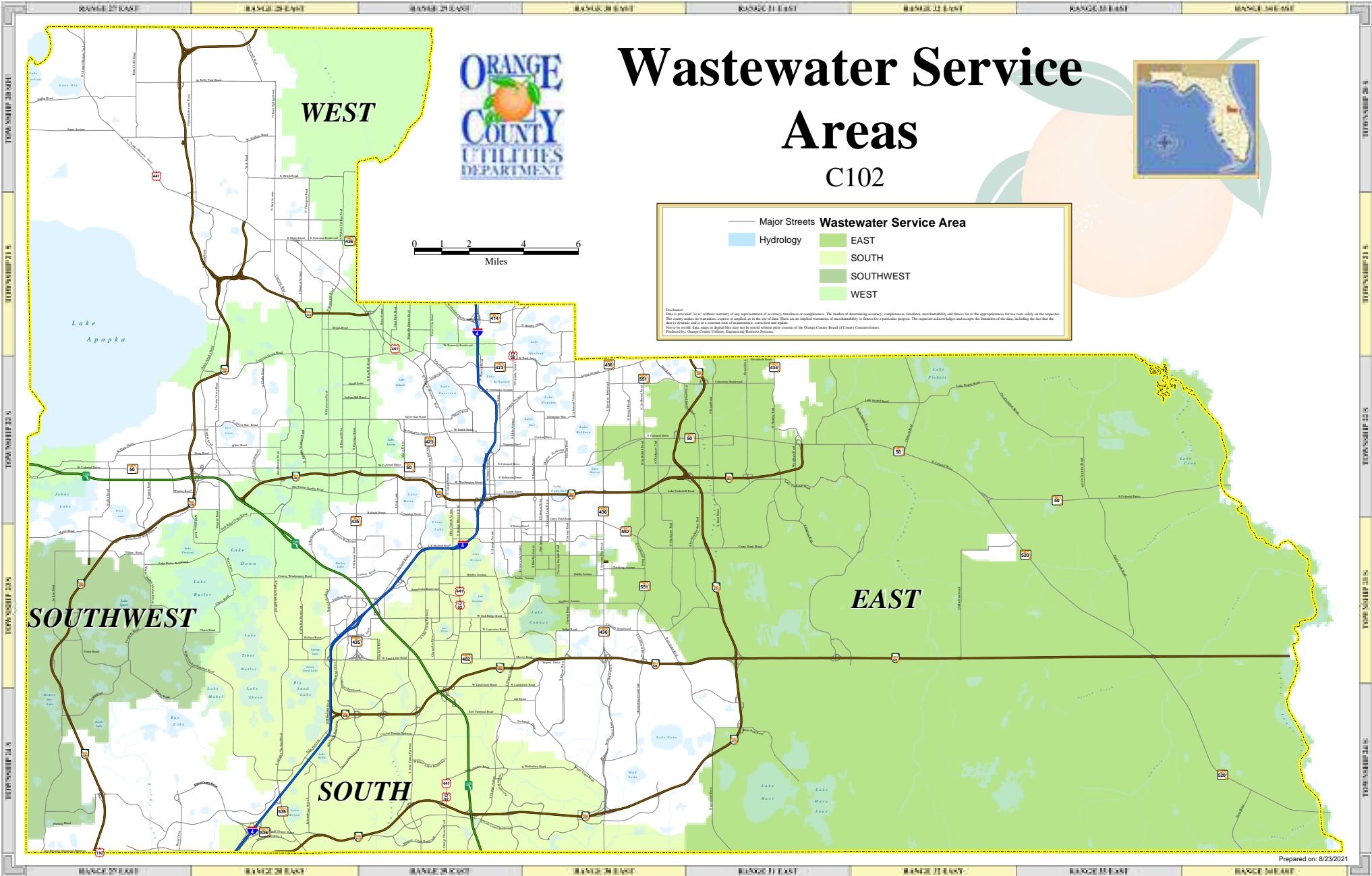
C102



Major Streets **Wastewater Service Area**

	Hydrology		EAST
			SOUTH
			SOUTHWEST
			WEST

Disclaimer:
Data is provided "as is" without warranty of any representation of accuracy, timeliness or completeness. The holder of all underlying accuracy, completeness, timeliness, marketability and fitness for use rests solely on the requester. The county makes no warranty, express or implied, as to the use of data. There are no implied warranties of merchantability or fitness for a particular purpose. The requester acknowledges and accepts the limitation of data, including the fact that the data is dynamic and is a changing state of development, collection and rights.
Data is provided as a courtesy and is not intended for use in any legal proceeding.
Produced by Orange County Utilities, Engineering Business System.

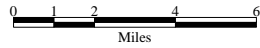


THIS PAGE INTENTIONALLY LEFT BLANK



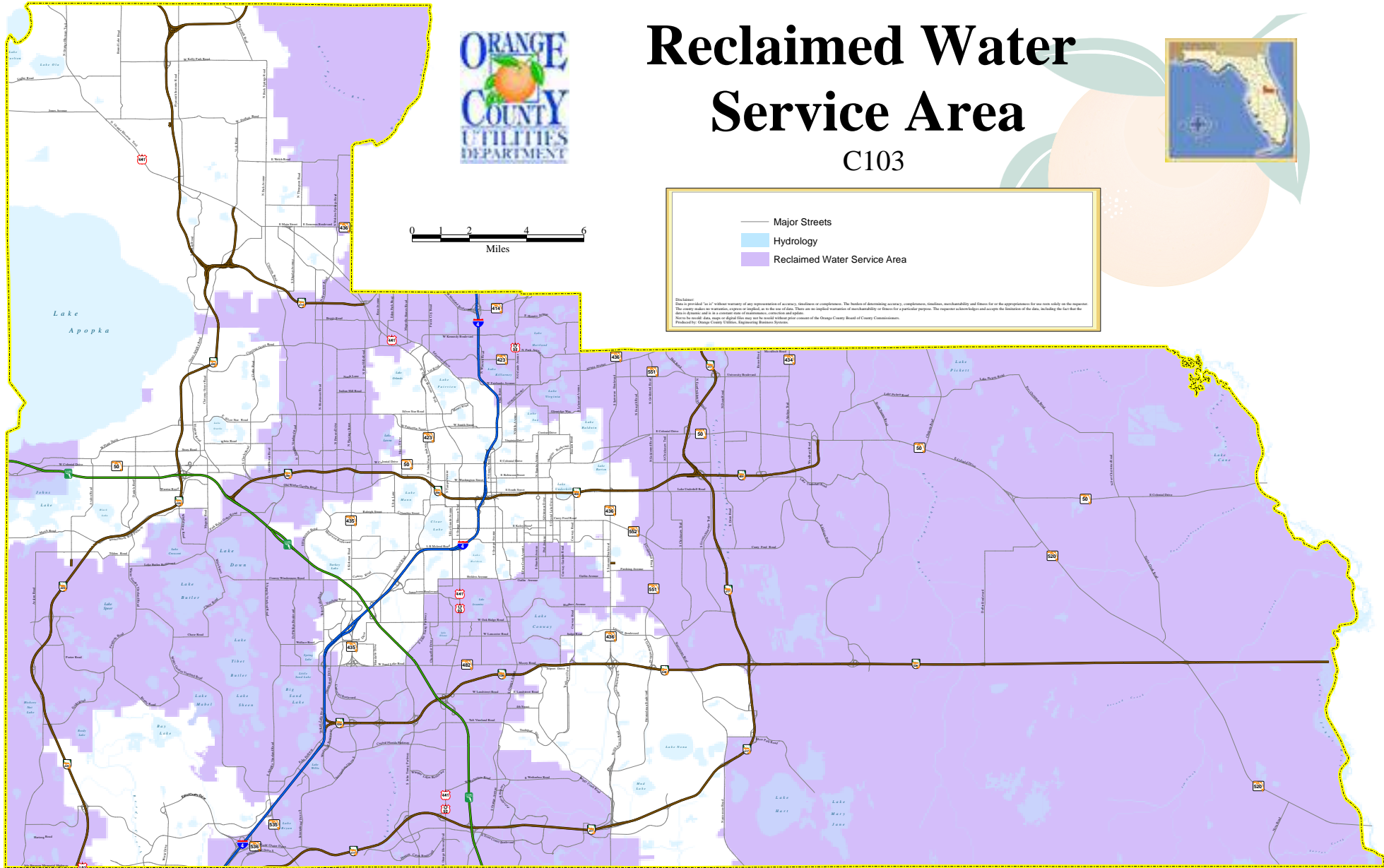
Reclaimed Water Service Area

C103



- Major Streets
- Hydrology
- Reclaimed Water Service Area

Disclaimer:
Data is provided "as is" without warranty of any representation of accuracy, timeliness or completeness. The burden of determining accuracy, completeness, timeliness, marketability and fitness for the application for use rests solely on the user.
The County makes no warranty, express or implied, as to the use of data. There are no implied warranties of merchantability or fitness for a particular purpose. The user acknowledges and accepts the limitation of the data, including the fact that the data is derived from a single source of information, collection and display.
There is no real-time data. Some digital data may not be available during power outages or system downtime.
Produced by Orange County Utilities, Engineering Business System.



THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D

PRODUCTS

Approval Process for New Products

October 10, 2021

PART 1 GENERAL

- A. The STANDARDS COMMITTEE evaluates new and existing products for efficient and economical utilization within UTILITIES systems. The STANDARDS COMMITTEE is charged with the development of a fair and reasonable methodology to systematically evaluate utility products for use through research and/or field evaluation.
- B. A list of approved products specified in the MANUAL is included in Appendix D. It is the intent of UTILITIES to review and update the list as appropriate to ensure efficient operation of the services and facilities under the jurisdiction of the MANUAL. Products in use by UTILITIES are subject to ongoing consideration and evaluation by the STANDARDS COMMITTEE. When changes, deletions or additions become necessary and are approved, the list will be revised. Questions concerning the Appendix D, “List of Approved Products” may be addressed to the STANDARDS COMMITTEE web site.
- C. The approval process for adding materials to the Appendix D, “List of Approved Products” requires the product and equipment manufacturers to submit a written request to be considered on the list. The STANDARDS COMMITTEE evaluates new and existing products for efficient and economical utilization within UTILITIES’ system. The STANDARDS COMMITTEE is charged with the development of a fair and reasonable methodology to systematically evaluate products for use through academic research and field evaluation. UTILITIES may approve a demonstration project with specific conditions and timelines and may request the supplier provide the product at no charge to UTILITIES for testing.

PART 2 SUBMITTALS

2.01 General:

- A. Product and equipment manufacturers shall submit a request for consideration to the MANUAL web site. If the submittal is acceptable, the STANDARDS COMMITTEE will evaluate the product. Products may be requested for testing or field evaluation.
- B. Following review of the submittal, the STANDARDS COMMITTEE may request a presentation by the manufacturer at a regularly scheduled committee meeting to demonstrate the product or provide additional information. Procedures for testing or evaluation shall be as agreed upon between the supplier and the STANDARDS COMMITTEE. Results will become a part of the product file and will be made available to the supplier upon request. UTILITIES will periodically update a database of all testing locations, time of test and results.
- C. From this information, the STANDARDS COMMITTEE will recommend approval or denial of the product(s). A majority vote by the STANDARDS COMMITTEE is required to accept any new product. The STANDARDS COMMITTEE will advise the supplier of the decision regarding the product. The newly accepted product will be added to the list of approved products. The list of approved products will be revised in accordance with Section 1111, “Policies and Procedures”, Part 6, Manual Revision Procedure.

APPENDIX D

PRODUCTS

Approval Process for New Products

October 10, 2021

- D. Issues regarding accepted products shall be submitted to the STANDARDS COMMITTEE for review. Such review may lead to a recommendation to rescind approval. The STANDARDS COMMITTEE shall inform the supplier/manufacturer of the reasons for removal from Appendix D, “List of Approved Products”.

2.02 Submittal Requirements:

- A. The product representative will submit the completed product submittal in PDF format. There is a 10MB limit on all COUNTY received e-mail, thus the product representative may need to break the submittal into multiple parts or mail to the STANDARDS COMMITTEE on compact disk. If the submittal is sent via mail, the product representative shall provide a copy of the formal submittal letter and table of contents by email. It is this final electronic PDF document that shall be considered the manufacturer’s submittal package. The appropriate e-mail address to be used for submittal and all communication is: Standards.Committee@ocfl.net. The email subject line shall contain the words “Appendix D Submittal” as well as the product name, model number, Utilities Category and manufacturer or representative:
1. The very first page of the submittal shall be a formal letter, with the manufacturer logo/name at the top, addressed to the STANDARDS COMMITTEE requesting a formal review of one specific product for possible inclusion on to the approved products list indicating the appropriate specifications section with page numbers, Appendix D Utilities categories with page numbers and the applications.
 2. The second page of the submittal shall be the “Table of Contents” page in the format listed below. The manufacturer shall also be provided individual section partition sheets in the same electronic manner (PDF). These sheets shall be used to separate the individual information sections and should therefore be the first page of each following section. Any sections not used or not applicable shall be noted on the table of contents as such.
 3. History and Sales Literature section which shall consist of:
 - a. A copy of the general sales brochure with the product on it
 - b. Company history
 4. Technical literature section which shall consist of:
 - a. Product description, the technical specifications, submittal sheets, scaled drawings, installation instructions / procedures, and catalog information including applicable part number or series number that approval is requested upon.
 - b. Quality Control procedures and ongoing testing your company has instituted to ensure uniform properties in your product, initial design proof-testing that you may have done (in-house), or testing you have done to prove the unique or outstanding selling factors of your product. The more official (signed and sealed by a Professional Engineer) these tests are the more useful.

APPENDIX D

PRODUCTS

Approval Process for New Products

October 10, 2021

5. List all applicable product standards , verification of standard certification and copies of the official standards (NSF, NSF-61, AWWA, ASTM, ANSI, NFPA, UL/FM, Uni-Bell, DIPRA, ISO, etc)as appropriate for the product
6. Test results showing compliance with applicable standards, including independent laboratory test results, if necessary.
7. Provide the product availability, delivery time and local representative availability and a list of all facilities and their locations that manufacture the product. In the case where multiple facilities produce the product, there shall be verification that identical testing and certification was performed for each manufacturing location. Please state if the manufacturing facilities are owned by the company/brand whose name appears on the product.
8. Maintenance requirements, special equipment and procedures and recommended maintenance schedules.
9. Product Warranty information including duration, repair / replacement procedures and parts / materials included or excluded per the warranty.
10. Product references (municipal or public users in Florida and other) shall include users name, address and telephone number, product application, number and details (size, specific model number, etc.) and number of years with date installed, and name, title ,telephone number and email of a contact person having knowledge of the particular usage. Corporate References (only in the state of Florida). This section may include contractors and other well established businesses. Limit this to six (6) references with the same format as above.
11. A detailed side-by-side comparison of the manufacturer’s product to a current item or items on the existing approved products list. Side by side comparison shall be factual and accurate.
12. Provide the safety data sheet (SDS), as applicable.
13. Provide recent product revisions or improvements.
14. Explanation of how the product benefits UTILITIES in terms of prolonged service life, reduced maintenance, reduced life-cycle cost and other relevant aspects.
15. Additional justification deemed necessary or helpful by the product representative such as samples, video or PowerPoint presentation and outline notes.
16. Any additional information deemed essential by the COUNTY.

APPENDIX D

PRODUCTS

Approval Process for New Products

October 10, 2021

PART 3 EXECUTION

3.01 STANDARDS COMMITTEE REVIEW

- A. If additional information is required, notification will be sent electronically with a required response time. If this information is not presented in this time period, the product may be removed from consideration.
- B. If the product is determined to be inappropriate for inclusion on the approved products list it may be removed from consideration. It is also possible for the STANDARDS COMMITTEE to forward products to Orange County Utilities Operations Divisions for future evaluation or use as maintenance products.

3.02 STANDARDS COMMITTEE RECOMMENDATION

- A. If the committee is able to reach a decision, it will make one of the following recommendations:
 - 1. Recommendation for inclusion in the next revision of the Manual. Products that have been recommended for inclusion shall not be approved for usage in the COUNTY nor added to the Appendix D Approved Products list until the effective date of the next revision of the Standards Manual.
 - 2. Table the product for further review and a decision at a later date. In this case, the Committee can ask for more information, request a product demonstration or testing done by OCU staff or request additional research.
 - 3. Recommendation for disapproval.
 - 4. Recommendation for disapproval in the Standards Manual but inclusion in Utilities Capital Improvement Program job specific specifications or usage by the Operations staff for system maintenance.

3.03 ADDITIONAL

- A. The COUNTY reserves the right to limit the number of approved manufacturers for any specific type of product for the purpose of minimizing inventory of parts, replacement components, and training requirements.
- B. The COUNTY may, with cause, disapprove and remove from the list any previously approved product. Cause may include, but is not limited to, the unavailability of a product or its replacement parts, failure of a product, unresponsiveness on the part of the manufacturer or their representative to resolve product issues, or a decline in the quality or performance of a product. These products shall be removed immediately from the approved products list per the procedures set forth in Section 1111.
- C. The COUNTY reserves the right to reject submittals of products that are incomplete or not applicable to the purpose and intent of the Manual. Further, the COUNTY reserves the right to reject resubmittals of products that have been rejected by the STANDARDS COMMITTEE.

APPENDIX D LIST OF APPROVED PRODUCTS

General Information

October 10, 2021

The list of approved products shall be used for construction of water, wastewater and reclaimed water utilities to be owned, operated and maintained by UTILITIES. All products shall conform to the current list at the time of the construction plan approval or the date of the construction plan approval extension (if granted). Revisions have been made to the list of approved products as noted in the following table.

List of Approved Products Revision Dates	
March 1, 2001	February 27, 2003
October 16, 2001	March 25, 2003
February 1, 2002	October 31, 2003
August 12, 2002	January 31, 2006
February 11, 2011	October 10, 2021

Registered recipients of this MANUAL will be notified by email of the pending revisions.

The list of approved products can be acquired from the COUNTY website.

For information on product approval procedures, please see “Approval Process for Products” in the MANUAL. Questions concerning the process should be emailed to the STANDARDS COMMITTEE at Standards.Committee@ocfl.net.

Appendix D has been reorganized into General Information (this page) and 3 separate groupings:

1. Transmission Systems;
2. Gravity Systems; and
3. Pump Station Systems.

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS							
Revised: October 10, 2021									
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater		
			Model #	Comments	Model #	Comments	Model #	Comments	
Air Release	ARV Enclosure	All ARV above ground enclosures shall be vented with tamper proof locking device.							
		Water Plus Polyethylene Enclosure	131632 H30-B	Blue 44" Tall	131632 H30-P	Pantone 44"	131632 H-30	Green 44" Tall	
			171730 H40-B	Blue 30" Tall	171730 H40-P	Pantone 30"	171730 H-40	Green 30" Tall	
			N/A	N/A	N/A	N/A	182635 H-65 (Wide model for 6" ARV)	Green 38" Tall	
		Hot Box Vent Guard Fiberglass Enclosure	AVG2036 Encl	Blue 36" Tall	AVG2036 Encl GP3232 Base	Pantone 36" Tall	AVG2036 Encl GP3232 Base	Green 36" Tall	
			AVG2041 Encl	Blue 41" Tall	AVG2041 Encl GP3232 Base	Pantone 41" Tall	AVG2041 Encl GP3232 Base	Green 41" Tall	
	AVG2448 Encl		Blue 48" Tall	AVG2448 Encl	Pantone 48" Tall	AVG2448 Encl	Green 48" Tall		
	Safety-Guard/Hydro Guard	15100 Encl	Blue 34" Tall	15100 Encl	Pantone 34" Tall	15100 Encl	Green 34" Tall		
	Air Release Valves	Air Release Valves shall be Combination Type, 316 SS. All ARV's shall be installed with ¼ turn valve on flush port.							
		ARI	D-040-ST ST	Combination	D-040-ST ST	Combination	N/A	N/A	
		H-TEC	993 (316SS)	0-250 PSI	993 (316SS)	0-250 PSI	986 (316SS)	Combination	
		Vent-O-Mat	Series RBX DN50	2"	Series RBX DN50	2"	N/A	N/A	
Dezurik / APCO		ASU	Combination	ASU	Combination	N/A	N/A		
Blow Off	Auto Blow Off	Automatic Blow Off Valve.							
		Hydro Guard	HG-1, HG1ST02018T1NF00	Automatic					
			HG-5	With air gap to sewer lateral.	N/A	N/A	N/A	N/A	
	Kupferle Foundry Co	Eclipse #9800WC	With air gap to sewer lateral.	N/A	N/A	N/A	N/A		
	Blow Off Valve box	Blow Off Valve box – Shall be 15" X 27" X 12" and AASHTO H-20 loading. Shall have OCU "WATER" or OCU "RECLAIM" on the lid. Logo to match OCU lid STANDARD DRAWING, powder coat not required.							
Oldecastle	1527		1527		N/A	N/A			
DFW Plastics, Inc.	DFW65C-14-AF1M		DFW65C-14-AF1M		N/A	N/A			

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS						
							Revised: October 10, 2021	
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	Comments
Casing Seals / Spacers	Casing End Seals	Casing End Seals. Annular space between pipe and steel casing shall be brick and mortar with end seals to secure ends.						
		Advance Products	Model AC and AW		Model AC and AW		Model AC and AW	
		BWM Company	Model WR and PO		Model WR and PO		Model WR and PO	
		Cascade Water Works	Model CCES		Model CCES		Model CCES	
		CCI Pipeline	Model ESW and ESC		Model ESW and ESC		Model ESW and ESC	
		Pipeline Seal & Insulator, Inc. (PSI)	Model C and W		Model C and W		Model C and W	
		Power Seal	Model 4810ES		Model 4810ES		Model 4810ES	
	Casing spacer	Casing spacers shall be a min. 8-inches wide for pipe 12" Dia or less or min. 12-inches wide for pipe 16" Dia or greater, shall have a minimum 14 gauge 304 stainless steel shell/band, minimum 10 gauge 304 reinforced risers; minimum thickness of 0.090 EPDM or PVC interior liners, glass reinforces polymer or ultra high molecular weight polyethylene and 304 stainless bolts, nuts and washers.						
		Advance Products	SSI8 / SSI12		SSI8 / SSI12		SSI8 / SSI12	
		BWM Company	BWM-SS-8 / SS-12		BWM-SS-8 / SS-12		BWM-SS-8 / SS-12	
		Cascade Water Works	Series CCS 8" / 12"		Series CCS 8" / 12"		Series CCS 8" / 12"	
		CCI Pipeline	Model CCS8 / CSS12		Model CCS8 / CSS12		Model CCS8 / CSS12	
		Pipeline Seal & Insulator, Inc (PSI)	Series S8G-2 / S12G-2		Series S8G-2 / S12G-2		Series S8G-2 / S12G-2	
	Coatings	Exterior Coatings for Exposed Metal Assets (System 1)	Coatings: Above ground piping, fittings, valves and appurtenances - System 1 Zinc / Urethane / Fluoropolymer application and color code per Section 3119 "Coatings & Linings". Coating shall not be in contact with Potable water unless NSF-61 approved.					
Carboline			Carbozinc 859	3.0 - 8.0 mils	Carbozinc 859	3.0 - 8.0 mils	Carbozinc 859	3.0 - 8.0 mils
			Carbothane 133 HB	3.0 - 5.0 mils	Carbothane 133 HB	3.0 - 5.0 mils	Carbothane 133 HB	3.0 - 5.0 mils
			Carboxane 950	2.0 - 3.0 mils	Carboxane 950	2.0 - 3.0 mils	Carboxane 950	2.0 - 3.0 mils
Tnemec			Zinc Series 90-97	2.5 - 3.5 mils	Zinc Series 90-97	2.5 - 3.5 mils	Zinc Series 90-97	2.5 - 3.5 mils
			Typoxy Series 27WB	4.0 - 14.0 mils	Typoxy Series 27WB	4.0 - 14.0 mils	Typoxy Series 27WB	4.0 - 14.0 mils
			EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils
			Hydroflon Series 700	2.0 - 3.0 mils	Hydroflon Series 700	2.0 - 3.0 mils	Hydroflon Series 700	2.0 - 3.0 mils
Sherwin Williams			Corothane 1 Zinc	3.0 - 4.0 mils	Corothane 1 Zinc	3.0 - 4.0 mils	Corothane 1 Zinc	3.0 - 4.0 mils
			Acrolon 218 HS Urethane	3.0 - 6.0 mils	Acrolon 218 HS Urethane	3.0 - 6.0 mils	Acrolon 218 HS Urethane	3.0 - 6.0 mils
			Fluorokem HS	2.0 - 3.0 mils	Fluorokem HS	2.0 - 3.0 mils	Fluorokem HS	2.0 - 3.0 mils

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS							
Revised: October 10, 2021									
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater		
			Model #	Comments	Model #	Comments	Model #	Comments	
Coatings	Exterior Coatings for Exposed Metal Assets (System 2)	Coatings: Hydrants - System 2 Zinc / Epoxy / Urethane application and color code per Section 3119 "Coatings & Linings".							
		Carboline	Carbozinc 859	3.0 - 8.0 mils	N/A	N/A	N/A	N/A	
			Carboguard 890	4.0 -6.0 mils	N/A	N/A	N/A	N/A	
			Carboxane 950	2.0 - 3.0 mils	N/A	N/A	N/A	N/A	
		Tnemec	Zinc Series 90-97	2.5 - 3.5 mils	N/A	N/A	N/A	N/A	
			Typoxy Series 27WB	4.0 -14.0 mils	N/A	N/A	N/A	N/A	
			Hi-Build Epoxoline II Series N69	4.0 - 10.0 mils	N/A	N/A	N/A	N/A	
		Sherwin Williams	EnduraShield Series73	2.0 - 3.0 mils	N/A	N/A	N/A	N/A	
			Corothane 1 Zinc	3.0 - 4.0 mils	N/A	N/A	N/A	N/A	
			Epoxy Mastic Aluminum	4.0 - 6.0 mils	N/A	N/A	N/A	N/A	
Hi-Solid Polyurethane	3.0 - 5.0 mils		N/A	N/A	N/A	N/A			
Fittings	Fittings	Ductile Iron Fittings C153 SSB / C110 FLG: (Water & Reclaimed Water fittings shall cement lined or holiday free fusion bonded epoxy lined per NACE standard RP0490). (Wastewater fittings interior shall be holiday free and coated with Protecto 401, or Permox-CTF)							
		American	30" & up	FBE / Cement	30" & up	FBE / Cement	30" & up	Protecto 401 / Permox-CTF	
		Sigma		FBE / Cement		FBE / Cement		Protecto 401 / Permox-CTF	
		SIP Industries		FBE / Cement		FBE / Cement		Protecto 401 / Permox-CTF	
		Star		FBE / Cement		FBE / Cement		Protecto 401 / Permox-CTF	
		Tyler Union & Clow		FBE / Cement		FBE / Cement		Protecto 401 / Permox-CTF	
	Fittings Bolt thru MJ Restraint	Ductile Iron fittings shall be FBE coating.							
		In Fact Corp	Foster Adapter MJ restraint		Foster Adapter MJ restraint		Foster Adapter MJ restraint		
		Star	Series 100 MJ x MJ adapter		Series 100 MJ x MJ adapter		Series 100 MJ x MJ adapter		
		SIP Industries	EZ GRIP MJ adapter		EZ GRIP MJ adapter		EZ GRIP MJ adapter		
	Fusion Fittings for HDPE	ASTM D2683. Electrofusion Fittings shall meet ASTM F1055 and installed per F1290. Per AWWA C906, the DR of HDPE fittings shall be the same or greater than the pipe to which the fitting will be joined.							
		George Fischer Central Plastics		Min. DR11		Min. DR11		Min. DR11	
		Plasson USA		Min. DR11		Min. DR11		Min. DR11	
IPEX			Min. DR11		Min. DR11		Min. DR11		
Specified Fittings			Min. DR11		Min. DR11		Min. DR11		
Strongbridge International Inc.			Min. DR11		Min. DR11		Min. DR11		

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS							
Revised: October 10, 2021									
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater		
			Model #	Comments	Model #	Comments	Model #	Comments	
Flow	Flow Meter	Flow Meters							
		Siemens	N/A	N/A	N/A	N/A	5100 with MAG 6000 Remote Transmitter		
		ABB	N/A	N/A	N/A	N/A	Water Master FEW		
Hydrants	Hydrants	Hydrants Shall open left, 1-1/2" Pentagon operating nut, NST hose & pumper thread, rotate 360 degrees, closed drains, epoxy on shoe in & out and 304 SS nuts & bolts below ground. Hydrant sizes shall be 36", 42", 48", or 54" only.							
		American Flow Control / American Darling	B-84-B-5 (6")		N/A	N/A	N/A	N/A	
		Clow	Medallion 2545 (5-1/4")		N/A	N/A	N/A	N/A	
		Mueller	Super Centurion 250 (5-1/4")		N/A	N/A	N/A	N/A	
	Hydrant MJ Offset Sweeps Adapters	Hydrants shall use MJ Swivel adapter to ensure hydrant is at proper grade. Risers shall not be permitted.							
		GradeLok	Swivel x Swivel		N/A	N/A	N/A	N/A	
		Star	MJ x Swivel		N/A	N/A	N/A	N/A	
Tyler Union		MJ x Swivel		N/A	N/A	N/A	N/A		
Joint Restraints	Ductile iron pipe MJ Restraints	Mechanical Joint Wedge-action Restraining Gland, Epoxy Coated Restrain ductile iron pipe to mechanical joint fittings, pipe and appurtenances.							
		EBAA Iron Inc	Megalug Series 1100		Megalug Series 1100		Megalug Series 1100		
		Ford / Uni-Flange	UFR-1400		UFR-1400		UFR-1400		
		Sigma	OneLok Series SLD/SLDE		OneLok Series SLD/SLDE		OneLok Series SLD/SLDE		
		Smith Blair	Cam Lok Series 111		Cam Lok Series 111		Cam Lok Series 111		
		Star	Star Grip Series 3000		Star Grip Series 3000		Star Grip Series 3000		
		Tyler Union	TufGrip Series TLD		TufGrip Series TLD		TufGrip Series TLD		
	Ductile Iron pipe Bell Joint Restraints (4"-12") (New & Existing)	Bell Joint Restraints for Ductile Iron Pipe (4"-12") (New & Existing) - All restraints split serrated on bell and spigot ends. Pipe 16" and greater shall have restraint gaskets or locking bells. (Wastewater only for restraint of existing DIP FM).							
		EBAA Iron Inc	Tru-Dual Series 1500TD		Tru-Dual Series 1500TD		Tru-Dual Series 1500TD		
		Ford / Uni-Flange	Uni-Flange Series 1390C		Uni-Flange Series 1390C		Uni-Flange Series 1390C		
		Sigma	PV-Lok Series PWP-C		PV-Lok Series PWP-C		PV-Lok Series PWP-C		
		Smith Blair	Bell-Lock Series 165		Bell-Lock Series 165		Bell-Lock Series 165		
		Star	StarGrip Series 3100S		StarGrip Series 3100S		StarGrip Series 3100S		
		Tyler Union	TufGrip-Series 300C		TufGrip-Series 300C		TufGrip-Series 300C		

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS							
Revised: October 10, 2021									
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater		
			Model #	Comments	Model #	Comments	Model #	Comments	
Joint Restraints	Ductile Iron Bell Joint Restraints (16" & Greater)	Ductile Iron Pipe Bell Joint Restraints for Ductile Iron Pipe (16" & Greater) - All restraints shall have a split back-up ring for the bell and a serrated or wedge action gland for the spigot end. New installation for water & reclaimed water piping 16" and greater shall have restraint gaskets or locking bells.							
		EBAA Iron Inc	Series 1100HD	Existing Only	Series 1100HD	Existing Only	Series 1100HD	Existing Only	
		Sigma	Series SSLDH	Existing Only	Series SSLDH	Existing Only	Series SSLDH	Existing Only	
		Star	Series 3100S	Existing Only	Series 3100S	Existing Only	Series 3100S	Existing Only	
	Ductile iron pipe Bell Joint Restraint Gaskets and Locking Bell (4" & Above)	Bell Joint Restraint Gaskets and Locking Bell (4" & Above) Stainless Steel locking wedges built into the gasket-rubber. ANSI/AWWA C111/A21.11 Standard for Rubber-Gasket Joints for Ductile Iron Pressure Pipe. Ductile Iron Bell Joint Restraint for Push-On Pipe- Locking bell joint system that prevents joint separation and allows for joint deflection. Bells shall be painted red to verify restrained gasket.							
		American	Fast Grip Gasket	Gasket	Fast Grip Gasket	Gasket	N/A	N/A	
			Flex-Ring Joint	Bell Lock	Flex-Ring Joint	Bell Lock	N/A	N/A	
			Lok-Ring Joint	Bell Lock	Lok-Ring Joint	Bell Lock	N/A	N/A	
		Griffin	Talon RJ Gasket	Gasket	Talon RJ Gasket	Gasket	N/A	N/A	
			Snap-Lok	Bell Lock	Snap-Lok	Bell Lock	N/A	N/A	
		McWane Ductile	Sure Stop 350 Gasket	Gasket	Sure Stop 350 Gasket	Gasket	N/A	N/A	
			TR-Flex	Bell Lock	TR-Flex	Bell Lock	N/A	N/A	
		US Pipe	Field Lok 350 Gasket	Gasket	Field Lok 350 Gasket	Gasket	N/A	N/A	
			Field Lok Gasket	Gasket	Field Lok Gasket	Gasket	N/A	N/A	
	TR-Flex		Bell Lock	TR-Flex	Bell Lock	N/A	N/A		
		HP Lok Restraint Joint	Bell Lock	HP Lok Restraint Joint	Bell Lock	N/A	N/A		
	PVC Pipe MJ Restraints	Mechanical Joint Wedge-action Restraining Gland, Epoxy Coated Restrain PVC pipe to mechanical joint fittings, and appurtenances.							
		EBAA Iron Inc	Mega-lug Series 2000PV		Mega-lug Series 2000PV		Mega-lug Series 2000PV		
			N/A	N/A	N/A	N/A	Megalug Series 2200	(42"-48")	
		Ford / Uni-Flange	UFR 1500 Series		UFR 1500 Series		UFR 1500 Series		
		Sigma	One Lok Series SLC/SLCE		One Lok Series SLC/SLCE		One Lok Series SLC/SLCE		
Smith Blair		Cam Lok Series 120		Cam Lok Series 120		Cam Lok Series 120			
Star		Star Grip Series 4000		Star Grip Series 4000		Star Grip Series 4000			
Tyler Union	TufGrip Series TLP		TufGrip Series TLP		TufGrip Series TLP				
PVC Bell Joint Restraints (4" - 12") (New & Existing)	PVC Bell Joint Restraints: PVC pipe Split Serrated on Bell End and Spigot End. (4" - 12") (New & Existing).								
	EBAA Iron Inc	Tru-Dual Series 1500TD		Tru-Dual Series 1500TD		Tru-Dual Series 1500TD			
	Ford / Uni-Flange	Uni-Flange Series 1390		Uni-Flange Series 1390		Uni-Flange Series 1390			
	Sigma	PV-Lok Series PWP		PV-Lok Series PWP		PV-Lok Series PWP			
	Smith Blair	Bell-Lock Series 165		Bell-Lock Series 165		Bell-Lock Series 165			
	Star	Series 1100		Series 1100		Series 1100			
	Tyler Union	TufGrip 300C		TufGrip 300C		TufGrip 300C			

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS						
Revised: October 10, 2021								
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	Comments
Joint Restraints	PVC Bell Joint Restraints (16" & Greater)	PVC Bell Joint Restraints: (16" & Greater) PVC pipe Split Serrated on Bell End and Spigot End. Water & Reclaimed Water Existing pipe only. Wastewater shall be new and existing pipe.						
		Ford / Uni-Flange	Series 1390	Existing Only	Series 1390	Existing Only	Series 1390	
		JCM	Sur-Grip Series 621	Existing Only	Sur-Grip Series 621	Existing Only	Sur-Grip Series 621	
		Sigma	PV-Lok PWP	Existing Only	PV-Lok PWP	Existing Only	PV-Lok PWP	
		Smith Blair	Bell-Lock Series 165	Existing Only	Bell-Lock Series 165	Existing Only	Bell-Lock Series 165	
		Star	Series 1100	Existing Only	Series 1100	Existing Only	Series 1100	
		Tyler Union	TufGrip Series 3000	Existing Only	TufGrip Series 3000	Existing Only	TufGrip Series 3000	
Pipe	PVC C900 Bell & Spigot	AWWA C-900 Bell & Spigot PVC Pipe: Minimum DR18 for water and reclaimed water. 4", 6", & 8" Dia only. Minimum DR18 for wastewater forcemains 4" to 24". Minimum DR21 for wastewater forcemains 30" and greater. Manufacturers shall be members in good standing with Uni-Bell to maintain approval status.						
		Diamond Plastics Corp	C-900	Blue	C-900	Pantone Purple	Diamond C900/Trans-21 DR18	Green
		Ipex Inc	C-900 Blue Brute	Blue	C-900	Pantone Purple	C900 Blue Brute / IPEX Centurion	Green
		JM Eagle	C-900	Blue	C-900	Pantone Purple	C-900	Green
		National Pipe & Plastics Inc	C-900 Dura-Blue	Blue	C-900	Pantone Purple	C-900 / C905	Green
		North American Pipe Corp (NAPCO)	C-900	Blue	C-900	Pantone Purple	C-900 / C905	Green
		North American Pipe Corp (NAPCO) 4" to 12"	Certa-Lok C900/ RJ DR18 (Directional Drill Only)	Blue NSF (Joint Coupled)	Certa-Lok C900/ RJ DR18 (Directional Drill Only)	Pantone Purple (Joint Coupled)	Certa-Lok C900/ RJ DR18 (Directional Drill Only)	Green (Joint Coupled)
	Sanderson Pipe Corp	C-900	Blue	C-900	Pantone Purple	C-900	Green	
	HDPE C906 DR11	HDPE Pipe DR11 AWWA C906 shall be Ductile Iron Pipe Size, PE 4710 DIPS manufactured in accordance with ASTM F-714 and listed with NSF. Pipe shall be marked in accordance with either AWWA C901, AWWA C906. Compression type connections are not acceptable in new installations. Pipe joints shall be butt fusion or electro-fusion with flange or adapter. All HDPE shall be color coded to the Utility. Color identifications are in accordance with the APWA/ULCC Uniform Color Code. Manufacturers shall be members in good standing with PPI to maintain approval status.						
		Charter Plastics, Inc		Blue Stripes		Pantone Stripes		Green Stripes
Flying W Plastics			Blue Stripes		Pantone Stripes		Green Stripes	
JM Eagle			Blue Stripes		Pantone Stripes		Green Stripes	
Performance Pipe (Chevron)			Blue Stripes		Pantone Stripes		Green Stripes	
Pipeline Plastics			Blue Stripes		Pantone Stripes		Green Stripes	
WL Plastics Corp			Blue Stripes		Pantone Stripes		Green Stripes	
TUBI		Blue Stripes		Pantone Stripes		Green Stripes		

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS							
Revised: October 10, 2021									
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater		
			Model #	Comments	Model #	Comments	Model #	Comments	
Pipe	Ductile Iron Pipe	Ductile iron/Cast iron: (4" to 12" = Class 350, 16" to 24" - Class 250, 30" to 64" = Class 200). Water and Reclaimed water shall be cement lined. Exterior coatings shall be Asphaltic or Zinc coating. Wastewater Piping shall be Holiday Free Protecto 401 or Permax-CTF. Exterior coatings as specified. Wastewater DIP piping shall be for pump station piping only. Manufacturers shall be members in good standing with DIPRA to maintain approval status.							
		American	Cement Lined	Blue	Cement Lined	Pantone Purple	Protecto 401 / Permax-CTF	Pump Station	
		McWaneDuctile	Cement Lined	Blue	Cement Lined	Pantone Purple	Protecto 401 / Permax-CTF	Pump Station	
		US Pipe	Cement Lined	Blue	Cement Lined	Pantone Purple	Protecto 401 / Permax-CTF	Pump Station	
	Polyethylene Encasement	Polyethylene encasement: Shall be required for all ductile iron pipe 24 inches and greater and installed in accordance with ANSI/AWWA A21.51/C105.							
		Trumbull	V-Bio ®	Blue PE tape	V-Bio ®	Purple PE tape	N/A	N/A	
		American	V-Bio ®	Blue PE tape	V-Bio ®	Purple PE tape	N/A	N/A	
		McWane Ductile	V-Bio ®	Blue PE tape	V-Bio ®	Purple PE tape	N/A	N/A	
		US Pipe	V-Bio ®	Blue PE tape	V-Bio ®	Purple PE tape	N/A	N/A	
	Sample Stations	Sample Station	Sample Stations - Bacteriological Sample Station with built in flush system, all internal piping to be 2", brass and includes lockable green enclosures.						
Safety-Guard			SG-BSS-05 with pedestal #77	Green Enclosure	N/A	N/A	N/A	N/A	
Water Plus Corp			Model 5000	Green	N/A	N/A	N/A	N/A	
Services	Brass Service Saddles PVC Pipe	Brass Service Saddles for 1" & 2" water & reclaimed water services on 4" through 8" (existing 12") PVC Mains - Service saddles shall be hinge or bolt controlled OD saddles to be used on C-900 and existing IPS OD PVC pipe. Shall be no lead brass.							
		Ford	Series S-70, S-90	4"-12"	Series S-70, S-90	4"-12"	N/A	N/A	
		AY McDonald	Model 3891 / 3895,3801 / 3805	4"-12"	Model 3891 / 3895,3801 / 3805	4"-12"	N/A	N/A	
		Mueller	Series S-13000 / H-13000	4"-12"	Series S-13000 / H-13000	4"-12"	N/A	N/A	
	Service Saddles	Service Saddles for 1" (CC) & 2" (Iron pipe threads) Water & Reclaimed Water services on mains greater than 12". Service saddles for 2" taps (iron pipe threads) on 4" mains and greater for Wastewater: Epoxy or nylon coated stainless steel 18-8-type 304 double straps, controlled O.D. saddles to be used on C-900 / C905 and DIP for all 1" and 2" taps on pipes over 12". Shall be no lead brass.							
		Ford	Series FC202	16" & greater	Series FC202	16" & greater	Series FC202	4" & greater	
		JCM	Series 406	16" & greater	Series 406	16" & greater	Series 406	4" & greater	
		Mueller	DR2S	16" & greater	DR2S	16" & greater	DR2S	4" & greater	
Romac		Series 202NS	16" & greater	Series 202NS	16" & greater	Series 202NS	4" & greater		
	Smith Blair	Series 317	16" & greater	Series 317	16" & greater	Series 317	4" & greater		

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS						
							Revised: October 10, 2021	
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	Comments
Services	Service Saddles for HDPE (Fusion fittings)	Service Saddles for 1" (CC) & 2" (Iron Pipe threads) Water and Reclaimed Water Services: Electrofusion service saddles to be used on HDPE for all 1-in and -2in taps. Taps to HDPE pipe shall be approved on a case by case basis. Shall be no lead brass.						
		George Fischer Central Plastics		Min. DR11		Min. DR11		Min. DR11
		Plasson USA		Min. DR11		Min. DR11		Min. DR11
		IPEX		Min. DR11		Min. DR11		Min. DR11
		Specified Fittings		Min. DR11		Min. DR11		Min. DR11
		Strongbridge International Inc.		Min. DR11		Min. DR11		Min. DR11
	1" Corporation Stops Ball Type	Corporation Stops Ball Type (1-inch with AWWA taper C threads only/pack joint outlet for CTS). Shall be no lead brass.						
		Ford	FB1000		FB1000		N/A	N/A
		AY McDonald	74701B-22		74701B-22		N/A	N/A
		Mueller	P25008		P25008		N/A	N/A
	2" Valves	Valves shall have a 2" operating nut. Water and Reclaimed water valve shall be resilient wedge gate valve with threaded ends. Wastewater valve shall be 316 SST plug valve with threaded ends.						
		American	Series 2500		Series 2500		N/A	N/A
		Clow	C509 THRD X THRD		C509 THRD X THRD		N/A	N/A
		Mueller	A-2362 RWGV - THDXTHD		A-2362 RWGV - THDXTHD		N/A	N/A
		Dezurk	N/A	N/A	N/A	N/A	Eccentric Plug	
		Henry Pratt Company	N/A	N/A	N/A	N/A	Ballcentric Plug	
		Val-Matic	N/A	N/A	N/A	N/A	Eccentric Plug	
	Curb Stops	Curb Stops - Straight Valves: Ball type compression 2" cts O.D. tubing by 2" FIP. Shall be no lead brass.						
		Ford	B41-777W		B41-777W		N/A	N/A
		AY McDonald	76102W-22		76102W-22		N/A	N/A
		Mueller	P25172		P25172		N/A	N/A
	Curb Stops	Curb Stops - Straight Valves: ball type compression x compression. Shall be no lead brass.						
		Ford	B44-444W		B44-444W		N/A	N/A
		AY McDonald	76100W-22		76100W-22		N/A	N/A
		Mueller	P25146		P25146		N/A	N/A
	PE tubing	Polyethylene tubing: AWWA C901 or C904. UV protection (SDR-9) 1-inch and 2-inch only. PE 4710						
		Endot	Endopure Blue	Blue	Endocore Lavender	Purple	N/A	N/A
		JM Eagle	Pure-Core	Blue	N/A	N/A	N/A	N/A
Advanced Drainage Systems, Inc.		PolyFlex 4710	Blue	PolyFlex 4710	Purple	N/A	N/A	
REHAU		Municipex	Blue	Municipex	Purple	N/A	N/A	

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS							
Revised: October 10, 2021									
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater		
			Model #	Comments	Model #	Comments	Model #	Comments	
Tapping Sleeves and Valves	Line Stops	Line Stops with stainless steel nuts and bolts. Working pressure shall be minimum 150 psi.							
		Team Insert Valve	4"-12"	MJ DI Resilient Wedge Gate Valve	4"-12"	MJ DI Resilient Wedge Gate Valve	N/A	N/A	
		JCM	440 Series		440 Series		440 Series	Fabricated 316 SST	
		Smith Blair	680 Series		680 Series		N/A	N/A	
	Tapping Sleeves	Tapping Sleeves: (Mechanical joint for taps on cast iron, ductile iron, PVC & AC pipe, including size on size) with stainless steel nuts and bolts. Working Pressure shall be minimum 150 psi. Wastewater tapping sleeves shall be fabricated 316SST. MJ gland ends shall meet AWWA C-110/C-111.							
		American Flow Control	Series 2800	FBE	Series 2800	FBE	N/A	N/A	
		JCM	414 Series	FBE	414 Series	FBE	414 Series	Fabricated 316 SST	
		Mueller	Series H-615	DIP/PVC	Series H-615	DIP/PVC	N/A	N/A	
			Series H-619	A/C Pipe	Series H-619	A/C Pipe	N/A	N/A	
		Smith Blair	Style 624	FBE	Style 624	FBE	N/A	N/A	
	Ford	MJTS-xxxx style	FBE	MJTS-xxxx style	FBE	N/A	N/A		
	Tapping Valves: 12" and smaller	Tapping Valves: 12" and smaller - Tapping Valves shall be furnished with an alignment lip and installed in the vertical position for Water and Reclaim Water. Wastewater shall be installed horizontally and abandoned in the open position. Tapping valves shall be resilient seated only and meet the requirements of AWWA C509 or C515 All hardware for valve construction shall be 304 SS nuts and bolts.							
		American Flow Control	Series 2500	Alignment Lip	Series 2500	Alignment Lip	Series 2500	Alignment Lip	
		Clow	Series F-6114	Alignment Lip	Series F-6114	Alignment Lip	Series F-6114	Alignment Lip	
		Mueller	Series T2361 (4"-12")	Alignment Lip	Series T2361 (4"-12")	Alignment Lip	Series T2361 (4"-12")	Alignment Lip	
	Tapping Valves: 16" and Larger	Tapping Valves: 16" and Larger - Tapping valves shall be furnished with an alignment lip and be installed in the vertical position for Water and Reclaimed Water. No tapping valve shall be installed horizontally for Water and Reclaim Water unless approved by the engineer. Tapping Valves 16" and larger AWWA C515 resilient seated only (16" and 24" no gearing required) above 24" shall be installed vertically with a spur gear actuator unless noted by the engineer. All tapping valves above 24" shall be furnished with NPT pipe plugs for flushing the tracks when valves are installed horizontally. Tapping valves for Wastewater shall be installed horizontally and abandoned in open position. All hardware for valve construction shall be 304 SS nuts and bolts							
		American Flow Control	Series 2500	Alignment Lip & flushing port	Series 2500	Alignment Lip & flushing port	Series 2500	Alignment Lip & flushing port	
		Clow	Series F-6114	Alignment Lip & flushing port	Series F-6114	Alignment Lip & flushing port	Series F-6114	Alignment Lip & flushing port	
		Mueller	Series T2361 (14"&up)	Alignment Lip & flushing port	Series T2361 (14"&up)	Alignment Lip & flushing port	Series T2361 (14"&up)	Alignment Lip & flushing port	

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS						
							Revised: October 10, 2021	
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	Comments
Valves	Butterfly Valve 42" and Above	Butterfly Valves 42" and above. AWWA C504. Actuators input torques based on 150 psi valve pressure and 16 fps velocity with a maximum input of 80 ft-lb on 2" nuts and shall withstand 250 ft-lbs. Valve seats shall be leak-tight in both directions at 150 psi. Horizontal shaft and no rubber seat on disc. Only approved valve actuators shall be accepted.						
		Dezurik	BAW		BAW		N/A	N/A
		Mueller / Pratt	LINSEAL III / Groundhog		LINSEAL III / Groundhog		N/A	N/A
	Check Valves	Valves (Check) 4-inch and Larger (8 mil epoxy lined)						
		American Flow Control	N/A	N/A	N/A	N/A	Series 600 or 50 line	
		Clow / M&H / Kennedy	N/A	N/A	N/A	N/A	106	
		Mueller	N/A	N/A	N/A	N/A	Series 2600	
		Dezurik / APCO	N/A	N/A	N/A	N/A	250LW Series	
	Gate Valves (12" and less)	Gate Valves 12" and smaller - resilient seated only AWWA C509 or C515. Valve seat shall be leak-tight in both directions at 150 psi. All hardware for valve construction shall be 304 SS nuts and bolts.						
		American Flow Control	Series 2500		Series 2500		N/A	N/A
		Clow	Series F-6100 (2638)		Series F-6100 (2638)		N/A	N/A
		Mueller	Series A-2361		Series A-2361		N/A	N/A
	Gate Valves (Vertical) 16" and Up	Gate Valves 16" and larger (Vertical Installation) AWWA C515 resilient seated only (16" and 24" no gearing required) above 24" shall be installed vertically with a gear actuator unless noted by the engineer. Valve seat shall be leak-tight in both directions at 150 psi. All hardware for valve construction shall be 304 SS nuts and bolts.						
		American Flow Control	Series 2500		Series 2500		N/A	N/A
		Clow	Series F-6100 (2638)		Series F-6100 (2638)		N/A	N/A
		Mueller	Series A-2361		Series A-2361		N/A	N/A
	Plug Valves	Plug Valves - Bi-directional, MJ & Flanged (min. 8mil epoxy with stainless steel bolts), gear operator to be sized for rated pressure of the valve. Plug valves shall be eccentric, 100% port rectangular plug. Valves up to 12" shall be factory tested to minimum 175PSI in both directions. Valves larger than 12" shall be factory tested to 160 psi in both directions. Only approved valve actuators shall be accepted. Gear box shall be AWWA certified. A torque limiting / over-torque protector device shall be permanently mounted to valves 16" and larger. Actuator name plate or ID tag shall include "OCU spec".						
		Clow / M&H / Kennedy	N/A	N/A	N/A	N/A	Eccentric (FLG / MJ)	4" & up
		Dezurik	N/A	N/A	N/A	N/A	Series PEF or PEC (FLG / MJ)	4" & up
		Val-Matic	N/A	N/A	N/A	N/A	5600F or 5700F (FLG / MJ)	4" & up
Valve Actuators (Plug & Butterfly Valves)	Valve actuators are required for all plug (4" and greater) and butterfly valves. Shall be modified at minimum to OCU specs including, IP68 rated at 50' for buried service and IP67 for above ground installation. Actuator designed to withstand, without damage, an input torque of 300 ft. lbs. Actuator name plate or ID tag shall include "OCU spec". Gear box shall be AWWA certified. A torque limiting / over-torque protector device shall be permanently mounted to valves 16" and larger.							
	Limatorque	HBC		HBC		HBC		
		WG series (300)(IP68-50)	Modified to OCU spec		WG series (300)(IP68-50)	Modified to OCU spec	WG series (300)(IP68-50)	Modified to OCU spec
	Rotork	IW-RL-MD-RAW	Modified to OCU spec		IW-RL-MD-RAW	Modified to OCU spec	IW-RL-MD-RAW	Modified to OCU spec
	AUMA	GS-OCU	Modified to OCU spec		GS-OCU	Modified to OCU spec	GS-OCU	Modified to OCU spec

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS						
							Revised: October 10, 2021	
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	Comments
Valve Boxes	Valve Boxes with Heavy Duty Lids (Cast Iron)	Two piece standard screw type Heavy Duty Valve Boxes with Heavy Duty Lids (Cast Iron) and type of service cast in heavy duty traffic lid (H20 loading) ASTM A48. Lids shall be powder coated and have OCU Logo per STANDARD DRAWING. Heavy duty lids shall be min. 5" length including a min. 4" skirt/vane length and minimum 22 lbs.						
		Bingham/Taylor	Series 4905	Box	Series 4905	Box	Series 4905	Box
			4905-X	Extension	4905-X	Extension	4905-X	Extension
			CUL5LHVTSK4OCW-B	Blue WATER Lid	CUL5LHVTSK4OCR-P	Purple RECLAIM Lid	CUL5LHVTSK4OCS-G	Green SEWER Lid
		EJ	6800 series	Blue WATER Lid	6800 series	Purple RECLAIM Lid	6800 series	Green SEWER Lid
		Sigma	Series VB 261X-268X	Box	Series VB 261X-268X	Box	Series VB 261X-268X	Box
			VB 6302	Extension	VB-6302	Extension	VB 6302	Extension
		Star	Series VB462SHD35	Box	Series VB462SHD35	Box	Series VB462SHD35	Box
			VBEX 12-24S	Extension	VBEX 12-24S	Extension	VBEX 12-24S	Extension
			VBLIDOCUW (Water) VBLIDOCUWFH (Hydrant)	Blue or Silver WATER Lid	VBLIDOCUR	Purple RECLAIM Lid	VBLIDOCUS	Green SEWER Lid
		Tyler Union	Series 6850	Box	Series 6850	Box	Series 6850	Box
			58, 59, 60	Extension	58, 59, 60	Extension	58, 59, 60	Extension

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS						
Revised: October 10, 2021								
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	Comments
Coatings	Anti-Graffiti Paint	Block Walls-Anti-Graffiti Paint per Section 3119 "Coatings & Linings".						
		American Building Restoration Products	N/A	N/A	N/A	N/A	Polyshield Graffiti Preventer for Unpainted Masonry Type B	Super Bio Strip or Strip it all
		Tnemec / Chemprobe	N/A	N/A	N/A	N/A	626 DUR A PEL	680 Mark A Way
		Professional Products of Kansas, Inc	N/A	N/A	N/A	N/A	Professional Water Seal & Anti-Graffiti (PWS-15 Super Strength)	Professional Phase II Cleaner
	Sherwin Williams	N/A	N/A	N/A	N/A	1K Siloxane		
	Coatings for Existing Manholes	Rehabilitation corrosion protection system per Section 3119 "Coatings & Linings". Interior coating for force main connections to existing concrete manholes only. New precast structures and existing pump stations shall be lined.						
		Kerneos Aluminate Technologies	N/A	N/A	N/A	N/A	Sewpercoat	min 1,000 mils (1")
		Raven Lining System	N/A	N/A	N/A	N/A	Raven 171 Primer Raven 405	min 8 mils min 125 mils
		Sauereisen	N/A	N/A	N/A	N/A	210 Series Topcoat Glaze 210G	min 125 mils min 20 mils
		Tnemec	N/A	N/A	N/A	N/A	Series 434 Topcoat Glaze 435	min 125 mils 15-20 mils
Sprayroq		N/A	N/A	N/A	N/A	SprayWall	min 250 mils	
PVC Pipe and fittings	Pipe SDR 26 Gravity Mains	PVC Pipe for Gravity (including service laterals) SDR26 (Green in color) ASTM D3034 and ASTM F679. Manufacturers shall be members in good standing with Uni-Bell to maintain approval status.						
		Diamond Plastics Corp	N/A	N/A	N/A	N/A	Sani-21 SDR-26	
		JM Eagle	N/A	N/A	N/A	N/A	Gravity Sewer	
		National Pipe & Plastics, Inc.	N/A	N/A	N/A	N/A	Ever-Green Sewer Pipe	
		North American Pipe Corp (NAPCO)	N/A	N/A	N/A	N/A	Gravity Sewer	
	Sanderson Pipe Corp	N/A	N/A	N/A	N/A	Gravity Sewer		
	Locate Balls	Locating Marker Systems - Wastewater Locator balls placed at all sanitary sewer cleanouts						
3M	N/A	N/A	N/A	N/A	3M™ EMS 4" Extended Range 5' Ball Marker 1404-XR			

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS						
Revised: October 10, 2021								
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	Comments
PVC Pipe and fittings	Fittings SDR 26/35	Fittings, Adapters and Plugs - Gravity PVC ASTM-D3034, Min SDR26 / SDR 35						
		GPk Products, Inc.	N/A	N/A	N/A	N/A	SDR26/SDR35 Gasketed sewer fittings	
		Harrington Corporation (HARCO)	N/A	N/A	N/A	N/A	SDR26/SDR35 Gasketed sewer fittings	
		Multi Fittings Corp.	N/A	N/A	N/A	N/A	SDR26/SDR35 Trench Tough sewer fittings	
		JM Eagle	N/A	N/A	N/A	N/A	SDR26/SDR35 Gasketed sewer fittings	
		Plastic Trends Inc	N/A	N/A	N/A	N/A	SDR26/SDR35 Gasketed sewer fittings	
	TIGRE USA, Inc.	N/A	N/A	N/A	N/A	SDR26/SDR35 Gasketed sewer fittings		
	Gravity Pipe Transition	Connectors and Transitions for differential pipe.						
		Maxadapter	N/A	N/A	N/A	N/A	Universal Shielded Sewer coupling	6"-12"
	Precast Concrete Structures	MH Lids	Frame and Cover					
EJ			N/A	N/A	N/A	N/A	08107127A01	
Neenah Foundry			N/A	N/A	N/A	N/A	R-1225	
Hatches		USF Fabrication Inc.	N/A	N/A	N/A	N/A	USF 225-AS	
		Wet Well Access Frames and Covers (Include the term "Confined Space" etched or cast into the cover with recessed lock & hasp. Frames and covers per manufacturers' specifications. (6' wet well hatch shall encompass entire top)						
		Halliday Products	N/A	N/A	N/A	N/A	S1R or S2R Series	
		USF Fabrication Inc.	N/A	N/A	N/A	N/A	APS or APD Series	
Precast Concrete Structures		EJ	N/A	N/A	N/A	N/A	CLS Series	
		Precast Manhole and Wetwell Structures ASTM C478. Precast concrete shall be batched with integral colorant crystalline waterproofing admixture with corrosion resistance. Concrete without admixture or without color tint /tracer shall be rejected. Minimum wall thickness shall be 6".						
		Allied Precast	N/A	N/A	N/A	N/A		Dyed Admix
		Atlantic Concrete Products, Inc.	N/A	N/A	N/A	N/A		Dyed Admix
		Delzotto Products, Inc.	N/A	N/A	N/A	N/A		Dyed Admix
		Forterra Pipe & Precast	N/A	N/A	N/A	N/A		Dyed Admix
		Mack Concrete	N/A	N/A	N/A	N/A		Dyed Admix
		Oldcastle Precast	N/A	N/A	N/A	N/A		Dyed Admix
Standard Precast Inc.		N/A	N/A	N/A	N/A		Dyed Admix	
Concrete Admix		Crystalline Waterproofing Concrete Admix with color dye shall be added to all concrete structures (precast and cast-in-place) to provide waterproofing and corrosion resistance. Concrete without admixture or without color tint / tracer shall be rejected. % concentration of admix with "RED" colored dye added to the mix shall be based on weight of cement.						
	Xypex Chemical Corp	N/A	N/A	N/A	N/A	Xypex Admix C-1000 Red	3.0 - 3.5%	
	Xypex Chemical Corp	N/A	N/A	N/A	N/A	Xypex Admix C-500 NF Red	2.0 - 2.5%	
Master Builders Solutions	N/A	N/A	N/A	N/A	MasterLife 300D Red	2.5 - 3.0%		

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS						
								Revised: October 10, 2021
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	Comments
Precast Concrete Structures	Liners	Interior Liner for new or existing Precast Manhole and Precast Wetwell Structures per Section 3119 "Coatings & Linings"						
		AFE	N/A	N/A	N/A	N/A	Fiberglass Liner	
		AGRU Liner	N/A	N/A	N/A	N/A	HDPE Liner (Min 2 mm for Manhole / Min 5 mm for Pump Station)	
		Containment Solutions Inc. (Flowtite)	N/A	N/A	N/A	N/A	Fiberglass Liner	
		GSE Studliner	N/A	N/A	N/A	N/A	HDPE Liner (Min 2 mm for Manhole / Min 5 mm for Pump Station)	
		L&F Manufacturing	N/A	N/A	N/A	N/A	Fiberglass Liner	
	Heat Shrink Seal	Heat Shrink Seal - Precast structures shall be primed with manufacturer approved primer prior to application of heat shrunk encapsulation.						
		Canusa-CPS	N/A	N/A	N/A	N/A	Wrapid Seal with WrapidSeal Primer (Canusa G Primer)	
		GPT	N/A	N/A	N/A	N/A	Riser Wrap with Polyken 1027 or 1039 primer	
	Joining Material	Joining Material Min. 2" width for all products to ensure squeeze out with manufacturer approved primer.						
		Henry Company	N/A	N/A	N/A	N/A	Ram-Nek RN100 Series	
		Martin Asphalt Company / Del Zotto Products	N/A	N/A	N/A	N/A	Evergrip 990	
		Trelleborg Pipe Seals	N/A	N/A	N/A	N/A	NPC – Bidco C-56	
		ConSeal, Concrete Sealants Inc.	N/A	N/A	N/A	N/A	CS-102 Joint Sealant	

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS						
								Revised: October 10, 2021
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	Comments
Precast Concrete Structures	Resilient Connector Pipe Seals, Manhole. Gravity	Resilient Connector Pipe Seals, Manhole - Gravity less than 12-inch and less than 15-ft deep						
		Atlantic Concrete	N/A	N/A	N/A	N/A	A-Lok STM (cast-in-place)	
		Vertex, Inc	N/A	N/A	N/A	N/A	Star Seal (cast-in-place)	
		IPS	N/A	N/A	N/A	N/A	Wedge Style	
		NPC / Trelleborg	N/A	N/A	N/A	N/A	Kor-N-Seal Model WS	
		Press-Seal Corporation	N/A	N/A	N/A	N/A	PSX Direct Drive	
	Cast in Place Pipe Seals, Manhole. Gravity	Cast in Place Pipe Seals, Manhole - Gravity Greater Than or Equal to 12-inch and all pipe sizes greater than 15-ft deep						
		Atlantic Concrete	N/A	N/A	N/A	N/A	A-Lok, STM	
		Press-Seal Corporation	N/A	N/A	N/A	N/A	Cast-A-Seal 12-08	
		Vertex, Inc	N/A	N/A	N/A	N/A	Star Seal	
	Modular Pipe Seals, Wetwell, Manhole, Foremain	Modular Pipe Seals for Wetwell penetrations and for all forcemain connections to existing and new precast concrete structures. EPDM Rubber with 316 SS Hardware						
		CCI Pipeline Systems	N/A	N/A	N/A	N/A	Wrap-It Link WL-SS Series	
		Pipeline Seal & Insulator, Inc / Link Seal	N/A	N/A	N/A	N/A	Link-Seal S-316 Modular Seal	
		Proco Products, Inc	N/A	N/A	N/A	N/A	PenSeal ES-PS Series	

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS							
Revised: October 10, 2021									
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater		
			Model #	Comments	Model #	Comments	Model #	Comments	
Generator	Generator	Generator Systems, Fixed Shall be UL 2200 Certified. Monitoring equipment shall be Pneumercator, Veeder-Root, or Omntec only.							
		Caterpillar	N/A	N/A	N/A	N/A	CAT Diesel Generator Set		
		Cummins Power Generation	N/A	N/A	N/A	N/A	Diesel Generator Set		
	Fuel Tanks	Generator Fuel Tanks. Shall be UL2085 certified and Fireguard rated.							
		Modern Welding	N/A	N/A	N/A	N/A	Fireguard	UL-2085	
		Phoenix	N/A	N/A	N/A	N/A	Envirovault	UL-2085	
		Envirosafe	N/A	N/A	N/A	N/A	Fireguard	UL-2085	
	GR	Generator Receptacle (GR)							
		Cooper Crouse-Hinds	N/A	N/A	N/A	N/A	AR2042 (230V, 200A, 3P, 4W)	With AJA1 Angle Adaptor	
		Cooper Crouse-Hinds	N/A	N/A	N/A	N/A	AR2042-S22 (460V, 200A, 3P, 4W)	With AJA1 Angle Adaptor	
		Pyle National	N/A	N/A	N/A	N/A	JRE-4100 (230V, 100A, 3P, 4W)		
	ATS	Generator Transfer Switch							
		Russelectric	N/A	N/A	N/A	N/A	RMTD Series with model 2000 controller	NEMA 12/3R 316SS Enclosure	
Odor Control Units	Biotrickling Filters	Biotrickling filters							
		BioAir	N/A	N/A	N/A	N/A	EcoPure® Bio Tricking Filter		
		Biorem	N/A	N/A	N/A	N/A	Biosorbens BTF		
	Carbon Adsorption Units	Carbon Adsorption Units							
		Calgon	N/A	N/A	N/A	N/A			
		Pure Air Filtration	N/A	N/A	N/A	N/A			
		Evoqua	N/A	N/A	N/A	N/A			
	Grease Filter / Mist Eliminator	Grease Filter / Mist Eliminator Units							
		Perry Fiberglass Products, Inc.	N/A	N/A	N/A	N/A	Perry Fiberglass H (horizontal) and V (vertical) series		

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS							
Revised: October 10, 2021									
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater		
			Model #	Comments	Model #	Comments	Model #	Comments	
Pressure Transmitter	Pressure Transmitter	Pressure Transmitter							
		Ametek	375 AG375FB0100GLSVX40FT		N/A	N/A	N/A	N/A	
		ABB	N/A	N/A	N/A	N/A	AB 266HRHPRRA		
		Siemens	P200 7MF1565-4BG00-5GD1NA		N/A	N/A	7MF 4033 / 7MF4860		
Pumps	Pumps	Submersible Pumps							
		ABS	N/A	N/A	N/A	N/A			
		Flygt	N/A	N/A	N/A	N/A			
	Floats	Float Regulator (FR) - Duplex and Triplex Pump Stations							
		Anchor Scientific	N/A	N/A	N/A	N/A	Roto-Float		
	Level Transducer	Level Transducer							
		Siemens	N/A	N/A	N/A	N/A	Sitrans LR560	Quadplex and above	
Sitrans LR120							Duplex and Triplex		
Pulsar		N/A	N/A	N/A	N/A	DBI10	Duplex and Triplex		
Pump Station Main Service	Main Service Disconnect	Main Service Disconnect Breaker							
		Square D	N/A	N/A	N/A	N/A	H or J Frame 3 Pole 600 Volt (HGL or JGL determined by amperage)		
	Surge Protector Device	Surge Protector - UL 1449, 3rd Edition listed and labeled, minimum 10 year warranty, NEMA LS-1 and IEEE C62, 41/45 tested with NEMA 4X enclosure, internal fusing, voltage and phase to match service. Rated 80,000 amps per mode for Duplex & Triplex stations and 150,000 Amperes per mode for Master Stations. All devices shall be provided with a NEMA 4X Plastic enclosure which is approved in lieu of stainless steel.							
		Current Technology (Power & Systems Innovations)	N/A	N/A	N/A	N/A	XN-80, TG-150 or CurrentGuard 150 Plus Series		
		Joslyn AKA (Total Protection Solutions)	N/A	N/A	N/A	N/A	TSS-ST 160 Series, ST 300 Series or JSP-300 Series		
Surge Suppressors, Inc	N/A	N/A	N/A	N/A	LSE Series or SHL Series				
Sub Panel	Sub Panel	Sub-Panel Enclosure - NEMA 12/3R Enclosure 316SS, white polyester powder coated-finish inside and out, with 3 Point Pad lockable Handle, and Door Stop							
		Hoffman	N/A	N/A	N/A	N/A			
		Schaefer	N/A	N/A	N/A	N/A			
		Universal enclosure systems	N/A	N/A	N/A	N/A			

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS						
							Revised: October 10, 2021	
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	Comments
Pump Station Control Panel	SCADA & Control Panel	SCADA & Control Panel Supplier						
		ECS	N/A	N/A	N/A	N/A		
		Sta-Con Inc	N/A	N/A	N/A	N/A		
	Enclosure	Enclosure - NEMA 12/3R Enclosure 316SS, white polyester powder coated finish inside and out, with 3 Point Pad lockable Handle, and Door Stop						
		Hoffman	N/A	N/A	N/A	N/A		
		Schaefer	N/A	N/A	N/A	N/A		
		Universal enclosure systems	N/A	N/A	N/A	N/A		
	Mnts	Mounting Channel for Enclosures						
		Unistrut Stainless Steel	N/A	N/A	N/A	N/A	1" 5/8 x 1" 5/8 316 SS	
	Sealoff	Explosion-Proof Sealoff						
		Cooper Crouse-Hinds	N/A	N/A	N/A	N/A	EYSR	
	FL	Flasher (FL)						
		MPE	N/A	N/A	N/A	N/A	025-120-105	
		SSAC	N/A	N/A	N/A	N/A	FS-126	
	AL	Alarm Light / With Base and Globe (AL)						
		Federal Signal	N/A	N/A	N/A	N/A	141ST-120-R	
	AH	Alarm Horn (AH)						
		Wheelock	N/A	N/A	N/A	N/A	3IT-115-R	
	Fuse	Fuses (F)						
		Bussmann	N/A	N/A	N/A	N/A	FNQ-R or KTK-R	
	HOA	Hand-Auto-Off Selector (HOA)						
Square D		N/A	N/A	N/A	N/A	9001-SKS43B		
HSS	Horn Silence Button (HSS)							
	Square D	N/A	N/A	N/A	N/A	9001-SKR1RH5		
Inter-lock	Mechanical Interlock							
	Square D	N/A	N/A	N/A	N/A	S29354		

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS							
Revised: October 10, 2021									
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater		
			Model #	Comments	Model #	Comments	Model #	Comments	
Pump Station Control Panel	Breakers	Control Panel Main Circuit Breaker (MCB) With S29450 Circuit Breaker Auxiliary Switch							
		Square D	N/A	N/A	N/A	N/A	H or J Frame 3 Pole 600 Volt	(HGL or JGL determined by amperage)	
		Emergency Circuit Breaker (ECB) With S29450 Circuit Breaker Auxiliary Switch							
		Square D	N/A	N/A	N/A	N/A	H or J Frame 3 Pole 600 Volt	(HGL or JGL determined by amperage)	
		Motor Circuit Breaker (MB)							
	Square D	N/A	N/A	N/A	N/A	H or J Frame 3 Pole 600 Volt	(HGL or JGL determined by amperage)		
	Control Circuit Breaker / GFCI Receptacle Breaker / SCADA Breaker								
	Square D	N/A	N/A	N/A	N/A	QOU120			
	MS	Motor Starter (MS)							
		Square D	N/A	N/A	N/A	N/A	Type S Class 8536 or IEC		
	OL	Overload Heater(OL)							
		Square D	N/A	N/A	N/A	N/A	Part number will vary with size needed		
	OR	Overload Reset							
		Square D	N/A	N/A	N/A	N/A	9066-RA1		
	Transformer	Control Circuit Transformer (XMFR)							
		Square D	N/A	N/A	N/A	N/A	9070TF75D23	120/24 Volt .075 KVA	
		Main Circuit Transformer (MCT)							
		Square D	N/A	N/A	N/A	N/A	9070T2000D1	480/120 2KVA	
	Switch	Combination Transformer and Panel							
		Square D	N/A	N/A	N/A	N/A	Mini power zone, 316 SS		
SPB	Supplemental Protector Breaker - 3 pole, 1-amp for Phase Monitor								
	Square D	N/A	N/A	N/A	N/A	MG24532			
Switch	Control Panel Lighting, 2 position switch								
	Square D	N/A	N/A	N/A	N/A	9001 SKS11B			

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS						
		Revised: October 10, 2021						
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	Comments
Pump Station Control Panel	PM	Phase Monitor (PM)						
		MPE 240 & 480V.	N/A	N/A	N/A	N/A	001-DVM-118-ORCO	
	Pump Alternator	Pump Automatic Alternator (PAA)						
		Diversified Duplex	N/A	N/A	N/A	N/A	ARB-120-ACA	
		Diversified Triplex	N/A	N/A	N/A	N/A	ARA-120-AME	
		MPE Duplex	N/A	N/A	N/A	N/A	008-120-13SP	
		MPE Triplex	N/A	N/A	N/A	N/A	009-120-23P	
		MPE Triplex Socket	N/A	N/A	N/A	N/A	SD-12-PC	
	Alt. Test Switch	Alt. Test Switch						
		Carling Technologies	N/A	N/A	N/A	N/A	6GG5E-78	
		Honeywell	N/A	N/A	N/A	N/A	2TL1-50	
	Relay	Relay						
		Potter Brumfield 24 Volt	N/A	N/A	N/A	N/A	KRPA-11AN-24	
		Potter Brumfield 120 Volt	N/A	N/A	N/A	N/A	KRPA-11AN-120	
		Square D 24 Volt	N/A	N/A	N/A	N/A	8501KP12P14V14	
		Square D 120Volt	N/A	N/A	N/A	N/A	8501KP12P14V20	
	Relay Base	Relay Base						
		IEDC 8 Pin Relay Base 600 Volt	N/A	N/A	N/A	N/A	SR2P-06	
	Duplex Receptacle / GFCI	Duplex Receptacle/GFCI (DR) Upgraded to 20 Amp						
		Hubbell	N/A	N/A	N/A	N/A	GFTR20BK	
		Pass & Seymour	N/A	N/A	N/A	N/A	2095TRBK	
	ETM	Elapse Time Meter (ETM)						
		Reddington	N/A	N/A	N/A	N/A	711-0160	
	Grounding	Grounding System						
		Marathon	N/A	N/A	N/A	N/A	Neutral Isolation Block 1421570	
		Panduit	N/A	N/A	N/A	N/A	Ground Lug LAM2A 1/0 - 014 - 6Y	
		Square D	N/A	N/A	N/A	N/A	Ground Buss PK7GTA	
	TS	Terminal Strip (TS)						
	Marathon	N/A	N/A	N/A	N/A	Series 200		
	Square D	N/A	N/A	N/A	N/A	9080GR6		

Appendix D		LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS						
							Revised: October 10, 2021	
Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	Comments
Pump Station Control Panel	TS	Terminal Strip End Blocks and End Clamps						
		Square D	N/A	N/A	N/A	N/A	9080GM6B & 9080GH10	
	PL	Pilot Light (PL) 24 Volt						
		IDEC	N/A	N/A	N/A	N/A	APP22M-2Q4A	
RL	Run Indicator Light (RL) 120 Volt							
	IDEC	N/A	N/A	N/A	N/A	APP22M-2QHG		
MT	Moisture and Temperature Failure Light (MT) 120 Volt with 120MB Bulb							
	IDEC	N/A	N/A	N/A	N/A	APP22M-2Q4R		
Sluice	Sluice Gate	Sluice Gate for Wet Well with Motorized Operator						
		Rodney Hunt	N/A	N/A	N/A	N/A	Series A - 113 SS	
		Fontaine	N/A	N/A	N/A	N/A	Model 20 - 316 SS	
VFD	VFD	Variable Frequency Drives						
		Square D	N/A	N/A	N/A	N/A		
Soft Starts	Soft Starts	Soft Starts						
		Square D	N/A	N/A	N/A	N/A	Below 25 HP – Altistart 22 25 HP and above – Altistart 48	

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX E

ERU/ERC DESIGN FACTORS

October 10, 2021

Table E-1. ERU/ERC Factors^{1,2}

Establishment		Unit	ERU/ERC Factor
Residential			
	Single-family home, detached or townhome, with water meter less than 1 inch	Home	1.000
	Single-family home, with water meter 1 inch or larger	By fixture units	N/A ³
	Duplex, 1 or 2 bedrooms	Each half of duplex	0.833
	Duplex, 3 or more bedrooms	Each half of duplex	1.000
	Multifamily, efficiency or 1 bedroom ⁴	Apartment	0.500
	Multifamily, 2 or more bedrooms ⁴	Apartment	0.833
	Mobile home, 1 or 2 bedrooms	Home	0.667
	Mobile home, 3 or more bedrooms	Home	0.833
Non-residential⁵			
	Animal care facility/veterinary clinic	Kennel, cage, or stall	0.091
	Bowling alley (add for restaurant and bar seats that are separated)	Bowling lane	0.333
	Church (add for residences, weekday schools, and daycare facilities)	Seat	0.017
	Hair salon (add 0.3 ERCs for each pedicure station)	Operator station	0.300
	Hotel room or one-bedroom hotel suite (add for food service, meeting and banquet rooms, self-service laundries, and major facilities attracting non-guests)	Room or suite	0.500
	Hotel suite, two or more bedrooms (add for food service, meeting and banquet rooms, self-service laundries, and major facilities attracting non-guests)	Suite	0.833
	Industrial/production facility, without showers (add for food service and industrial/production process demands) ²	Employee	0.050
	Industrial/production facility, with showers (emergency showers not included, add for food service and industrial/production process demands) ²	Employee	0.117

APPENDIX E

ERU/ERC DESIGN FACTORS

October 10, 2021

Table E-1. ERU/ERC Factors^{1,2}

	Establishment	Unit	ERU/ERC Factor
	Irrigation (ERC only)	1,000 sq. ft. of irrigable area	0.159
	Laundry, self-service	W a s h i n g machine	1.333
	Office building (add for food service)	1,000 sq. ft. gross floor area	0.334
	Retail space	By fixture units	N/A ³
	Shell building (unfinished space) with fixtures present (Exception: if building is multi-unit with fixtures located in common areas, apply “office building” factor instead of fixtures)	By fixture units	N/A ³
	Trailer park (overnight)	Each space	0.333
	Warehouse/office, 3,000 sq. ft. or less	By fixture units	N/A ³
	Warehouse/office, larger than 3,000 sq. ft.	By “office building” factor for office area. Warehouse area by bathroom fixture units as required by Plumbing Code (2 WC, 2 Lav, & 1 D.F.) plus any non-bathroom fixtures located in warehouse area	

APPENDIX E

ERU/ERC DESIGN FACTORS

October 10, 2021

Table E-1. ERU/ERC Factors^{1,2}

Establishment	Unit	ERU/ERC Factor
Food Service		
<ul style="list-style-type: none"> • If a restaurant eligible for a 25% capital charge reduction for the first 100 seats has mixed bar/restaurant seating, the reduction will apply to restaurant seats first, then to bar seats • Fast food classification applies to facilities with no table service, glassware, or washable plates and utensils 		
Restaurant, any type, less than 20 seats	By fixture units	N/A ³
Restaurant/cafeteria, per seat, first 100 seats	Seat	0.075
Restaurant/cafeteria, per seat, seats other than first 100	Seat	0.100
Restaurant, twenty-four hour, per seat, first 100 seats	Seat	0.125
Restaurant, twenty-four hour, per seat, seats other than first 100	Seat	0.167
Restaurant, fast food, per seat	Seat	0.050
Bar/cocktail lounge, per seat, first 100 seats	Seat	0.050
Bar/cocktail lounge, per seat, seats other than first 100	Seat	0.067
Healthcare		
Dentist office	Wet chair	0.650
Medical office	By fixture units	N/A ³
Hospital	Per bed	0.833
Nursing home	Per bed	0.417
Extended care facility, efficiency or one bedroom (no additional charge for staff-operated facilities supporting residents' daily living activities)	Housing unit	0.500
Extended care facility, two or more bedrooms (no additional charge for staff-operated facilities supporting residents' daily living activities)	Housing unit	0.833

APPENDIX E

ERU/ERC DESIGN FACTORS

October 10, 2021

Table E-1. ERU/ERC Factors^{1,2}

Establishment		Unit	ERU/ERC Factor
Theaters, Meeting and Banquet Rooms			
	Meeting and/or banquet rooms (seats = total sq. ft./15 sq. ft.)	Seat	0.017
	Theater	Seat	0.010
	Theater (dinner)	Seat	0.067
Schools			
	Daycare or preschool	Child, per permitted occupancy	0.025
	Elementary school or kindergarten	Student seat	0.025
	Middle and high schools	Student seat	0.067
	College or technical school	Student seat	0.067
	College or technical school outside of a typical campus	Student seat	0.025
	Student housing, one bed (add for food service)	Housing unit	0.500
	Student housing, two beds (add for food service)	Housing unit	0.583
	Student housing, three beds (add for food service)	Housing unit	0.833
	Student housing, four or more beds (add for food service)	Housing unit	1.000
Vehicle Fueling and Maintenance			
	Vehicle fueling station/ convenience store (add for vehicle wash and repair bays)	By fixture units	N/A ³
	Vehicle repair/maintenance facility (add for additional uses)	Repair bay	0.250
	Vehicle wash facility (or by engineer's estimate if wash water recycle system is proposed)	Wash bay	3.200

Table E-1. ERU/ERC Design Factors^{1,2}

1. For design purposes, a wastewater ERU = 300 gallons per day and a water ERC = 350 gallons per day.
2. Applicants with establishments that have uses with undefined factors or additional uses such as, but not limited to, water features in amusement parks, cooling water used for refrigerated storage or climate controlled storage, water used and/or wastewater generated in the manufacture of a product or other industrial use, shall submit an estimate of flows prepared by a professional ENGINEER licensed in the State of Florida.
3. See fixture unit calculations in Table E-2 “ERU/ERC Design Factors Based on Fixture Units”.
4. Multifamily project flows are based upon apartment units only. No additional design flows for management offices, laundry facilities, pools, or other amenities for the exclusive use of residents.
5. Non-residential parcels shall have a maximum of one meter per detached building and a minimum of one ERU/ERC per meter.

Note: For determination of capital charges, refer to “Section 37- 5, ‘Application for Water, Wastewater, and Reclaimed Water Services,’ Article I, Chapter 37, Orange County Code.”

APPENDIX E

ERU/ERC DESIGN FACTORS

October 10, 2021

Table E-2. ERU/ERC Design Factors Based on Fixture Units^{1,2}

Non Residential:		
Type of Fixture	Fixture Units	ERUs/ERCs
Dish washer, by drain size, see below	N/A	N/A
Drains, condensate	1.0	0.083
Drains, floor & fixtures not listed: 1-1/4 inch drainage outlet	1.0	0.083
Drains, floor & fixtures not listed: 1-1/2 inch drainage outlet	2.0	0.167
Drains, floor & fixtures not listed: 2 inch drainage outlet	3.0	0.250
Drains, floor & fixtures not listed: 2-1/2 inch drainage outlet	4.0	0.333
Drains, floor & fixtures not listed: 3 inch drainage outlet	5.0	0.417
Drains, floor & fixtures not listed: 4 inch drainage outlet	6.0	0.500
Drinking fountain, single or high/low combination	0.5	0.042
Lavatory (bathroom sink)	1.0	0.083
Showers, per head	3.0	0.250
Sink, service, hand	2.0	0.167
Sink, service, mop/janitor	3.0	0.250
Sink, pot/scullery	4.0	0.333
Sink, two-compartment	3.0	0.250
Sink, three-compartment	4.0	0.333
Urinal	4.0	0.333
Washing machine, non-coin operated, by drain size above	N/A	N/A
Water closet (toilet)	6.0	0.500
Residential, with 1 Inch or Larger Potable Meter		
Type of Fixture	Fixture Units	ERUs/ERCs
Bathroom group (lavatory, water closet, bidet and bathtub/shower)	6.0	0.500
Half bath (lavatory and water closet)	4.0	0.333
Bathtub, with or without overhead shower	2.0	0.167
Clothes washer	2.0	0.167
Dishwasher	2.0	0.167
Hose Bibb	0.5	0.042
Lavatory (bathroom sink)	1.0	0.083
Shower stall	2.0	0.167
Sink, kitchen, with or without garbage grinder	2.0	0.167
Sink, laundry	2.0	0.167

Table E-2. ERU/ERC Factors Based on Fixture Units^{1,2}

1. For design purposes, a wastewater ERU = 300 gallons per day and a water ERC = 350 gallons per day.
2. In cases for which the ERU/ERC factors are determined by fixture units, use the following formulas:

$$\text{Total ERUs} = \text{Number of Fixture Units} \times 1 \text{ ERU} / 12 \text{ Fixture Units}$$

$$\text{Total ERCs} = \text{Number of Fixture Units} \times 1 \text{ ERC} / 12 \text{ Fixture Units}$$

For fixtures not listed in Table E-2, use fixture units shown in the currently adopted version of the Florida Building Code.

Applicants with establishments that have uses with undefined factors or additional uses such as, but not limited to, water features in amusement parks, cooling water used for refrigerated storage or climate controlled storage, water used and/or wastewater generation in the manufacture of a product or other industrial use, shall submit an estimate of flows prepared by a professional ENGINEER licensed in the State of Florida.

Note: For determination of capital charges, refer to “Section 37- 5, ‘Application for Water, Wastewater, and Reclaimed Water Services,’ Article I, Chapter 37, Orange County Code.”

THIS PAGE INTENTIONALLY LEFT BLANK


APPENDICES

APPENDIX A

**GEOTECHNICAL ENGINEERING INVESTIGATION
WEST 2ND AVENUE ROADWAY IMPROVEMENTS
(INCLUDES BORINGS FOR FIRST AVENUE AND FOREST STREET
DRAINAGE IMPROVEMENTS)
MARCH 2017**

PREPARED BY:

GEC, INC.



Report of Geotechnical Engineering Investigation
WEST 2ND AVENUE ROADWAY IMPROVEMENTS
Windermere, Florida
GEC Project No. 3985G



Geotechnical
and
Environmental
Consultants, Inc.

At the very foundation of our community

March 8, 2017

Michael Galura Engineering Consultants, LLC
3222 Corrine Drive, Suite H
Orlando, FL 32803

Attention: Mr. Michael B. Galura, P.E.

Subject: Report of Geotechnical Engineering Investigation
WEST 2ND AVENUE ROADWAY IMPROVEMENTS
Windermere, Florida
GEC Project No. 3985G

Dear Mr. Galura:

Geotechnical and Environmental Consultants, Inc. (GEC) is pleased to present this Report of Geotechnical Engineering Investigation for the above-referenced project. This investigation was performed in general accordance with the scope of work described in our Proposal No. 8734G dated August 3, 2016 and authorized on January 6, 2017.

The purpose of this investigation was to explore soil, groundwater, and pavement conditions at the site and to provide this information for your use in pavement rehabilitation design and roadside exfiltration trench design and construction. This report presents the results of our field and laboratory investigations and presents our conclusions and recommendations.

GEC appreciates the opportunity to work with you on this project. If you should have any questions regarding the contents of this report, or if we may be of further assistance, please contact us.

Very truly yours,

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC.
Certificate of Authorization No. 5882

Ryan Petersen
Engineering Intern

RJP/CPM/dbj



Christopher P. Meyer, P.E.
Geotechnical Services Manager
Florida Registration No. 49328

TABLE OF CONTENTS

1.0 SITE LOCATION AND PROJECT DESCRIPTION	1
2.0 NRCS SOIL SURVEY REVIEW	1
3.0 FIELD INVESTIGATION PROGRAM	2
3.1 Pavement Cores	2
3.2 Machine Auger Borings.....	2
3.3 Groundwater Measurement.....	3
3.4 Field Permeability Tests.....	3
4.0 LABORATORY TESTING	3
5.0 PAVEMENT	4
5.1 Asphalt Surface Course and Base Thickness.....	4
5.2 Pavement Surface Condition and Cracking	4
6.0 SUBSURFACE CONDITIONS	4
6.1 Soil Stratigraphy.....	5
6.2 Field Permeability Tests.....	5
6.3 Groundwater Levels.....	5
7.0 CONCLUSIONS AND RECOMMENDATIONS	6
7.1 Pavement	6
7.2 Exfiltration Trench Unconfined Aquifer Parameters.....	7
8.0 CONSTRUCTION ISSUES	8
8.1 Temporary Dewatering.....	8
8.2 General Site Preparation	8
8.3 Fill Selection, Placement and Compaction	10
8.4 Temporary Excavations.....	11
9.0 QUALITY ASSURANCE	11
10.0 USE OF THIS REPORT	12

APPENDIX

Figure 1: USGS Quadrangle and NRCS Soil Survey Maps

Figure 2: Boring and Pavement Core Location Plan

Figure 3: Auger Boring results

Table 3: Pavement Evaluation and Condition Data Sheet

Pavement Core Photographic Logs

Field Permeability Test Calculations

1.0 SITE LOCATION AND PROJECT DESCRIPTION

The site is located along 2nd Avenue west of Main Street in the Town of Windermere, Florida as shown on **Figure 1** in the **Appendix**. The general vicinity of the approximately 4,000 lineal foot of alignment is characterized by residential land uses.

We understand that project plans include the milling and resurfacing of selected portions of 2nd Avenue and the design of an exfiltration trench system on Forest Street from 2nd Avenue to 1st Avenue (total length of approximately 400 feet).

2.0 NRCS SOIL SURVEY REVIEW

The Natural Resources Conservation Service (NRCS) Soil Survey of Orange County, Florida was reviewed for near-surface soil and groundwater information within the vicinity of the project alignment. The NRCS Soil Survey map of the project areas are shown on **Figure 1** in the **Appendix**. The NRCS soils are summarized on the following table:

Table 1
Orange County NRCS Soil Survey Classifications

Unit No.	Soil Name	Depth (inches)	Soil Description	Unified Classification Symbol	Depth to Seasonal High Groundwater (feet)	Hydrologic Group
42	Sanibel muck	0 – 11	Muck	A-8	+0.5 – 0.0	A/D
		11 – 15	Sand, fine sand, mucky fine sand	A-3		
		15 – 80	Fines sand, sand	A-3		
48	Tavares-Urban land complex, 0 to 5 percent slopes	0 – 80	Fine sand, sand	A-3, A-2-4	3.5 – 6.0	A

The soils depicted on the NRCS Soil Survey in the majority of the project site are denoted as Tavares-Urban land complex, 0 to 5 percent slopes (Soil Unit No. 48). This soil types is generally classified as fine sands with varying silt content (A-3, A-2-4) and are moderately well drained, nearly level to gently sloping in low ridges and knolls on uplands and the flatwoods. The NRCS predicts seasonal high groundwater levels to range from 3.5 to 6.0 feet below the natural ground surface within the project vicinity. Urban land refers to land covered by urban facilities such as asphalt, concrete, buildings, and other impervious surfaces that modify surface/subsurface drainage and obscure or alter the soils so that their identification is not possible.

The NRCS also depicts Sanibel muck (Soil Unit No. 42) on the west end of the project site. This soil is generally characterized as being nearly level and very poorly drained and can be found in depressions and freshwater marshes and swamps. The NRCS soil survey depict that the seasonal

high groundwater for this soil ranges from +0.5 feet above the natural ground surface to the natural ground surface.

...the NRCS Soil Survey is very general and may be outdated.

Information contained in the NRCS Soil Survey is very general and may be outdated. Therefore, it may not be reflective of actual soil and groundwater conditions, particularly if recent development in the site vicinity has modified soil conditions or surface/subsurface drainage.

3.0 FIELD INVESTIGATION PROGRAM

Pavement conditions along the project alignment were evaluated by performing a total of 10 pavement cores (C-1 to C-10) at locations requested by Michael Galura Consultants, LLC. Exact core locations were selected based on the distress observed while staking.

Soil conditions for the exfiltration trench were evaluated by performing 3 auger borings to a depth of 15 feet and two field permeability tests. The locations of the auger borings were spread out within the approximate footprint of the exfiltration trench.

The approximate locations of the pavement cores and borings are shown on **Figure 2** in the **Appendix**. The pavement core and soil boring locations were not surveyed, but established by measuring distances from project plans and existing site features. Although these locations are given only approximately, the methods used to locate them are, in GEC's opinion, sufficient to meet the intent of our study. If greater accuracy is desired, a registered Professional Land Surveyor should be retained to survey these locations.

3.1 Pavement Cores

Pavement cores were conducted using a 6-inch diameter core barrel and were cored through the pavement to the bottom of the base material. After the pavement cores were completed, the hole was backfilled with cuttings and patched with cold patch asphalt to the pavement surface.

3.2 Machine Auger Borings

Machine auger borings were performed in general accordance with ASTM Procedure D-4700. Machine auger borings were performed by hydraulically turning a continuous flight, solid-stem, auger into the ground in 5-foot increments until the desired boring termination depth was achieved. The auger flights were retrieved in 5-foot increments, without further rotation of the auger, and the retrieved soil was examined by our technician prior to collection of representative samples. Our technician collected representative samples for further visual examination and classification in our laboratory.

3.3 Groundwater Measurement

A GEC engineering technician measured the depth to groundwater in the boreholes at the time of drilling and again after approximately 24 hours. Once the 24-hour groundwater measurement was recorded, the boreholes were then backfilled with soil cuttings to prevailing ground surface.

3.4 Field Permeability Tests

Constant head permeability tests were performed in the field at this site. The field permeability tests were performed by driving a 3-inch diameter casing into the ground to the desired test depth and washing the soil out of the casing with water. The casing was backfilled with quartz gravel to 30 inches above the bottom of the casing and was then raised a distance of 24 inches.

When a constant head permeability test was conducted, water was added to the casing to achieve a stable water level. Once the water level stabilized, the flow required to maintain the stable water level over time was measured.

These relationships were used to calculate the permeability of the soil. Field permeability tests and calculations were performed in general conformance with NAVFAC DM 7.1-103 to 7.1-108.

4.0 LABORATORY TESTING

Selected soil samples retrieved from the borings were tested in general accordance with Florida Standard Testing Methods (FM). Florida Standard Testing Methods are adaptations of recognized standard methods, e.g., ASTM and AASHTO, which have been modified to accommodate Florida's geological conditions. The GEC laboratory is reviewed annually by the Construction Materials Engineering Council, Inc. (CMEC) to verify compliance with FM. Our laboratory testing program is summarized on the following table:

Table 2
Summary of Laboratory Testing Program

Type of Test	Number of Tests
Percent Fines (FM 1-T088)	5
Atterberg Limits (FM 1-T89/90)	2
Natural Moisture Content (FM 1-T265)	2

The individual results of our laboratory tests are shown adjacent to the soil profiles at the approximate depths from which the tested samples were obtained on the **Boring Results** sheet (**Figure 3**) in the **Appendix**.

5.0 PAVEMENT

GEC visually surveyed the condition of the existing pavement surface at the areas of study and obtained pavement cores at locations representative of the existing pavement conditions to aid in the evaluation of the existing pavement section. Pictures of the pavement cores, site reconnaissance, and individual core data detailed on the attached Pavement Evaluation Coring and Condition Data Sheet are included in the **Appendix**. The pavement data and evaluation described in the following sections of this report was performed on January 25, 2017. The following report sections summarize the collected pavement data and include our pavement recommendations.

5.1 Asphalt Surface Course and Base Thickness

The measured pavement and base course thicknesses are noted on the attached Pavement Evaluation and Condition Data table.

Generally, pavement core thicknesses ranged from 1.8 to 3.0 inches...

Generally, pavement core thicknesses ranged from 1.2 to 3.0 inches with an average thickness of 2.4 inches. The pavement base material ranged widely throughout the project from limerock to asphalt base course (ABC) to concrete. In general, ABC was used on the west end, concrete was used in the middle and limerock was used on the east end of West 2nd Avenue. The base thicknesses ranged from 2.0 to 8.5 inches thick with an average thickness of 5 inches.

5.2 Pavement Surface Condition and Cracking

...the pavement ...appeared to generally be in fair to poor condition.

As of January 25, 2017, the pavement along West 2nd Avenue appeared to generally be in fair to poor condition. Cracking was generally classified as moderate (M), with mainly Class I to II Single (S), and Branch (BR) cracking. A total of 6 of the 10 pavement cores obtained encountered full depth cracks. Horizontal cracks were also encountered in 2 cores (C-2 and C-5) at 1.0 and 1.6 inches deep, respectively. Individual crack details and pavement conditions for each location cored are detailed on the attached Pavement Evaluation and Condition Data Sheet in the **Appendix**.

6.0 SUBSURFACE CONDITIONS

The results of our borings are presented on the Auger Boring Results sheet (**Figure 3**) in the **Appendix**. The soils encountered in the machine auger borings were classified in accordance with the American Association of State Highway and Transportation Officials (AASHTO) Soil Classification System (A-3, A-2-4, etc.). Soils were described using the ASTM soil descriptions (e.g.,

sand with silt). We based our classifications on visual examination and the limited laboratory testing performed.

The boring logs indicate subsurface conditions only at the specific boring locations at the time of our field exploration. Subsurface conditions, including groundwater levels, at other locations of the project site may differ from conditions we encountered at the boring locations. Moreover, conditions at the boring locations can change over time. Groundwater levels fluctuate seasonally, and soil conditions can be altered by earthmoving operations.

The depths and thicknesses of the subsurface strata indicated on the boring logs were interpolated between samples obtained at different depths in the borings. The actual transition between soil layers may be different than indicated.

6.1 Soil Stratigraphy

The soil boring profiles are shown on the Auger Boring Results sheet (**Figure 3**) in the **Appendix**. The auger borings typically encountered fine sand with variable silt content (A-3, A-2-4) to the boring termination depth of 15 feet. A notable exception to this general profile was found in boring AB-3, which encountered a 1.5-foot thick clayey fine sand (A-2-6) layer at a depth of 3.5 feet below the existing ground surface. This clayey fine sand layer was underlain by a silty fine sand with trace clay to 12 feet deep.

6.2 Field Permeability Tests

GEC performed two field permeability tests at depths ranging from 1 to 4 feet. Permeability calculations are included in the **Appendix**. The field-tested horizontal permeability values were 2.0 and 2.3 feet per day at borings AB-1 and AB-3, respectively.

6.3 Groundwater Levels

GEC measured groundwater levels ranging from 7.6 feet to 9.4 feet below the existing ground surface at the boring locations.

Groundwater levels can vary seasonally and with changes in subsurface conditions between boring locations. Alterations in surface and/or subsurface drainage brought about by site development can also affect groundwater levels. *Therefore, groundwater depths measured at different times or at different locations along the project alignment can be expected to vary from those measured by GEC during this investigation.*

For the purposes of this report, estimated seasonal high groundwater levels are defined as groundwater levels that are anticipated at the end of the wet season of a “normal rainfall” year under current site conditions. We define a “normal rainfall” year as a year in which rainfall quantity and distribution were at or near historical rainfall averages.

Estimated seasonal high groundwater levels are estimated to range from 3.5 to 5.0 feet...

Estimated seasonal high groundwater levels are estimated to range from 3.5 to 5.0 feet below the existing ground surface. The encountered and estimated seasonal high groundwater levels at the boring locations are presented on the Auger Boring Results sheet (**Figure 3**) in the **Appendix**.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations contained in this report are based in part on the data obtained from a limited number of soil samples and groundwater measurements obtained from widely-spaced borings and pavement cores. The sampling methods used indicate subsurface conditions only at the specific boring locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Borings and cores cannot be relied upon to accurately reflect the variations that usually exist between boring and core locations and these variations may not become evident until construction.

If variations from the subsurface conditions described in this report do become evident during construction or if the project characteristics described in this report change, GEC should be retained to reevaluate this report's conclusions and recommendations and modify the recommendations included in this report, if needed, in light of such changes. We also recommend that GEC be allowed to review the construction plans prior to bidding so that we can verify that our recommendations were properly interpreted.

7.1 Pavement

Full depth cracking was ...at 6 of the 10 core locations.

Our conclusions and recommendations are based on our experience on similar roadway projects and the pavement data summarized in the previous sections of this report. The pavement was found to generally be in fair to poor condition. Full depth cracking was observed at 6 of the 10 core locations.

GEC proposes the following 2 alternatives for this project depending on the available project budget.

Based on the extent of cracking and the number of cores with full depth cracks, the best alternative would be complete reconstruction of the pavement section. Full reconstruction of the pavement and base would allow for complete removal of the cracked pavement layers and the installation of a single uniform base material. The new re-constructed pavement section should be designed to provide an adequate structural number to support the anticipated traffic for the chosen design life of the pavement. Typically, asphalt thicknesses of 1.5 to 2 inches and limerock base thicknesses of 6 to 8 inches are required to meet this type of traffic loading. The individual cores exhibited a wide range of 3 different base types (asphalt base, concrete, and limerock) and a wide range of base thicknesses (2 to 8.5 inches). This wide variability could be leading to the distress observed.

The next best alternative would be to perform milling and resurfacing with the intent of removing most of the cracked asphalt layers. Milling should be conducted to the maximum milling depth possible without scabbing the base (e.g.; leaving at least ½ inch of asphalt above the base). The contractor should be warned that areas of thinner pavement may exist in some areas, and he should be prepared to handle scabbing of the base, including concrete base, during milling. The

...new cracks will likely propagate up through the new asphalt ...if the full crack depth is not removed.

newly constructed pavement section should be designed to provide an adequate structural number to support the anticipated traffic for the chosen design life of the pavement. The Town should be made aware that new cracks will likely propagate up through the new asphalt over a milled section with full depth cracks if the full crack depth is not removed.

7.2 Exfiltration Trench Unconfined Aquifer Parameters

Based on the soil and groundwater conditions encountered in and around the exfiltration trench, GEC developed the following recommended average aquifer parameters for use in stormwater infiltration analyses:

- Horizontal Permeability = 2.2 ft/day
- Vertical Infiltration Rate = 2.2 ft/day
- Seasonal High groundwater Depth = 5.0 ft
- Confining Layer Depth = 5.0 ft
- Effective Soil Porosity = 25%

It is noted that Boring AB-3 encountered the worst soil and groundwater conditions with a shallow clayey fine sand from 3.5 to 5 feet deep and an estimated seasonal high groundwater level of 3.5 feet deep. If the exfiltration trench can be shifted to the south away from AB-3, then the trench can be designed with better soil and groundwater conditions.

8.0 CONSTRUCTION ISSUES

The following sections of this report include comments on issues related to the geotechnical aspects of the proposed construction. *These recommendations are not intended to dictate construction methods or sequences.* Instead, they are furnished as an aid to design professionals and to identify important construction issues related to foundation and earthwork plans and specifications. These recommendations may also be useful to personnel who observe construction activity.

Prospective contractors for this project should evaluate potential construction problems on the basis of their review of the contract documents, their own knowledge and experience in the local area, and on the basis of similar projects in other localities, taking into account their own proposed means and methods.

8.1 Temporary Dewatering

Depending on groundwater levels at the time of construction, excavation depths and final design grades, temporary dewatering may be required to facilitate stable excavations and placement and compaction of fill. The contractor should be required to provide a dewatering system which maintains groundwater levels at least 2 feet below compaction surfaces, including the bottom of all excavations. A system of ditches and sumps may be sufficient in some instances to achieve adequate dewatering, but the contractor should be prepared to install wellpoint dewatering systems as necessary.

Additionally, the contractor must provide positive site drainage during the site preparation and fill placement. Surface runoff should not be allowed to accumulate. Temporary rim ditches may be required to facilitate site preparation.

8.2 General Site Preparation

Our recommendations regarding routine site preparation of the exfiltration trench structure and pavement areas can be summarized as follows:

- Remove all concrete, asphalt, vegetation and organic topsoil, major root systems, buried utilities, sprinkler systems and other deleterious materials from beneath and to a minimum of 5 feet beyond the proposed structure and pavement limits. Standard clearing, grubbing, and topsoil stripping procedures should be appropriate for this site.
- Perform temporary dewatering as required to achieve proper site preparation, fill placement and compaction.

- Allow a Geotechnical Engineer to inspect the site after it has been stripped to verify adequate topsoil and vegetation removal and also to observe subsequent proofrolling.
- In structure and pavement areas where fill is required, proofroll the stripped ground surface using a large vibratory roller (Dynapac CA-25 or equivalent). Proofroll cut areas after excavation to proposed grade to allow adequate compaction of the exposed subsoil.
- ***Exercise extreme caution when operating vibratory equipment near existing structures.*** Operate roller in the static mode if excessive vibrations are experienced by any near-by structures or if the soil subgrade becomes unstable. (Nearby structures may be adversely affected by vibratory rolling operations. Provisions should be made to monitor the adjacent residences for excessive vibrations).
- Proofroll the structure and pavement areas with a minimum of 10 overlapping passes in each of two perpendicular directions. Allow a Geotechnical Engineer, or his representative, to observe proofrolling operations. The purposes of the proofrolling will be to detect unstable soils that yield when subjected to compaction and to densify the near-surface loose sands for support of new pavements.
- Remove material that yields excessively during proofrolling and replace with fill selected and compacted as described in the next section of this report. The Geotechnical Engineer, based on his observations, should recommend the nature and extent of any remedial work. If the soil subgrade is saturated, or if the fill is at a moisture content over “optimum”, then instability may occur and the contractor will be required to implement remedial measures to successfully place and compact the fill.
- Our borings did not encounter significant amounts of unsuitable material, such as peat or muck, which would need to be removed.
- Clayey sands (SC) may be exposed at the compaction surface during site preparation. These soils can be unstable during proofrolling if they contain excess moisture. The contractor should be prepared to manipulate the moisture content of unstable subgrade soils as necessary to achieve stability and compaction requirements.
- Continue proofrolling until the soil at a depth of 12 inches below the compaction surface has attained a minimum of 95% of the soil's modified Proctor maximum dry density as determined by ASTM Standard D-1557.

- Due to the relatively deep water table at this site, sand excavated above the water table may have to be wetted to attain the moisture content needed to achieve the required degree of compaction.
- Allow an Engineering Technician, working under the direction of a Geotechnical Engineer registered in the State of Florida, to perform in-place density tests to verify that the required degree of compaction has been achieved.

8.3 Fill Selection, Placement and Compaction

After the contractor proofrolls the site in accordance with the above recommendations, the contractor should place and compact fill required to bring the site to final grade. We recommend that all fill be selected, placed and compacted as follows:

- Use fill material comprised of non-plastic sands with less than about 12% fines content. The fill should not contain any significant amount of organic soil (less than 3% by weight) and should be substantially free from roots or other organic or deleterious materials.
- Sands excavated above the water table may have to be wetted to attain the moisture content needed to achieve the required degree of compaction.
- Place fill in level lifts no thicker than 12 inches. Thinner lifts may be needed to achieve compaction in the silty or clayey sands.
- Compact fill to a minimum of 95% of the soil's modified Proctor maximum dry density as determined by ASTM Standard D-1557 for each lift of fill placed.
- Allow an Engineering Technician, working under the direction of a registered Geotechnical Engineer, to perform in-place density tests to verify that the recommended degree of compaction has been achieved.
- Provide fill slopes no steeper than 2 horizontal to 1 vertical.
- Compact fill placed in utility trenches to the specifications stated above. However, in restricted working areas, where use of a large vibratory roller is not feasible, compact fill with lightweight, hand-guided compaction equipment and limit lift thicknesses to a maximum of 6 inches.
- All excavations including utility trenches, should comply with the recommendations included in the **Temporary Excavations** section of this report.

8.4 Temporary Excavations

The owner and the contractor should be familiar with local, state and federal safety regulations, including current Occupational Safety and Health Administration (OSHA) excavation and trench safety standards. Construction site safety is the responsibility of the contractor. The contractor should also be responsible for the means, methods, techniques, sequences, and operations of the construction.

The contractor should be aware that slope height, slope inclination, and excavation depths (including utility trench excavations) should not exceed those specified in local, state, or federal safety regulations; e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926. *OSHA regulations are strictly enforced and, if not followed, the owner, contractor, earthwork subcontractor or utility subcontractor could be liable for substantial penalties.*

The soil encountered in the borings performed by GEC at this site is primarily sand with varying amounts of silt. We anticipate that OSHA will classify these materials as Type C. OSHA recommends a maximum temporary slope inclination of 1.5 horizontal to 1 vertical for this soil type. Soils encountered in the construction excavations may vary significantly across the site. Our soil classifications are based on the materials encountered in widely-spaced borings. The contractor should verify that similar conditions exist throughout the proposed excavation area. If different subsurface conditions are encountered at the time of construction, GEC should be contacted immediately to evaluate the conditions encountered.

Since excavations will be required in the vicinity of existing facilities, the contractor should be required to provide temporary support of pavements and structures adjacent to excavations. A facility condition survey should be performed prior to construction and movements or vibrations should be monitored in nearby structures during construction activities. Prior to performing the work, the contractor should provide a plan to the Engineer of Record for temporary support of existing facilities and for condition monitoring during construction.

9.0 QUALITY ASSURANCE

We recommend establishing a comprehensive quality assurance program to verify that all site preparation and pavement construction is conducted in accordance with the appropriate plans and specifications. Materials testing and inspection services should be provided by Geotechnical and Environmental Consultants, Inc. due to our familiarity with the site conditions and the intent of our recommendations. As a minimum, we recommend inspecting and testing the new pavement thickness with pavement cores to ensure the required pavement thicknesses are met.

10.0 USE OF THIS REPORT

GEC has prepared this report for the exclusive use of our client, Michael Galura Engineering Consultants, Inc., for specific application to our client's project. GEC will not be held responsible for any other party's interpretation or use of this report pavement and subsurface data without our written authorization.

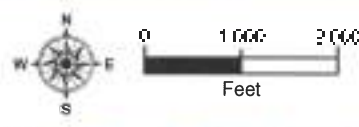
The sole purpose of the borings and cores performed by GEC at this site was to obtain indications of soil and pavement conditions as part of a geotechnical exploration program. GEC has not evaluated the site for the potential presence of contaminated soil or groundwater, nor have we subjected any soil samples to analysis for contaminants.

GEC has strived to provide the services described in this report in a manner consistent with that level of care and skill ordinarily exercised by members of our profession currently practicing in Central Florida. No other representation is made or implied in this document.

The conclusions or recommendations of this report should be disregarded if the nature, design, or location of the facilities is changed. If such changes are contemplated, GEC should be retained to review the new plans to assess the applicability of this report in light of proposed changes.

APPENDIX

**USGS QUADRANGLE
AND NRCS SOIL SURVEY MAPS**



Geotechnical and Environmental
 Consultants, Inc.
 4111 Lee Road, Suite 1000
 Orlando, FL 32814
 Phone: (407) 221-1111 Fax: (407) 221-1112
 E-mail: gec@gecinc.com www.gecinc.com
 CHRISTOPHER P. MEYER P.E. NO. 48026



PROJECT NO.
 2017017
 DRAWN BY
 RJP
 CHECKED BY
 GEM

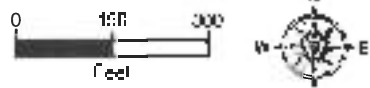
USGS QUADRANGLE AND NRCS SOIL SURVEY MAPS
**WEST 2nd AVENUE
 ROADWAY IMPROVEMENTS**

FIGURE
 NO.
 1

BORING AND PAVEMENT CORE LOCATION PLAN



-  APPROXIMATE AUGER BORING LOCATION
-  APPROXIMATE PAVEMENT CORE LOCATION



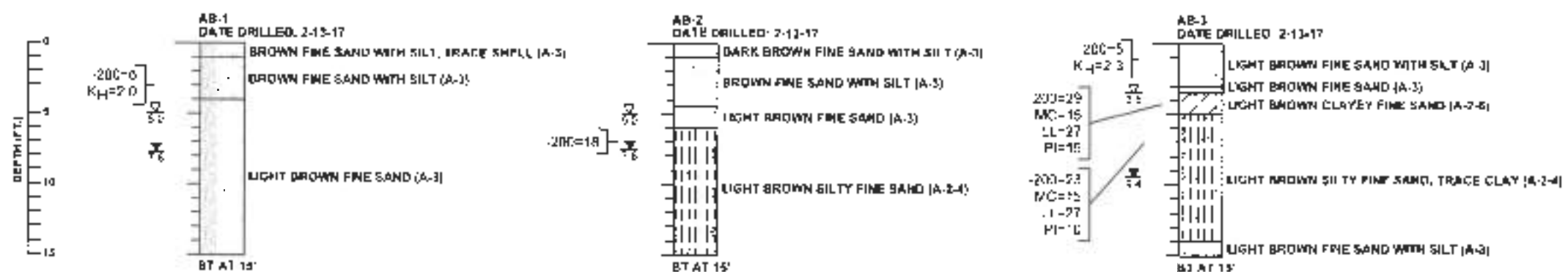
Geotechnical and Environmental
 Consultants, Inc.
GEC
 1411 East Highway 100
 Orlando, FL 32814
 Phone: 407-241-1111 Fax: 407-241-1111
 1411 East Highway 100, Suite 1000
 CHRISTOPHER P. WEAVER, P.E. NO. 48328

PROJECT NO.	38850
DATE	3/16/2017
DRAWN BY	SKP
CHECKED BY	RMP
DATE	3/16/2017
SCALE	AS SHOWN

BORING AND PAVEMENT CORE LOCATION PLAN
WEST 2nd AVENUE
ROADWAY IMPROVEMENTS

FIGURE NO.
2

AUGER BORING RESULTS



LEGEND

- ESTIMATED SEASONAL HIGH GROUNDWATER DEPTH (FT.)
- ENCOUNTERED GROUNDWATER DEPTH (FT.) 24 HRS. AFTER DATE DRILLED
- BT BORING TERMINATED AT DEPTH INDICATED
- %P PERCENT PASSING NO. 200 U.S. STANDARD SIEVE
- MC PERCENT NATURAL MOISTURE CONTENT
- LL LIQUID LIMIT
- PI PLASTICITY INDEX
- K_H HORIZONTAL PERMEABILITY RATE (FT./DAY)



GENERAL NOTES

SUBSURFACE CONDITIONS SHOWN ON THE BORINGS REPRESENT THE CONDITIONS ENCOUNTERED AT THE BORING LOCATIONS. ACTUAL CONDITIONS BETWEEN THE BORINGS MAY VARY FROM THOSE SHOWN. AASHTO SOIL CLASSIFICATIONS SHOWN ON THE BORINGS ARE BASED ON VISUAL EXAMINATION AND THE LABORATORY TESTING SHOWN.

THE BORING LOCATIONS WERE NOT SURVEYED. BORING LOCATIONS WERE ESTABLISHED IN THE FIELD BY MEASURING DISTANCES FROM EXISTING FEATURES.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC. 4101 Lakeville Road Lakeville, MN 55044 TEL: 763.479.1877 FAX: 763.479.1878 E-MAIL: gec@geconsultants.com CHRISTOPHER P. MEYER, P.E. NO. 49028	PROJECT NO. 38650	AUGER BORING RESULTS WEST 2nd AVENUE ROADWAY IMPROVEMENTS	FIGURE NO. 3
	DRAWN BY SURETIF		CHECKED BY RMR

**PAVEMENT EVALUATION
AND CONDITION DATA SHEET**

Table 3
Pavement Evaluation and Condition Data
West 2nd Ave Roadway Improvements
Orange County, Florida
GEC Project No. 3985G

Core No.	Pavement Layer	Base		Pavement Cracking				⁵ Pavement Condition	Rut Depth (in)	Cross Slope (%)	Notes
	Core Length (in)	¹ Type	Approximate Thickness (in)	Depth (in)	² Type	³ Class	⁴ Extent				
C-1	2.8	ABC	4.5	---	---	---	---	G	0.5	1.0	
C-2	2.9	ABC	4.5	Full	S	I	L	F	0.2	0.5	Horizontal crack at 1.0"
C-3	1.7 - 3.0	CONC.	5.0	Full	S, BL	III	S	P	0.6	1.0	
C-4	1.2	ABC	2.0	Full	S, BR	II	M	F	0.2	0.2	
C-5	3.0	LR/ CONC.	5.0	Full	S, BR	II	M	P	0.1	0.5	Base split across core with both limerock and concrete base. Horizontal crack at 1.6"
C-6	1.8	CONC.	6.5	0.5	S, BR	I	M	F	0.1	0.6	
C-7	3.0	CONC.	8.5	Full	S, BR	I	M	F	0.1	0.8	
C-8	1.7	LR	5.5	---	---	---	---	G	0.1	1.1	
C-9	3.0	LR	4.0	---	S	I	L	F	0.1	0.3	
C-10	1.8	LR	4.5	Full	S, BR	I	L	F	0.2	1.0	

- Notes: 1. LR: Limerock, CONC= Concrete, ABC: Asphalt Base Course
2. S: Single cracks, BR: Branch cracks, BL: Block Cracks, AL: Alligator cracks
3. I: crack width less than 1/8", II: S, BR and BL cracks width between 1/8" and/or AL crack width less than 1", III: S, BR and BL cracks greater than 1/4" wide and AL cracks
4. L: Light cracking, M: Moderate cracking, S: Severe cracking
5. G: Good; indicated no cracking with minor rutting or distortion, F: Fair; indicates Class I cracking with minor rutting or distortion, P: Poor; indicated class II or III cracking with

PAVEMENT CORE PHOTOGRAPHIC LOGS

Pavement Core Photographic Log

Client Name: Michael Galura Engineering Consultants	Project Name: West 2 nd Ave Roadway Improvements	Project Location: Orange County, Florida	GEC Project No.: 3985G
--	--	--	----------------------------------

Photo: 1	Date: 1/2017
--------------------	------------------------

Description:

Location of C-1



Photo: 2	Date: 1/2017
--------------------	------------------------

Description:

Core C-1



Pavement Core Photographic Log

Client Name:
 Michael Galura
 Engineering Consultants

Project Name:
 West 2nd Ave Roadway
 Improvements

Project Location:
 Orange County, Florida

GEC Project No.:
 3985G

Photo: 3
Date: 1/2017

Description:
 Location of C-2



Photo: 4
Date: 1/2017

Description:
 Core C-2



Pavement Core Photographic Log

Client Name: Michael Galura Engineering Consultants	Project Name: West 2 nd Ave Roadway Improvements	Project Location: Orange County, Florida	GEC Project No.: 3985G
--	--	--	----------------------------------

Photo: 5	Date: 1/2017
--------------------	------------------------

Description:

Location of C-3



Photo: 6	Date: 1/2017
--------------------	------------------------

Description:

Core C-3



Pavement Core Photographic Log

Client Name:
 Michael Galura
 Engineering Consultants

Project Name:
 West 2nd Ave Roadway
 Improvements

Project Location:
 Orange County, Florida

GEC Project No.:
 3985G

Photo:
 7

Date:
 1/2017

Description:

 Location of C-4



Photo:
 8

Date:
 1/2017

Description:

 Core C-4



Pavement Core Photographic Log

Client Name: Michael Galura Engineering Consultants	Project Name: West 2 nd Ave Roadway Improvements	Project Location: Orange County, Florida	GEC Project No.: 3985G
--	--	--	----------------------------------

Photo: 9	Date: 1/2017
-------------	-----------------

Description:

Location of C-5



Photo: 10	Date: 1/2017
--------------	-----------------

Description:

Core C-5

Note: Base material contains both limerock base and concrete



Pavement Core Photographic Log

Client Name: Michael Galura Engineering Consultants	Project Name: West 2 nd Ave Roadway Improvements	Project Location: Orange County, Florida	GEC Project No.: 3985G
--	--	--	----------------------------------

Photo: 11	Date: 1/2017
---------------------	------------------------

Description:

Location of C-6



Photo: 12	Date: 1/2017
---------------------	------------------------

Description:

Core C-6



Pavement Core Photographic Log

Client Name: Michael Galura Engineering Consultants	Project Name: West 2 nd Ave Roadway Improvements	Project Location: Orange County, Florida	GEC Project No.: 3985G
--	--	--	----------------------------------

Photo: 13	Date: 1/2017
---------------------	------------------------

Description:

Location of C-7



Photo: 14	Date: 1/2017
---------------------	------------------------

Description:

Core C-7

Note: Base not
pictured



Pavement Core Photographic Log

Client Name: Michael Galura Engineering Consultants	Project Name: West 2 nd Ave Roadway Improvements	Project Location: Orange County, Florida	GEC Project No.: 3985G
--	--	--	----------------------------------

Photo: 15 Date: 1/2017

Description:

Location of C-8



Photo: 16 Date: 1/2017

Description:

Core C-8



Pavement Core Photographic Log

Client Name: Michael Galura Engineering Consultants	Project Name: West 2 nd Ave Roadway Improvements	Project Location: Orange County, Florida	GEC Project No.: 3985G
--	--	--	----------------------------------

Photo: 17 Date: 1/2017

Description:

Location of C-9



Photo: 18 Date: 1/2017

Description:

Core C-9



Pavement Core Photographic Log

Client Name: Michael Galura Engineering Consultants	Project Name: West 2 nd Ave Roadway Improvements	Project Location: Orange County, Florida	GEC Project No.: 3985G
--	--	--	----------------------------------

Photo: 19 Date: 1/2017

Description:

Location of C-10



Photo: 20 Date: 1/2017

Description:

Core C-10



FIELD PERMEABILITY CALCULATIONS

Input From Test

Pond No.	---	---
Test Location	AB-1	AB-3
Test Depth (ft)	2 - 4	1 - 3
Soil Type	A-3	A-3
Diameter of Gravel Pack, D (in)	3.00	3.00
Riser Height, H_r (ft)	3.0	4.0
Groundwater Depth, D_{wt} (ft)	2.0	1.0
Length of Gravel Pack, L (ft)	2.0	2.0
Water Level in Casing, D_{wl} (ft)	0.0	0.0
Flow, q (gal/min)	0.2	0.2
Flow, q (ft ³ /day)	40.4	47.0
Field Horizontal Permeability Rate, k_h (ft/day)	2.0	2.3

Calculations

$$m = \sqrt{\frac{k_h}{k_v}}$$

Transformation Ratio

$$m = \sqrt{2}$$

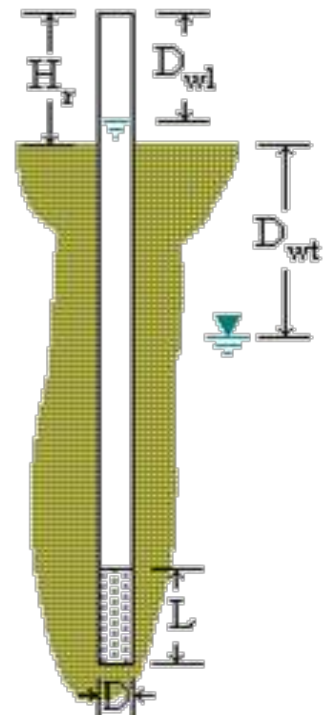
Assuming $k_v = 0.5k_h$

$$H_c = D_{wt} + H_r - D_{wl}$$

Constant Piezometric Head

$$k_h = q \cdot \frac{\ln \left[m \cdot \frac{L}{D} + \sqrt{1 + \left(m \cdot \frac{L}{D} \right)^2} \right]}{2 \cdot \pi \cdot L \cdot H_c}$$

From NAVFAC TM 5-818-5 Figure 3-5



APPENDIX B

**SOUTH FLORIDA WATER MANAGEMENT DISTRICT
ENVIRONMENTAL RESOURCE GENERAL PERMIT
PERMIT NO. 48-106682-P
APPLICATION NO. 220201-32905
DATE ISSUED: APRIL 4, 2022**



South Florida Water Management District
Environmental Resource General Permit No. 48-106682-P
Date Issued: April 4, 2022

Permittee: Town Of Windermere
614 Main Street
Windermere, FL 34786

Project: West Second Avenue Roadway And Drainage Improvements

Location: Orange County, See Exhibit 1

Application No. 220201-32905

Description: The project proposes to install exfiltration trenches in the low points along the West Second Avenue in the Town of Windermere, Orange County Florida to alleviate roadway flooding. The proposed retrofit activities meets all criteria for general permit pursuant to 62-330.451 (1)-(10), F.A.C.

Rule: **62-330.451, F.A.C.:** General Permit to Counties, Municipalities, and other Agencies to Conduct Stormwater Retrofit Activities

Expiration: April 4, 2027

Your application to use a General Environmental Resource Permit has been approved. This action is taken based on Chapter 373, Part IV, of Florida Statutes (F.S.) and the rules in Chapter 62-330, Florida Administrative Code (F.A.C.). Please read this entire agency action thoroughly and understand its contents.

This permit is subject to:

- Not receiving a filed request for a Chapter 120, F.S., administrative hearing.
- The attached General Conditions for Environmental Resource General Permits.
- The attached Specific Conditions.
- All referenced Exhibits.

Should you object to these conditions, please refer to the attached "Notice of Rights" which addresses the procedures to be followed if you desire a public hearing or other review of the proposed agency action. Please contact this office if you have any questions concerning this matter. If we do not hear from you in accordance with the "Notice of Rights", we will assume that you concur with the District's action.

Certificate of Service

I hereby certify that this written notice has been mailed or electronically transmitted to the Permittee (and the persons listed in the distribution list) on April 4, 2022, in accordance with Section 120.60(3), F.S. Notice was also electronically posted on this date through a link on the home page of the District's website (www.sfwmd.gov/ePermitting).

A handwritten signature in black ink that reads "Richard J. Lott".

Richard Lott, P.G., P.E.
Section Leader, Engineer

General Conditions for All General Permits, 62-330.405, F.A.C.

1. The general permit is valid only for the specific activity indicated. Any deviation from the specified activity and the conditions for undertaking that activity shall constitute a violation of the permit and shall subject the permittee to enforcement action and revocation of the permit under Chapter 373, F.S.
2. The general permit does not eliminate the necessity to obtain any required federal, state, local and special district authorizations prior to the start of any construction, alteration, operation, maintenance, removal or abandonment authorized by this permit; and it does not authorize any violation of any other applicable federal, state, local, or special district laws (including, but not limited to, those governing the “take” of listed species).
3. This general permit does not convey to the permittee or create in the permittee any property right, or any interest in real property, nor does it authorize any entrance upon or activities on property which is not owned or controlled by the permittee, or convey any rights or privileges other than those specified in the general permit.
4. The general permit does not relieve the permittee from liability and penalties when the permitted activity causes harm or injury to: human health or welfare; animal, plant or aquatic life; or property. It does not allow the permittee to cause pollution that violates state water quality standards.
5. Section 253.77, F.S., provides that a person may not commence any excavation, construction, or other activity involving the use of state-owned or other lands of the state, the title to which is vested in the Board of Trustees of the Internal Improvement Trust Fund without obtaining the required consent, lease, easement, or other form of authorization authorizing the proposed use. Therefore, the permittee is responsible for obtaining any necessary authorizations from the Board of Trustees prior to commencing activity on state-owned lands.
6. The authorization to conduct activities under a general permit may be modified, suspended or revoked in accordance with Chapter 120, F.S., and Section 373.429, F.S.
7. The general permit is not transferable to a new third party. To be used by a different permittee, a new notice to use a general permit must be submitted in accordance with rule 62-330.402, F.A.C. Activities constructed in accordance with the terms and conditions of a general permit are automatically authorized to be operated and maintained by the permittee and subsequent owners in accordance with subsection 62-330.340(1), F.A.C. Any person holding the general permit, persons working under the general permit, and owners of land while work is conducted under the general permit shall remain liable for any corrective actions that may be required as a result of any permit violations prior to sale, conveyance, or other transfer of ownership or control of the permitted project, activity, or the real property at which the permitted project or activity is located.
8. Upon reasonable notice to the permittee, Agency staff with proper identification shall have permission to enter, inspect, sample and test the permitted system to ensure conformity with the plans and specifications approved by the general permit.
9. The permittee shall maintain any permitted project or activity in accordance with the plans submitted to the Agency and authorized in this general permit.

10. A permittee's right to conduct a specific activity under this general permit is authorized for a duration of five years.
11. Activities shall be conducted in a manner that does not cause or contribute to violations of state water quality standards. Performance-based erosion and sediment control best management practices shall be implemented and maintained immediately prior to, during, and after construction as needed to stabilize all disturbed areas, including other measures specified in the permit to prevent adverse impacts to the water resources and adjacent lands. Erosion and sediment control measures shall be installed and maintained in accordance with the State of Florida Erosion and Sediment Control Designer and Reviewer Manual (Florida Department of Environmental Protection and Florida Department of Transportation, June 2007), available at <https://www.flrules.org/Gateway/reference.asp?No=Ref-04227>, and the Florida Stormwater Erosion and Sedimentation Control Inspector's Manual (Florida Department of Environmental Protection, Nonpoint Source Management Section, Tallahassee, Florida, July 2008), available at http://publicfiles.dep.state.fl.us/DEAR/Stormwater_Training_Docs/erosion-inspectors-manual.pdf.
12. Unless otherwise specified in the general permit, temporary vehicular access within wetlands during construction shall be performed using vehicles generating minimum ground pressure to minimize rutting and other environmental impacts. Within forested wetlands, the permittee shall choose alignments that minimize the destruction of mature wetland trees to the greatest extent practicable. When needed to prevent rutting or soil compaction, access vehicles shall be operated on wooden, composite, metal, or other non-earthen construction mats. In all cases, access in wetlands shall comply with the following:
 - (a) Access within forested wetlands shall not include the cutting or clearing of any native wetland tree having a diameter four inches or greater at breast height;
 - (b) The maximum width of the construction access area shall be limited to 15 feet;
 - (c) All mats shall be removed as soon as practicable after equipment has completed passage through, or work has been completed, at any location along the alignment of the project, but in no case longer than seven days after equipment has completed work or passage through that location; and
 - (d) Areas disturbed for access shall be restored to natural grades immediately after the maintenance or repair is completed.
13. Barges or other work vessels used to conduct in-water activities shall be operated in a manner that prevents unauthorized dredging, water quality violations, and damage to submerged aquatic communities.
14. The construction, alteration, or use of the authorized project shall not adversely impede navigation or create a navigational hazard in the water body.
15. Except where specifically authorized in the general permit, activities must not:
 - (a) Impound or obstruct existing water flow, cause adverse impacts to existing surface water storage and conveyance capabilities, or otherwise cause adverse water quantity or flooding impacts to receiving water and adjacent lands; or
 - (b) Cause an adverse impact to the maintenance of surface or ground water levels or surface water flows established pursuant to section 373.042, F.S., or a Works of the District established pursuant to section 373.086, F.S.
16. If prehistoric or historic artifacts, such as pottery or ceramics, projectile points, stone tools, dugout canoes, metal implements, historic building materials, or any other physical remains that could be associated with Native American, early European, or American settlement are encountered at any time within the project site area, the permitted project shall cease all

activities involving subsurface disturbance in the vicinity of the discovery. The permittee or other designee shall contact the Florida Department of State, Division of Historical Resources, Compliance Review Section (DHR), at (850)245-6333, as well as the appropriate permitting agency office. Project activities shall not resume without verbal or written authorization from the Division of Historical Resources. If unmarked human remains are encountered, all work shall stop immediately and the proper authorities notified in accordance with section 872.05, F.S.

17. The activity must be capable, based on generally accepted engineering and scientific principles, of being performed and of functioning as proposed, and must comply with any applicable District special basin and geographic area criteria.
18. The permittee shall comply with the following when performing work within waters accessible to federally- or state-listed aquatic species, such as manatees, marine turtles, smalltooth sawfish, and Gulf sturgeon:
 - (a) All vessels associated with the project shall operate at "Idle Speed/No Wake" at all times while in the work area and where the draft of the vessels provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.
 - (b) All deployed siltation or turbidity barriers shall be properly secured, monitored, and maintained to prevent entanglement or entrapment of listed species.
 - (c) All in-water activities, including vessel operation, must be shut down if a listed species comes within 50 feet of the work area. Activities shall not resume until the animal(s) has moved beyond a 50-foot radius of the in-water work, or until 30 minutes elapses since the last sighting within 50 feet. Animals must not be herded away or harassed into leaving. All onsite project personnel are responsible for observing water-related activities for the presence of listed species.
 - (d) Any listed species that is killed or injured by work associated with activities performed shall be reported immediately to the Florida Fish and Wildlife Conservation Commission (FWC) Hotline at 1(888)404-3922 and ImperiledSpecies@myFWC.com.
 - (e) Whenever there is a spill or frac-out of drilling fluid into waters accessible to the above species during a directional drilling operation, the FWC shall be notified at ImperiledSpecies@myfwc.com with details of the event within 24 hours following detection of the spill or frac-out.
19. The permittee shall hold and save the Agency harmless from any and all damages, claims, or liabilities which may arise by reason of the construction, alteration, operation, maintenance, removal, abandonment or use of any activity authorized by the general permit.
20. The permittee shall immediately notify the Agency in writing of any submitted information that is discovered to be inaccurate.

Specific Conditions for General Permits, 62-330.451, F.A.C.

1. Within 30 days after completion of construction, a registered professional shall submit certification that construction was completed in substantial conformance with the plans and calculations that were submitted in the notice to use this general permit.

Distribution List

Michael Galura, Michael Galura Engineering Consultants

Div of Recreation and Park - District 3

Orange County Engineer

Exhibits

The following exhibits to this permit are incorporated by reference. The exhibits can be viewed by clicking on the links below or by visiting the District's ePermitting website (<http://my.sfwmd.gov/ePermitting>) and searching under this application number 220201-32905 .

[Exhibit No. 1.0 Location Map](#)

[Exhibit No. 2.0A Construction Plans](#)

[Exhibit No. 2.0B Construction Plans](#)

[Exhibit No. 2.0C Construction Plans](#)

[Exhibit No. 2.0D Construction Plans](#)

[Exhibit No. 2.0E Construction Plans](#)

NOTICE OF RIGHTS

As required by Chapter 120, Florida Statutes, the following provides notice of the opportunities which may be available for administrative hearing pursuant to Sections 120.569 and 120.57, Florida Statutes, or judicial review pursuant to Section 120.68, Florida Statutes, when the substantial interests of a party are determined by an agency. Please note that this Notice of Rights is not intended to provide legal advice. Some of the legal proceedings detailed below may not be applicable or appropriate for your situation. You may wish to consult an attorney regarding your legal rights.

RIGHT TO REQUEST ADMINISTRATIVE HEARING

A person whose substantial interests are or may be affected by the South Florida Water Management District's (District) action has the right to request an administrative hearing on that action pursuant to Sections 120.569 and 120.57, Florida Statutes. Persons seeking a hearing on a District decision which affects or may affect their substantial interests shall file a petition for hearing in accordance with the filing instructions set forth herein within 21 days of receipt of written notice of the decision unless one of the following shorter time periods apply: (1) within 14 days of the notice of consolidated intent to grant or deny concurrently reviewed applications for environmental resource permits and use of sovereign submerged lands pursuant to Section 373.427, Florida Statutes; or (2) within 14 days of service of an Administrative Order pursuant to Section 373.119(1), Florida Statutes. "Receipt of written notice of agency decision" means receipt of written notice through mail, electronic mail, posting, or publication that the District has taken or intends to take final agency action. Any person who receives written notice of a District decision and fails to file a written request for hearing within the timeframe described above waives the right to request a hearing on that decision.

If the District takes final agency action that materially differs from the noticed intended agency decision, persons who may be substantially affected shall, unless otherwise provided by law, have an additional point of entry pursuant to Rule 28-106.111, Florida Administrative Code.

Any person to whom an emergency order is directed pursuant to Section 373.119(2), Florida Statutes, shall comply therewith immediately, but on petition to the board shall be afforded a hearing as soon as possible.

A person may file a request for an extension of time for filing a petition. The District may grant the request for good cause. Requests for extension of time must be filed with the District prior to the deadline for filing a petition for hearing. Such requests for extension shall contain a certificate that the moving party has consulted with all other parties concerning the extension and whether the District and any other parties agree to or oppose the extension. A timely request for an extension of time shall toll the running of the time period for filing a petition until the request is acted upon.

FILING INSTRUCTIONS

A petition for administrative hearing must be filed with the Office of the District Clerk. Filings with the Office of the District Clerk may be made by mail, hand-delivery, or e-mail. Filings by facsimile will not be accepted. A petition for administrative hearing or other document is deemed filed upon receipt during normal business hours by the Office of the District Clerk at the District's headquarters in West Palm Beach, Florida. The District's normal business hours are 8:00 a.m. – 5:00 p.m., excluding weekends and District holidays. Any document received by the Office of the District Clerk after 5:00 p.m. shall be deemed filed as of 8:00 a.m. on the next regular business day.

Additional filing instructions are as follows:

- Filings by mail must be addressed to the Office of the District Clerk, 3301 Gun Club Road, West Palm Beach, Florida 33406.
- Filings by hand-delivery must be delivered to the Office of the District Clerk. Delivery of a petition to the District's security desk does not constitute filing. It will be necessary to request that the District's security officer contact the Office of the District Clerk. An employee of the District's Clerk's office will receive and process the petition.
- Filings by e-mail must be transmitted to the Office of the District Clerk at clerk@sfwmd.gov. The filing date for a document transmitted by electronic mail shall be the date the Office of the District Clerk receives the complete document.

INITIATION OF ADMINISTRATIVE HEARING

Pursuant to Sections 120.54(5)(b)4. and 120.569(2)(c), Florida Statutes, and Rules 28-106.201 and 28-106.301, Florida Administrative Code, initiation of an administrative hearing shall be made by written petition to the District in legible form and on 8 1/2 by 11 inch white paper. All petitions shall contain:

1. Identification of the action being contested, including the permit number, application number, District file number or any other District identification number, if known.
2. The name, address, any email address, any facsimile number, and telephone number of the petitioner, petitioner's attorney or qualified representative, if any.
3. An explanation of how the petitioner's substantial interests will be affected by the agency determination.
4. A statement of when and how the petitioner received notice of the District's decision.
5. A statement of all disputed issues of material fact. If there are none, the petition must so indicate.
6. A concise statement of the ultimate facts alleged, including the specific facts the petitioner contends warrant reversal or modification of the District's proposed action.
7. A statement of the specific rules or statutes the petitioner contends require reversal or modification of the District's proposed action.
8. If disputed issues of material fact exist, the statement must also include an explanation of how the alleged facts relate to the specific rules or statutes.
9. A statement of the relief sought by the petitioner, stating precisely the action the petitioner wishes the District to take with respect to the District's proposed action.

MEDIATION

The procedures for pursuing mediation are set forth in Section 120.573, Florida Statutes, and Rules 28-106.111 and 28-106.401–.405, Florida Administrative Code. The District is not proposing mediation for this agency action under Section 120.573, Florida Statutes, at this time.

RIGHT TO SEEK JUDICIAL REVIEW

Pursuant to Section 120.68, Florida Statutes, and in accordance with Florida Rule of Appellate Procedure 9.110, a party who is adversely affected by final District action may seek judicial review of the District's final decision by filing a notice of appeal with the Office of the District Clerk in accordance with the filing instructions set forth herein within 30 days of rendition of the order to be reviewed, and by filing a copy of the notice with the appropriate district court of appeals via the Florida Courts E-Filing Portal.

APPENDIX C

**FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
NO PERMIT REQUIRED (NPR)
FILE NO: 417221-001-NPR
DATE ISSUED: FEBRUARY 9, 2023**



FLORIDA DEPARTMENT OF Environmental Protection

Central District
3319 Maguire Blvd, Suite 232
Orlando, FL 32803-3767

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Shawn Hamilton
Secretary

February 9,
2023

Town of Windermere
C/o: Robert Smith
614 Main St
Windermere, FL 34786
rsmith@town.windermere.fl.us

File No.: **417221-001-NPR**,
Orange County

Dear Mr. Robert Smith:

On March 28, 2022, we received your request for verification that a State 404 Program permit will not be required for the activity described below.

The proposed activity is to perform roadway and stormwater improvements to address flooding occurrences and to improve structural capacity. No outfalls are proposed to lake areas or no wetland impacts are proposed. The project is located at West Second Avenue at the intersection of W. 2nd Ave and Forest St, Windermere, FL 34786, Section 8, Township 23 South, Range 28 East, Orange County.

Based on a review of the information submitted and site inspection conducted by staff, the Department has verified that the activity, as proposed does not involve discharge of dredged or fill material into the waters of the United States and therefore, does not require a permit or other form of authorization under the State 404 Program, as described in Chapter 62-331, Florida Administrative Code (F.A.C.).

This verification reflects current regulations and is only valid for a period of no longer than five years from the date of this letter unless new information warrants a revision of this verification before the expiration date.

Please retain this letter. The activities described above may be inspected by authorized state personnel in the future to ensure compliance with appropriate statutes and administrative codes. If the activities are not in compliance, you may be subject to enforcement action and possible penalties.

File Name: West Second Avenue Roadway
FDEP File No.: 417221-001
Page 2 of 2

This letter does not relieve you from the responsibility of obtaining other federal, state (including ERP), or local authorizations that maybe required for this activity.

If you have any questions regarding this letter or permitting requirements, please contact Melanie by telephone at 407-897-2952 or by e-mail at melanie.wharton@floridadep.gov.

Sincerely,



Teayann Duclos
Environmental Manager
Permitting and Waste Cleanup Program

Enclosures:
Site Inspection Report, 43 pages

cc:

Melanie Wharton, FDEP, melanie.wharton@floridadep.gov
Teayann Duclos, FDEP, Teayann.Duclos@floridadep.gov
Michael Galura, Agent, mchgalu@aol.com

State 404 Program

Department Certified Wetland Evaluator Work Product Cover Sheet

The attached files were reviewed/created and approved by the Certified Wetland Evaluator(s) (CWEs) employed by the Florida Department of Environmental Protection as indicated below.

State 404 File Number: 417221-001 WMD/DLG ERP/FD File Number: _____

Date(s) of Site Inspection: 05/22/2022

Purpose of Site Inspection: 404 Site Inspection NPR status - no Wetland Impacts

Evaluation Documentation Includes (check all that apply):

- 62-340, F.A.C. Data Forms: _____ pages
- Functional assessment forms: _____ pages
 - UMAM
 - WRAP
 - WATER
 - Other _____

Site photos: _____ pages

State 404 Program WOTUS Information Form: 3 _____ pages

Other WOTUS-related documentation: 37 _____ pages

Description Description maps of stormwater features and NPR status - no Wetland Impacts

By signing below, the DEP CWE(s) affirm that the attached documentation was completed in accordance with the following laws and rules as applicable: Chapters 62-330, 62-331, 62-340, and 62-345, F.A.C., and 40 C.F.R. 120, and contain true and accurate information that reflects the site conditions at the time of the inspection.

Lead DEP CWE Name (legible): Stephen O. Rice

Signature: Stephen O. Rice  Digitally signed by Stephen O. Rice
Date: 2023.02.02 17:22:42 -05'00'

Date Approved: 09/2/2023

DEP CWE Name (legible): _____

Signature: _____

Date Approved: _____

DEP CWE Name (legible): _____

Signature: _____

Date Approved: _____

DEP CWE Name (legible): _____

Signature: _____

Date Approved: _____

DEP CWE Name (legible): _____

Signature: _____

Date Approved: _____

Information Required for a WOTUS Determination in State-assumed Waters

I. General Information

The following information is required if an applicant is requesting that the Department perform a Waters of the United States (WOTUS) jurisdictional determination pursuant to the Navigable Waters Protection Rule (40 C.F.R. 120) during review of a State 404 Program permit application, a Formal Determination under Chapter 62-340, F.A.C., or a request for verification that no permit is required under the State 404 Program. This form is provided as a service to applicants and petitioners. Use of the form may assist efficient review.

II. Findings

A. Summary

Check all that apply. At least one box from the following list **MUST** be selected. Complete the corresponding sections/tables and summarize data sources.

- The review area is comprised entirely of dry land (i.e., there are no waters or water features, including wetlands, of any kind in the entire review area).
Rationale: (N/A or describe rationale)
- There are “waters of the United States” within Clean Water Act jurisdiction within the review area (complete appropriate tables in Section II.B).
- There are waters or water features excluded from Clean Water Act jurisdiction within the review area (complete table in Section II.C)

B. Clean Water Act Section 404 Jurisdiction (40 C.F.R. 120)

Please expand tables or use additional sheets as needed. Include measurement units in size column (acres, linear feet, etc.).

Traditional Navigable Waters ((1)(i) waters)

(1)(i) Name	(1)(i) Size	(1)(i) Criteria	Rationale for (1)(i) Determination
Lake Butler			Not in Project Area

Note: All Territorial Seas and any Traditional Navigable Water listed in Appendix B of the 404 Handbook (Retained Waters List) are not assumable under the State 404 Program. If your project site contains or borders one of these waters and you are proposing or plan to propose dredge or fill activities within 300 feet of the mean high tide line or ordinary high water mark, please apply to the US Army Corps of Engineers for a permit or jurisdictional determination under Section 404 of the Clean Water Act.

III. Supporting Information

A. Resources Used

Select/enter all resources that were used to aid in this determination and attach data/maps to this document and/or references/citations in the administrative record, as appropriate.

- Information submitted by, or on behalf of, the applicant/consultant (Title(s) and date(s)):
- Current 62-340, F.A.C. delineation:
- Aerial photographs:
- Other photographs:
- Previous WOTUS jurisdictional determinations (Corps PJD or AJD/Department WOTUS determination):
- Previous or current 62-340, F.A.C. formal jurisdictional determination:
- Antecedent Precipitation Tool (provide detailed discussion in Section III.B.):
- USDA NRCS Soil Survey (Title(s) and/or date(s)):
- USFWS NWI maps (Title(s) and/or date(s)):
- USGS topographic maps (Title(s) and/or date(s)):

Other data sources used to aid in this determination:

Data source	Name and/or date and other relevant information
USGS Sources	
USDA Sources	
NOAA Sources	
USACE Sources	
State/Local/Tribal Sources	
Other Sources	

B. Typical Year Assessments

N/A or provide typical year assessment for each relevant data source used to support the determination:

C. Additional comments to support the WOTUS jurisdictional determination

N/A or provide additional discussion as appropriate: