

A REQUEST FOR PROPOSAL



CITY OF BROOKSVILLE
201 HOWELL AVENUE
BROOKSVILLE, FL 34601

Contract Documents and Specifications for:

RFP-DPW-2025-0006

Cortez Blvd (SR 50) Pump Station Replacement Project

Project Solicitation Date: Friday, March 14, 2025

Mandatory Pre-Bid Conference: Thursday, April 3, 2025 @ 10:00 AM

Question Submission Deadline: Thursday, April 10, 2025 @ 5:00 PM

Questions must be submitted via:

BidNetDirect or procurement@cityofbrooksville.us

Proposal Submission Deadline: Thursday, April 17, 2025 @ 10:00 AM

Bid Opening: Thursday, April 17, 2025 @ 10:00 AM

Bid Evaluation Meeting: Tuesday, April 22, 2025 @ 10:00 AM

Submit Bid offer to:

City of Brooksville
Procurement Division
201 Howell Ave.
Brooksville, FL 34601



SOLICITATION

TENTATIVE BID SCHEDULE

Listed above are the tentative dates and times of the project and schedule by which the actions noted must be completed. If the City finds it necessary to change any of these dates and/or times, the change will be accomplished by addenda. All dates and times are subject to change at the City's discretion.

THE BID PACKAGE

Each bid submitted in response to this RFP must contain the following documents:

- Bid Cover Sheet
- Bidder's Minimum Qualifications
- Schedule of Subcontractors, where applicable
- Reference List
- Attachments A – K

Pursuant too. § 119.07 (b). Fla. Stat., sealed bids, proposals or replies received by an agency pursuant to a competitive solicitation are exempt from final inspection until such time as the agency provides notice of an intended decision or until thirty (30) days after the opening of the bids, proposals or final replies, whichever is earlier.

COMPLETION OF BID SUBMISSION PACKAGE

It is the responsibility of the Bidder to ensure that all pages are included. All Bidders are advised to closely examine this RFP.

All bids must be submitted on the Bid forms provided. Bids submitted on Bidder's letterhead or quotation forms will not be accepted; provided, however, an addendum may be added to the bid form to further explain qualifications.

Bid forms must be neatly written in ink or typed and must be signed in ink by an officer or employee having authority to bind the bidder (where a signature is required). Failure to submit a duly signed bid may be cause for rejection of the bid.

BID PRICES

All prices shall remain valid for ninety (90) days after the date of bid closing or other time stated in the Special Terms.

The City of Brooksville is not responsible for expenses incurred prior to the award.

HOW TO SUBMIT A BID

The original and three (3) copies of the bid must be submitted in a sealed envelope. **ENVELOPES CONTAINING BIDS MUST BE IDENTIFIED AS BID RFP-DPW-2025-0006** marked on the outside of the envelope with title, and date bids are scheduled to be received. *Please refrain from using staples or binders; original and copies can be separated by individual envelopes or binder clips.*



All sealed bids must be mailed or hand-delivered to:

City of Brooksville
Procurement Division
201 Howell Ave.
Brooksville, FL 34601

Any bid received after 10:00 AM on Thursday, April 17, 2025, whether by mail or otherwise, will be returned unopened. The time of receipt shall be determined by the time clock located in City Hall. Bidders are responsible for ensuring that their bid is stamped by City personnel by the deadline indicated.

Bids submitted by telephone, telegram facsimile or email shall not be accepted.

Submission of a Bid implies a full understanding of this RFP. Any misunderstanding of such terms by the Bidder will not relieve the Bidder from performance.

This RFP consists of this document along with all plans, drawings and/or technical specifications incorporated or attached to this RFP, all of which are incorporated herein by this reference.

BID REJECTION

Bids may be rejected for noncompliance with requirements after review by the City.

The City of Brooksville reserves the right to reject any or all responses and to waive any irregularities or informalities.

The City reserves the right to reject any or all bids in whole or in part; to award by any item, group(s) of items, total bid, or accept the bid that is most advantageous and in the best interest of the City.

BID SYSTEM

The City of Brooksville officially distributes solicitation and addenda documents through the Florida Online Bid System (www.BidNetDirect.com) and the City of Brooksville website. Solicitation documents may be downloaded using these systems.

The City of Brooksville is not responsible for solicitation and addenda documents obtained from sources other than the Florida Online Bid System, the City website or the City Procurement Division. Vendors who submit responses and later claim they did not receive complete documents or had no knowledge of any change, modifications, or additions made to the official solicitation documents shall still be bound by the solicitation, including any changes, modifications, or additions to the official solicitation documents.

Only vendors who properly register and obtain solicitation documents directly from the Florida Online Bid System or the City website will receive addenda and other important information if issued.

All addenda can be found on the City website, the Florida Online Bid System or obtained through the City Procurement Division. Vendors are responsible for acquiring knowledge of changes, modifications, or additions to official solicitation documents.



If you obtained a solicitation document or addenda from any other source than the Florida Online Bid System or the City of Brooksville website, it is highly recommended that you register as a vendor and download the official document at www.BIDNETDIRECT.com or www.cityofbrooksville.us.

PRE-BID CONFERENCE

A **MANDATORY** Pre-bid Meeting and site visit will be held on Thursday, April 3, 2025, at 10:00 AM, at Council Chambers at the City of Brooksville City Hall, 201 Howell Ave., Brooksville, FL, 34601. The purpose of the pre-bid conference is to allow potential Proposer/Contractors an opportunity to present questions to staff and obtain clarification of the requirements contained in the solicitation. This conference will be held only once and is open to the public.



RFP-DPW-2025-0006

Cortez Blvd (SR 50) Pump Station Replacement Project

SUMMARY OF WORK

This project consists of replacing the Pump (Lift) Station on Cortez Blvd (SR50), which is within the City limits. This lift station is a major asset to the City's wastewater flow, and infrastructure. The term "replacing" is a very broad term to include all avenues of building and infrastructure function. Please review the included multipage, engineering document to ensure the entire scope is understood. The awarded contractor would work closely with the engineer of record, as well as City employees, to ensure all needs of the infrastructure are met, with regards to the lift station replacement.

Be advised that flow will continue through the lift station during construction. The City cannot take this piece of infrastructure offline at any time. The existing generator, and standby power transfer switch will remain. The City of Brooksville utilizes sole source for FLYGT products through Xylem Water Solutions USA, Inc. Please take this into consideration during bid pricing:

Tri-Plex Station – Three (3) pumps needed:

FLYGT 3301.185-5145

Impeller: 462

HP: 105

RPM: 1775

AMP: 125

Volts: 480

Note: Contractor to provide/confirm all materials amounts and quantities.



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Article I. CITY OF BROOKSVILLE GENERAL PROVISIONS

These general terms and conditions apply in like force to this solicitation and to any contract resulting therefrom.

Section 1.01 CONE OF SILENCE DURING SOLICITATION AND LOBBYING PROHIBITION

The City's procurement cone of silence will be in effect as of the due date for proposals in response to this RFP. The cone of silence terminates at the time of award, rejection of all responses or some other action by the City to end the selection process.

Communicating with or lobbying of evaluation committee members, city or county government employees, or elected officials (including Mayor and City Council Members) regarding requests for proposals, requests for qualifications, bids, or contracts by the Proposer/Contractors or any member of the Proposer/Contractor's staff, an agent of the Proposer/Contractor, or any person employed by any legal entity affiliated with or representing an organization that is responding to the requests for proposal, requests for qualification, bid or contract outside a publicly noticed meeting specifically called to address this particular solicitation is strictly prohibited. Nothing herein shall prohibit a prospective Proposer/Contractor from contacting the Procurement Specialist to address concerns, or grievances, or receive clarification about a particular procurement.

For purposes of this provision lobbying activities shall include, but not be limited to, influencing or attempting to influence action or non-action in connection with any requests for proposals, requests for statements of qualifications, invitations for bids, related processes or contracts through direct or indirect oral or written communication or an attempt to obtain goodwill of persons and/or entities specified in this provision. Such actions may cause any proposal, statement of qualification, bid, contract or any other response to be rejected.

The prohibition on communication with City or County Persons (including Mayor and City Council Members) by vendors and their representatives regarding a procurement in which they have a pecuniary interest, begins upon issuance of the solicitation and ends upon final award, when the protest is finally resolved, or when the procurement process is otherwise concluded, whichever occurs later. This prohibition does not apply to communication on other matters in which a Proposer/Contractor may have an interest outside of the solicitation.

Section 1.02 AMERICANS WITH DISABILITIES ACT

The City of Brooksville does not discriminate upon the basis of any individual's disability status. This non-discrimination policy involves every aspect of the City's functions including one's access to, participation, employment, or treatment in its programs or activities. Anyone requiring reasonable accommodation to the solicitation documents or for the public meetings related to any solicitation should contact the Procurement staff member named on the solicitation summary at least twenty-four (24) hours in advance of the meeting. Please be advised that if you contact the City by email, your email address will become a public record and may be subject to disclosure under the Florida Public Records Act.

Section 1.03 ACCEPTANCE/REJECTION/MODIFICATION TO BID

The City of Brooksville may (1) amend or modify this request, (2) revise requirements of this request, (3) require supplemental statements or information from any firm, (4) accept or reject any or all bids, (5) extend the deadline for submission of bids, (6) waive non-material defects, and (7) cancel this request, in whole or in part, if the City deems it in its best interest to do so. The City may exercise the foregoing rights at any time without notice and without liability to any offering firm or any other party for their expenses incurred in the preparation of bid or otherwise.



Section 1.04 ACKNOWLEDGMENT OF ADDENDUM

Proposer/Contractors shall acknowledge receipt of any addendum to the solicitation by identifying the addendum number in the space provided for this purpose on Attachment D, by letter, or by returning a copy of the issued amendment with the submitted bid. The acknowledgment should be received by the City of Brooksville by the time and at the place specified for the receipt of bids. Failure to acknowledge an issued addendum may result in bid rejection and disqualification.

Section 1.05 ALTERNATIVE BIDS

The Proposer/Contractor WILL NOT be allowed to offer more than one (1) price (for the goods or services specified). If a Proposer/Contractor submits more than one (1) price on any item (or service), ALL prices will be rejected for that item.

Section 1.06 ANTITRUST

By entering into a contract, the Proposer/Contractor conveys, sells, assigns, and transfers to the City of Brooksville all rights, titles, and interest it may now have or hereafter acquire under the antitrust laws of the United States and the State of Florida that relate to the particular goods or services purchased or acquired by the City under the said contract.

Section 1.07 APPLICABLE LAW

The resulting contract shall be governed in all respects by the laws of the State of Florida, and any litigation with respect thereto shall be brought in the courts of the City of Brooksville, Hernando County, Florida. The Proposer/Contractor shall comply with all applicable Federal, State, and local laws and regulations. Lack of knowledge by the Proposer/Contractor will in no way be a cause for relief from responsibility.

Section 1.08 ASSIGNMENT

The successful Proposer/Contractor(s) shall not assign, transfer, convey, sublet, or otherwise dispose of any award or any or all of its rights, title, or interest therein, or delegate the duties hereunder without the prior written consent of the City of Brooksville.

Section 1.09 AWARD

Consideration for award will be by proximity to specifications given, costs, time of delivery, and other factors deemed by the City of Brooksville to be appropriate. All purchases, leases, or contracts that are based on competitive bids will be awarded to the lowest, responsive, and responsible Proposer/Contractor. Complete and accurate responses to all items are necessary for the complete and fair evaluation of bids. Total-cost or life-cycle-costing, which includes the identification of identifiable costs associated with acquisition, installation, maintenance, and operation of the Proposer/Contractor's offered equipment may be used to determine the lowest Proposer/Contractor. Such analysis may be based upon the Proposer/Contractor's proposal data and other data which is gathered by the City. Additional factors that may be considered include the expected life of equipment, output, maintenance, consumption costs, disposal value, warranty, complexity of operation, required training, and other factors that may contribute to the overall cost of ownership. In determining the responsibility of Proposer/Contractor, past performance, references, documented experience, financial capability, and other reasonable factors may be considered. The City of Brooksville reserves the right to award by item, group of items, lowest total, or whatever manner is deemed to be in the City's best interest.

Section 1.10 BID ACCEPTANCE PERIOD

The Proposer/Contractor agrees that if this offer is accepted within ninety (90) calendar days from the bid opening date, the Proposer/Contractor will furnish to the City of Brooksville all items from which prices are offered in this bid solicitation at the price(s) so offered, delivered to the designated point(s), within the time period specified, and at the terms and conditions so stipulated in this solicitation document. Any bid for which the Proposer/Contractor specifies a shorter acceptance period may be rejected.



Section 1.11 BID CLARIFICATIONS

If any party contemplating the submission of a bid on this invitation is in doubt as to the true meaning of any part of the plans, specifications, or other documents, they should submit a written request for an interpretation. Questions or requests can be submitted through the Florida Online Bid System (BidNetDirect.com) or via email to the Procurement Division at procurement@cityofbrooksville.us. The request shall be clearly marked in the subject line as a "PREBID QUESTION" and must include the solicitation number. Questions or requests for interpretations shall clearly state, in detail, the basis for such question(s) or request(s) including a reference to the specific paragraph or language in the solicitation. All questions will be answered as an addendum to the solicitation. Modifications to solicitations will be made only by properly issued written addenda. All such addenda shall become part of the solicitation and resulting contract documents. The City of Brooksville shall only be responsible for explanations or interpretations that are issued by written addendum. No oral interpretations will be made as to the meaning of specifications or any other contract documents. Failure to comply with this provision will result in the Proposer/Contractor waiving his/her right to dispute the bid specification.

Section 1.12 PROPOSER/CONTRACTOR CERTIFICATION

The Proposer/Contractor agrees that submission of a signed bid form is certification that the Proposer/Contractor will accept an award made to it as a result of the submission.

Section 1.13 PROPOSER/CONTRACTOR INVESTIGATIONS

Before submitting a bid, each Proposer/Contractor shall make all investigations and examinations necessary to ascertain all site conditions, specifications, delivery requirements and performance requirements affecting the full performance of the contract and to verify any representations made by the City of Brooksville upon which the Proposer/Contractor will rely. If the Proposer/Contractor receives an award as a result of its bid submission, failure to have made such investigations and examinations will in no way relieve the Proposer/Contractor from its obligation to comply in every detail with all provisions and requirements of the contract documents, nor will a plea of ignorance of such conditions and requirements be accepted as a basis for any claim whatsoever by the Proposer/Contractor for additional compensation.

Section 1.14 BID ENVELOPES

Envelopes containing bids must be sealed and marked in the lower left-hand corner with the solicitation number, solicitation name, and the date and time of opening of bids. Failure to do so may cause bid not to be considered. Express company or express mail envelopes containing a sealed bid shall also be sealed and should be clearly marked with the solicitation number, solicitation name, and date and time of opening of bids. Failure to clearly mark envelopes may delay delivery and render the response late.

Section 1.15 BID FORM SUBMISSION

Bids shall be submitted on the attached forms. Bids concerning separate bid invitations must not be combined on the same form or placed in the same envelope. Bids submitted in violation of this provision shall not be considered. All bids must be signed, in ink, in order to be considered. Erasures are not acceptable on bids; if necessary to make a change, strike out or draw a line through incorrect item and type the correction above, and initial the correction in ink. If the Proposer/Contractor is a firm or corporation, the Proposer/Contractor must show the title of the individual executing the bid, and if the individual is not an officer of the firm or corporation, the Proposer/Contractor must submit proof that the individual has the authority to obligate the firm or corporation. BIDS MAY NOT BE ALTERED OR AMENDED AFTER THE BID CLOSING.

Section 1.16 BUSINESS NAME REQUIREMENT

The Proposer/Contractor must provide on the Bid Form, Proposer/Contractor Certification Form, and if awarded, on all remittance of invoices for payment, the business name that is provided on their W9 Form. Additionally, if there is a name change and/or EIN number that is changed at any time, the Proposer/Contractor must immediately notify the Procurement Division as to the change and provide all



supporting documentation.

Section 1.17 BID RECEIPT AND OPENING

The City of Brooksville will receive sealed bid proposals until date and time indicated on bid cover. Bids must be delivered, by hand or mail, to the City of Brooksville City Hall, located at 201 Howell Avenue, Brooksville, Florida, 34601. Bids must be time stamped before or, on the hour and date indicated on the cover sheet of the solicitation. Bids received after the date and time of the bid opening will be received, date stamped, and returned to the Proposer/Contractor unopened. It is the responsibility of the Proposer/Contractor to ensure that bids arrive at the designated opening place on time. Late or non-delivery due to mail or express delivery company failure will not be considered an adequate reason for consideration of late bids. **FAXED BIDS WILL NOT BE ACCEPTED AND SHALL NOT BE CONSIDERED FOR EVALUATION OR AWARD.** In accordance with § 119.071, Fla. Stat., sealed bids, proposals, or replies received by an agency pursuant to a competitive solicitation are exempt from public inspection until such time as the agency provides notice of an intended decision or until thirty (30) days after opening the bids, proposals, or replies, whichever is earlier.

Failure to include all the forms required with any bid will result in the Proposer/Contractor being deemed non-responsive and will result in rejection of the bid.

Section 1.18 BID WITHDRAWAL

To withdraw a bid that includes a clerical error after bid opening, the Proposer/Contractor must give notice in writing to the City of Brooksville of claim or right to withdraw a bid. Within two (2) business days after the bid opening, the Proposer/Contractor requesting withdrawal must provide to the City all original work papers, documents, and other materials used in the preparation of the bid. A Proposer/Contractor may also withdraw a bid prior to the time set for the opening of bids by simply making a request in writing to the City; no explanation is required. No Proposer/Contractor who is permitted to withdraw a bid shall, for compensation, supply any material or labor to or perform any subcontract or other work for the person to whom the contract is awarded or otherwise benefit from the contract. No partial withdrawals of a bid are permitted after the time and date set for the bid opening; only complete withdrawals are permitted. The decision to allow or disallow bid withdrawal remains solely with the City of Brooksville. **BIDS MAY NOT BE ALTERED OR AMENDED AFTER THE BID CLOSING.**

Section 1.19 BID PROTEST

Any person or entity whose bid or proposal is rejected, in whole or in part, or who submits a bid or proposal but is not awarded the contract may protest such decision, but only in strict compliance with the **Bid Protest Procedures**. This Policy shall apply to protests by bidders and proposers when the City Manager or a Department Director recommends a purchase of goods, supplies, equipment or services that would cost ten thousand dollars (\$10,000) or more.

For information on the Bid Protest Procedure, Proposers/Contractors may contact the City of Brooksville Procurement Division.

Section 1.20 BRAND NAMES

Any catalog, brand name, or manufacturer's reference used in the specifications is intended to be descriptive and not restrictive and is used only to indicate the desired type and quality. Any article, equipment, or material, which shall conform to the standards and excellence so established, and is of equal merit, strength, durability, and appearance to perform the desired function, is deemed eligible for offer as a substitute. The qualifications of the offer shall be judged as to their conformance with these specifications. Any equipment offered other than herein specified shall be subject to a competitive demonstration and evaluation by the City of Brooksville. The determination as to whether any alternate product or service is or is not equal shall be made by the City, and such determination(s) shall be final and binding upon all Proposer/Contractors.



Section 1.21 CANCELLATION

The City of Brooksville reserves the right to cancel a resulting contract, without cause, by giving thirty (30) days prior written notice to the Proposer/Contractor of the intention to cancel, or with cause if at any time the Proposer/Contractor fails to fulfill or abide by any of the terms or conditions specified. Failure of the Proposer/Contractor to comply with any of the provisions of the resulting contract shall be considered a material breach of contract and shall be cause for immediate termination of the contract at the sole discretion of the City. In addition to all other legal remedies available to the City, the City of Brooksville reserves the right to cancel and obtain from another source, any services which have not been provided within the required period of time or if no such time is stated, within a reasonable period of time from the date of order or request, as determined by the City of Brooksville.

Section 1.22 CERTIFICATION OF INDEPENDENT PRICE DETERMINATION

The Proposer/Contractor certifies that the prices submitted in response to the solicitation have been arrived at independently and without (for the purpose of restricting competition) any consultation, communication, or agreement with any other Proposer/Contractor or competitor relating to those prices, the intention to submit a bid, or the methods or factors used to calculate the prices bid.

Section 1.23 CHANGE IN SCOPE OF WORK

The City of Brooksville may order changes in the work consisting of additions, deletions, or other revisions within the general scope of the contract. No claims may be made by the Proposer/Contractor that the scope of the project or of the Proposer/Contractor's services has been changed, requiring changes to the amount of compensation to the Proposer/Contractor or other adjustments to the contract, unless such changes or adjustments have been made by written amendment/Change Order (CO) to the contract or purchase order signed by the City's designated Project Manager. If the Proposer/Contractor believes that any specific work is not within the scope of the project, is a material change, or will otherwise require more compensation to the Proposer/Contractor, the Proposer/Contractor must immediately notify the City in writing of this belief. If the City believes that the particular work is within the scope of the contract as written, the Proposer/Contractor will be ordered to and shall continue with the work as changed and at the cost stated for the work within the scope.

Section 1.24 COLLUSION AMONG PROPOSER/CONTRACTORS

Each Proposer/Contractor, by submitting a bid, certifies that it is not a party to any collusive action or any action that may be in violation of the Sherman Antitrust Act. Any or all bids shall be rejected if there is any reason for believing that collusion exists among the Proposer/Contractors. The City of Brooksville may or may not, at its discretion, accept future bids for the same work from participants in such collusion. More than one (1) bid from an individual, firm, partnership, cooperation, or association under the same or different names may be rejected. Reasonable grounds for believing that a Proposer/Contractor has interest in more than one (1) bid for the work being bid may result in rejection of all bids in which the Proposer/Contractor is believed to have interest. Nothing in this clause shall preclude a firm acting as a Sub-proposer/Sub-contractor to be included as a Sub-proposer/Sub-contractor for two (2) or more primary Proposer/Contractor(s) submitting a bid for the work.

Section 1.25 CONFLICT OF INTEREST

The Proposer/Contractor, by submission of its bid, certifies that to the best of his/her knowledge or belief, no elected/appointed official or employee of the City of Brooksville is financially interested, directly or indirectly, in the offer of goods or services specified in this invitation.



Section 1.26 DEBARMENT

By submitting a bid, the Proposer/Contractor certifies that it is not currently debarred from submitting bids for contracts issued by any political subdivision or agency of the State of Florida and that it is not an agent of a person or entity that is currently debarred from submitting bids for contracts issued by any subdivision or agency of the State of Florida.

Section 1.27 E-VERIFY COMPLIANCE

The City of Brooksville is an employer participant in the Department of Homeland Security's Image Program and utilizes E-Verify to ensure its employees are appropriately authorized to work in the United States. As part of its compliance efforts under this program, the City encourages all consultants, Proposer/Contractors (and/or their Sub-proposer/Sub-contractor(s) under contract with or performing work for the City to establish employment procedures that adopt the Images Program Best Practices and otherwise ensure compliance with Federal employment eligibility verification requirements as part of its hiring practices. The selected consultant or Proposer/Contractor shall also include this requirement in all its Sub-consultant/Sub-proposer/Sub-contractor contracts involving City work. For those City projects utilizing State of Florida funds, the requirement to comply with E-Verify will be mandatory. The City reserves the right to request verification of compliance from its consultants and Proposer/Contractors during the term of its contract with the City and for a period of up to five (5) years thereafter. Should a City-retained consultant, Proposer/Contractor and/or its Sub-consultants/Sub-proposers/Sub-contractors be found to be noncompliant with E-Verify as part of a Federal audit or other inquiry, the consultant, Proposer/Contractor, and/or its Sub-consultant/Sub-proposer/Sub-contractor(s) will be solely responsible for the payment of any fines or costs imposed upon the City as a result of such noncompliance.

Section 1.28 AUDIT COOPERATION REQUIREMENT FOR GRANT FUNDED PROJECTS

In those instances where state funding is involved, the selected Proposer/Contractor, and its subconsultant(s) must agree to cooperate with the inspector general in any investigation, audit, inspection, review, or hearing pursuant § Section 20.055 (5), Fla. Stat. By submitting a bid to this solicitation, the Proposer/Contractor certifies that they understand and will comply with this subsection.

Section 1.29 ERRORS IN EXTENSIONS

The Proposer/Contractor must initial erasures or corrections in any Bid Form in ink. The CITY shall reject any Bid Form with such erasures or corrections where City staff concludes it cannot determine with certainty the accuracy or intent of said Bid Form, as corrected. In the case of unit price contracts, if an error is committed in the extension of an item, the unit price as shown in the Bid Form will govern. If the unit price and the extension price are in variance, the unit price shall prevail. Unit prices will be utilized to adjust the total compensation due the successful Proposer/Contractor based on actual quantities encountered. No negotiation of these unit prices after contract award will be allowed. Therefore, each Proposer/Contractor shall proportionately distribute overhead and profit across the unit prices. Significant changes in quantities, including total deletions, are possible through an approved amendment/Change Order to the contract.

Section 1.30 ETHICS IN PUBLIC PROCUREMENT

The contract upon award shall incorporate by reference, but shall not be limited to, the provisions of law contained in § Chapter 112, Florida Statute. A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on a contract to provide any goods or services to a public entity; may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work; may not submit bids on leases or real property to a public entity; may not be awarded or perform work as a Proposer/Contractor, Supplier, Sub-proposer/Sub-contractor, or Consultant under a contract with any public entity; and may not transact business with any public entity in excess of the threshold amount provided in. § 287.017, Fla. Stat., for CATEGORY TWO for a period of thirty-six (36) months from the date of being placed on the convicted vendor list. The Proposer/Contractor certifies that its bid was made without collusion or fraud; that it has not offered or received any kickbacks or inducements from any



other Proposer/Contractor, Supplier, Manufacturer, or Sub-proposer/contractor in connection with this bid; and that it has not conferred on any public employee having official responsibility for this procurement transaction any payment, loan, subscription, advance, deposit of money, services, or anything of value.

Section 1.31 EXCEPTIONS

Proposer/Contractors taking exception to any part or section of the solicitation shall indicate such exceptions on the bid form or appendix. Failure to indicate any exception will be interpreted as the Proposer/Contractor's intent to comply fully with the minimum requirements as written. Conditional or qualified bids, unless such exception(s) are deemed non-material by the City of Brooksville (in its sole discretion), shall be subject to rejection in whole or in part.

Section 1.32 EXPENSES INCURRED IN PREPARING BID

The City of Brooksville accepts no responsibility for any expense incurred by the Proposer/Contractor in the preparation and presentation of a bid. Such expenses shall be borne exclusively by the Proposer/Contractor.

Section 1.33 FAILURE TO DELIVER

In the event of failure of the Proposer/Contractor to deliver the goods and services in accordance with the contract terms and conditions, the City of Brooksville may procure the goods and services from other sources and hold the Proposer/Contractor responsible for any resulting additional costs. A failure to deliver will result in immediate termination of a resulting contract, and immediate disqualification and debarment from submitting bids to the City of Brooksville for a maximum of five (5) years. These remedies shall be in addition to any other remedies that the City of Brooksville may have available.

Section 1.34 FAILURE TO ENFORCE

Failure by the City of Brooksville at any time to enforce the provisions of the contract shall not be construed as a waiver of any such provisions. Such failure to enforce shall not affect the validity of the contract or any part thereof or the right of the City to enforce any provision at any time in accordance with its terms.

Section 1.35 FAIR LABOR STANDARDS

By submission of a bid, the Proposer/Contractor certifies that the Proposer/Contractor(s) and/or Sub-Proposer/Contractor(s) providing product(s) or service(s) shall, in the execution or performance of such a contract, maintain fair labor standards as defined in applicable State and Federal regulations.

Section 1.36 FORCE MAJEURE

The Proposer/Contractor shall not be held responsible for failure to perform the duties and responsibilities imposed by the contract due to legal strikes, fires, riots, rebellions, government actions, and acts of God beyond the control of the Proposer/Contractor, unless otherwise specified in the contract. If government actions include the imposition of tariffs that directly affect the materials or equipment to be provided by the Proposer/Contractor under the solicitation, the Proposer/Contractor must submit certification from its supplier that the materials required were acquired by the Proposer/Contractor after the tariffs went into effect and that the Proposer/Contractor now must pay additional costs for the materials or equipment. The City of Brooksville has the discretion to approve an increase in price based on the information supplied or to terminate the contract.

Section 1.37 IDENTICAL BIDS

Identical bids or bids which otherwise appear suspicious will be reported to the City Attorney and/or the Procurement Specialist for investigation.

Section 1.38 INDEMNIFICATION

In consideration of the sum of Fifteen and 00/100 Dollars (\$15.00), the receipt and sufficiency of which is acknowledged by the Proposer/Contractor to be included and paid for in the contract price, the



Proposer/Contractor shall indemnify, defend, and hold harmless the City of Brooksville and its agents and employees from and against all liabilities, claims, damages, losses, and expenses, including attorneys' fees, arising out of or resulting from the performance of the work, provided that any such liability, claim, damage, loss, or expense: 1) 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; and 2) is caused in whole or in part by any negligent act or omission of the Proposer/Contractor and Sub-proposer/Contractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, except for those caused by the negligent act or omission of the City of Brooksville.

In any and all claims against the City of Brooksville or any of its agents or employees by any employee of the Proposer/Contractor, any Sub-proposer/Sub-contractor(s), anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation under the previous paragraph shall not be limited in any way as to the amount or type of damages, compensation, or benefits payable by or for the Proposer/Contractor or any Sub-Proposer/Contractor under Workers' Compensation Acts, disability benefit acts, or other employee benefit acts.

Section 1.39 INDEPENDENT PROPOSER/CONTRACTOR

The Proposer/Contractor shall be legally considered an Independent Contractor and neither the Proposer/Contractor nor its employees shall, under any circumstances, be considered servants or agents of the City of Brooksville; and the City of Brooksville shall be at no time legally responsible for any negligence or other wrongdoing by the Proposer/Contractor, its servants, or agents. The City of Brooksville shall not withhold from the Proposer/Contractor any Federal or State unemployment taxes, Federal or State income taxes, Social Security tax, or any other amounts for benefits to the Proposer/Contractor. Further, the City of Brooksville shall not provide to the Proposer/Contractor any insurance coverage or other benefits, including workers' compensation, normally provided by the City for its employees.

Section 1.40 INFORMALITIES AND IRREGULARITIES

The City of Brooksville has the right to waive minor defects or variations of a bid from the exact requirements of the specifications that do not affect the price, quality, quantity, delivery, or performance time of the services being procured. If insufficient information is submitted by a Proposer/Contractor with the bid for the City to properly evaluate the bid, the City has the right to require such additional information as it may deem necessary after the time set for receipt of bids, provided that the information requested does not change the price, quality, quantity, delivery, or performance time of the services being procured. The City reserves the right to reject any or all bids in whole or in part; to award by any item, group(s) of items, total bid, or accept the bid that is most advantageous and in the best interest of the City.

Section 1.41 LAW COMPLIANCE

Each party will comply with all applicable Federal, State, and local laws, rules, regulations, and guidelines related to performance under this agreement. In particular, the Proposer/Contractor/vendor/named party, verifies and affirms that it is in compliance with 8 U.S.C., Sec. 1324, prohibiting the employment either directly or by contract, subcontract, or exchange of unauthorized aliens in the United States. The City of Brooksville will consider the employment of unauthorized aliens by any Proposer/Contractor, during the term of the agreement, a violation of the Immigration and Nationality Act. Such violation shall be cause for unilateral cancellation of this agreement by the City of Brooksville.

Section 1.42 LIMITATION OF COST

The Proposer/Contractor agrees to perform the work specified and complete all obligations under the contract within the stated amounts.



Section 1.43 LIQUIDATED DAMAGES

☒ **YES**

☐ **NO**

Each Proposer/Contractor is reminded that time is of the essence of this project, and failure to complete the work on time shall constitute a material breach of the Independent Proposer/Contractor Agreement, the basis for determination of the default of the Proposer/Contractor, and termination of the agreement for cause.

In lieu of termination of the agreement for cause, the City may opt to include a liquidated damages clause of which shall be included in the Contract Documents. An amount determined for liquidated damages at the daily rate specified shall be assessed against the successful Proposer/Contractor not complying with a stated delivery time specified in this bid solicitation (See Bid Form) and any subsequent change orders by the substantial completion date and/or final completion date then the work is considered to be late. The damage figure stipulated must be a reasonable estimate of the probable loss to the agency, and not calculated simply to impose a penalty on the Proposer/Contractor.

When the Proposer/Contractor is in default for nonperformance within the stipulated Contract Time, including any intermediate Milestone Dates, the Procurement Officer will issue a letter in writing within thirty (30) days after the intermediate Milestone Date, Substantial Completion Date, or Final Completion Date notifying the Proposer/Contractor that liquidated damages will be assessed each calendar day until the work is completed and accepted by the City Representative for substantial or final completion date whichever one applies. Liquidated damages shall be deducted at the daily rate in the amount stated in the Independent Proposer/Contractor Agreement documents from any monies due the Proposer/Contractor. The City Manager, however, retains discretion to recommend to the Council that any portion or all of the liquidated damages be waived in order to advance the best interests of the City.

Any failure of the City to provide written notice to the Proposer/Contractor within the applicable thirty (30) day period of its intent to assess liquidated damages shall not constitute a waiver of the right of the CITY to liquidated damages, or otherwise relieve the contractor of liability for liquidated damages.

Section 1.44 NON-APPROPRIATION

All funds for payment by the City of Brooksville under this contract are subject to the availability of an annual appropriation for this purpose by the City. In the event of non-appropriation of funds by the City of Brooksville for the services provided under the contract, the City will terminate the contract, without termination charge or other liability, on the last day of the then-current fiscal year or when the appropriation made for the then-current year for the services covered by this contract is spent, whichever event occurs first. If at any time funds are not appropriated for the continuance of this contract, cancellation shall be accepted by the Proposer/Contractor on thirty (30) days prior written notice, but failure to give such notice shall be of no effect, and the City shall not be obligated under this contract beyond the date of termination.

Section 1.45 NON-DISCRIMINATION

By submission of bid, the Proposer/Contractor certifies that the Proposer/Contractor(s) and/or Sub-proposer/Sub-contractor(s) providing product(s) or service(s) shall not discriminate against any employee or applicant for employment, to be employed in the performance of such contract, with respect to his/her hire, tenure, terms, conditions, or privileges of employment, because of his/her race, color, religion, sex, disability, or national origin, as outlined in applicable State and Federal regulations.

Section 1.46 OFFICIAL DOCUMENTS

The City of Brooksville officially distributes solicitation and addenda documents through the Florida Online Bid System (www.BidNetDirect.com) and the City of Brooksville website. Solicitation documents may be downloaded using these systems. The City of Brooksville is not responsible for solicitation and addenda documents obtained from sources other than the Florida Online Bid System, the City website or the City Procurement Division. Only vendors who properly register and obtain solicitation documents directly from the Florida Online Bid System or Procurement Division will receive addenda and other important information if



issued. All addenda can be found on the City website, the Florida Online Bid System or obtained through the City Procurement Division. Vendors are responsible for acquiring knowledge of changes, modifications, or additions to official solicitation documents. Vendors who submit responses and later claim they did not receive complete documents or had no knowledge of any change, modifications, or additions made to the official solicitation documents shall still be bound by the solicitation, including any changes, modifications, or additions to the official solicitation documents.

IF YOU OBTAINED A SOLICITATION DOCUMENT FROM A SOURCE OTHER THAN THE FLORIDA ONLINE BID SYSTEM OR THE CITY OF BROOKSVILLE WEBSITE, IT IS HIGHLY RECOMMENDED THAT YOU REGISTER AS A VENDOR AND DOWNLOAD THE OFFICIAL DOCUMENT AT www.bidnetdirect.com.

Section 1.47 ORAL STATEMENTS

No oral statement of any person shall modify or otherwise affect the terms, conditions, or specifications stated in this contract. All modifications to the contract or purchase order must be made in writing by the City of Brooksville.

Section 1.48 PATENTS AND ROYALTIES

The Proposer/Contractor covenants to save, defend, keep harmless, and indemnify the City of Brooksville and all of its officers, departments, agencies, agents, and employees from and against all claims, loss, damage, injury, fines, penalties, and cost - including court costs and attorneys' fees, charges, liability, and exposure, however caused - for or on account of any copyright or patented or unpatented invention, process, or article manufactured or used in the performance of the contract, including its use by the City of Brooksville. If the Proposer/Contractor uses any design, device, or materials covered by patent or copyright, it is mutually agreed and understood without exception that the contract price includes all royalties or costs arising from the use of such design, device, or materials in any way in the work.

Section 1.49 PAYMENT PROCEDURES CONSTRUCTION CONTRACT

The City of Brooksville will process payments in a timely manner and in accordance with § 218.735, Fla. Stat., Construction Contract Prompt Payment Law.

Several payment options are available to the successful Proposer/Contractor upon receipt of an approved invoice:

- a. Check may be mailed to the remit address on the invoice. The check is sent to the Post Office the day after City Council's approval.
- b. Check may be picked up in the City of Brooksville at City Hall. The Proposer/Contractor must pick up the check the day after the City Council's approval. The successful Proposer/Contractor must call (352) 540-3810 for detailed instructions.
- c. Payment may be sent by EFT to the vendor's bank account. The vendor must call (352) 540-3810 for detailed instructions.

Section 1.50 PAYMENT TERMS AND DISCOUNTS OTHER THAN CONSTRUCTION

Unless otherwise indicated in the bid documents or required by state law, payment terms will be net forty-five (45) days. Terms not consistent with this provision are not acceptable and may be cause for rejection. The City of Brooksville will pay the vendor within forty-five (45) days after the receipt of a correct and approved invoice for the specified work or goods received. Payments will be made according to the contract/agreement documents.

Discounts for prompt payment requiring payment by the City of Brooksville within a stipulated number of days



will be interpreted as applying within the stipulated number of calendar days after the date of receipt by the City of a correct invoice describing reasonable work allocable to the contract or after the date of acceptance of work/goods that meets contract requirements, whichever event occurs later. Discounts for payment in less than forty-five (45) days will not be considered during evaluation for award but may be taken if applicable after award.

Section 1.51 PUBLIC INFORMATION

After the City provides notice of an intended decision or thirty (30) days after opening the bids, proposal, or replies, whichever is earlier, any and all information contained therein, is considered public and may be reviewed by any person interested in doing so as provided under Florida Law.

All materials submitted in response to this solicitation ultimately become public record and shall be subject to inspection and copying as provided under Florida's Public Records Law. Unrestricted disclosure of proprietary information places it in the public domain. Only submittal information clearly identified with the words "Confidential Disclosure" and placed in a separate envelope marked as such shall be considered to qualify as Trade Secret Data. Any material to be treated as Trade Secret Data must include a justification for the request. The request will be reviewed and either approved or denied by the City. If denied, the Proposer/Contractor shall have the opportunity to withdraw the entire Proposal or to remove the confidential or proprietary restrictions. Neither cost nor pricing information nor the total Proposal shall be considered confidential or proprietary. Any costs to preserve the Trade Secret data designation shall be the responsibility of the Proposer/Contractor.

Section 1.52 PROHIBITION AGAINST CONSIDERING SOCIAL, POLITICAL, OR IDEOLOGICAL INTERESTS IN GOVERNMENT CONTRACTING

Pursuant to Sec. 287.05701, Fla. Stat., the City of Brooksville shall not request documentation of or consider a vendor's social, political, or ideological interests when determining if a vendor is a responsible vendor.

Section 1.53 PROPOSER/CONTRACTOR'S PUBLIC RECORDS REQUIREMENTS

The Proposer/Contractor shall comply with the requirements of Chapter 119, Florida Statute, Florida's Public Records Law. To the extent required by § 119.0701 Fla. Stat., Proposer/Contractor shall (a) keep and maintain public records required by the City to perform the service under the Agreement; (b) upon request from the City's custodian of public records provide the City with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided for under Florida's Public Records Law; (c) 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 contract term and following completion of the contract if Proposer/Contractor does not transfer the records to the City; and (d) upon completion of the contract, transfer, at no cost to the City all public records in possession of Proposer/Contractor. Upon transfer, Proposer/Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records requirements. All records stored electronically must be provided to the City in a format that is compatible with the information technology systems of the City. All documentation produced as part of this Agreement will become the property of the City. This paragraph shall survive the expiration or termination of this Agreement.

IF THE PROPOSER/CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF FLORIDA STATUTE CHAPTER 119, TO THE PROPOSER/CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CITY CLERK'S OFFICE, 201 HOWELL AVENUE, BROOKSVILLE, FL 34601 OR AT (352) 540-3880.



Under Florida Law, a Proposer/Contractor who fails to provide the public records to the City within a reasonable time may be subject to penalties under § 119.10, Fla. Stat., and such non-compliance will constitute a breach of the Agreement and may serve as grounds for termination of this Agreement.

Section 1.54 PUBLISHED PRODUCT SPECIFICATIONS

The Proposer/Contractor should submit a copy of the manufacturer's published and advertised specifications, including warranty information, for the product(s) being offered, if applicable. Failure to provide these specifications may be cause for bid rejection. If the City is unable to verify compliance with the specifications, the response may be rejected. The City's inability to verify responsiveness may result in a determination of non-responsiveness and rejection.

Section 1.55 PURCHASE ORDER REQUIREMENT

Purchases of the City of Brooksville are authorized only if a signed purchase order issued in advance of the transaction, showing that the ordering department has budgeted funds available to pay for the service. Vendors providing services without a signed purchase order do so at their own risk. The City of Brooksville will not be liable for payment for any services provided under the contract unless a valid purchase order has been issued to the Proposer/Contractor.

Section 1.56 QUALIFICATIONS OF PROPOSER/CONTRACTORS

The Proposer/Contractor may be required, before the award of any contract, to show to the complete satisfaction of the City of Brooksville that it has the necessary facilities, ability, and financial resources to provide the service specified therein, in a satisfactory manner. The Proposer/Contractor may also be required to give work history and references to satisfy the City of Brooksville regarding the Proposer/Contractor's qualifications. The City may make reasonable investigations deemed necessary and proper to determine the ability of the Proposer/Contractor to perform the work, and the Proposer/Contractor shall furnish to the City all information for this purpose that may be requested.

The City of Brooksville reserves the right to reject any bid if the evidence submitted by, or investigation of, the Proposer/Contractor fails to satisfy the City that the Proposer/Contractor is properly qualified to carry out the obligations of the contract and to complete the work described therein. Evaluation of the Proposer/Contractor's qualifications shall include:

- The ability, capacity, skill, and financial resources to perform the work or provide the service required.
- The ability of the Proposer/Contractor to perform the work or provide the service promptly or within the time specified, without delay or interference.
- The character, integrity, reputation, judgment, experience, and efficiency of the Proposer/Contractor.
- The quality of performance of previous contracts or services.

Section 1.57 QUALITY OF GOODS

All goods shall be new, in first class condition, and of the manufacturer's latest design of the model presently in production. All materials, supplies, and equipment and/or services performed under the terms of this purchase order or contractual agreement shall comply with the requirements and standards specified in the Williams-Steiger Occupational Safety and Health Act of 1970 (Public Law 91-596), as well as other applicable Federal, State, and local codes. Equipment and materials furnished by the Proposer/Contractor having serious defects, corrosion, or scratches which tend to present an "other than new" appearance shall be promptly corrected by the Proposer/Contractor at no cost to the City of Brooksville. Any existing Material Safety Data Sheets (MSDS) for the products, materials, supplies, or equipment being bid must be submitted



with the bid. No product containing asbestos, lead paint or polychlorinated biphenyl (PCB) in any form will be considered for award by the City of Brooksville.

Section 1.58 RECOVERY OF MONEY

Whenever, under the contract, any sum of money shall be recoverable from or payable by the Proposer/Contractor to the City of Brooksville, the same amount may be deducted from any sum due the Proposer/Contractor under the contract or under any other contract between the Proposer/Contractor and the City of Brooksville. The rights of the City are in addition and without prejudice to any other right to claim the amount of any loss or damage suffered by the City by the acts or omissions of the Proposer/Contractor.

Section 1.59 RIGHT TO AUDIT

The successful Proposer/Contractor shall maintain such financial records and other records as they relate to the purchase of goods and/or services by the City of Brooksville from the subject vendor. The Proposer/Contractor shall retain these records for a period of three (3) years after final payment, or until they are audited by the City, whichever event occurs first. These records shall be made available during the term of the contract and the subsequent three (3) year period for examination, transcription, and audit by the City, its designees, or other authorized bodies.

Section 1.60 RISK OF LOSS

The City of Brooksville shall be relieved from all risks of loss or damage to goods during periods of transportation, manufacture, and the entire time the goods are in the possession of the Proposer/Contractor prior to acceptance by the City of Brooksville. At such time, the risk of loss or damage for goods shall pass to the City. The Proposer/Contractor shall not be responsible for damage to the goods occasioned by negligence of the City or its employees.

Section 1.61 TABULATIONS

Solicitation results (tabulations) will not be given over the telephone or via fax. The selected bidder will be notified in writing with intent to award a contract. Recommended awards will be available for review by interested parties at City Hall.

Section 1.62 TAXES

All bids shall be submitted exclusive of direct Federal, State, and local taxes; however, if the Proposer/Contractor believes certain taxes are properly payable, he/she may list such taxes separately in each case directly below the respective item bid price. Prices quoted must be in units per required specifications, and not include the cost of any such taxes, including those on any material, supplies, or equipment used or installed in the work. The City of Brooksville does not pay Federal Excise and Sales Taxes on direct purchases of tangible personal property. See Exemption Number on face of the resulting purchase order. This exemption does not apply to purchases of tangible personal property made by Proposer/Contractors who use the tangible personal property in the performance of contracts for improvement of City-owned real property. Please refer to § Chapter 192, Fla. Stat.

Section 1.63 UNSATISFACTORY WORK

If, at any time during the contract term, the services or work performed by the Proposer/Contractor is considered by the City of Brooksville to create a condition that threatens the health, safety, or welfare of the community, the Proposer/Contractor shall, on being notified by the City, immediately correct such deficient service or work. In the event the Proposer/Contractor fails, after notice, to correct the deficient service or work immediately, the City shall have the right to order the correction of the deficiency by separate contract or with its own resources at the expense of the Proposer/Contractor. Notwithstanding the above, the City of Brooksville reserves the right to cancel a resulting contract, without cause, by giving thirty (30) days prior written notice to the Proposer/Contractor of the intention to cancel.



Section 1.64 VENDORS LIST

Vendors must visit www.bidnetdirect.com to register as a vendor. Once registered, vendors will have the ability to view and download solicitations for the City of Brooksville as well as other participating agencies throughout Florida. Vendors may also visit the City of Brooksville's website and register on the Solicitation List Application form provided and submit to procurement@cityofbrooksville.us or may be mailed to City of Brooksville, Procurement Division, 201 Howell Ave., Brooksville, FL 34601.

Section 1.65 WARRANTIES

The Proposer/Contractor agrees that the supplies and services furnished under this award shall be covered by the most favorable commercial warranties the Proposer/Contractor gives to any customer for comparable quantities of such supplies or services and that the rights and remedies provided herein are in addition to and do not limit any rights afforded to the City by any other provision of this award.

END OF GENERAL PROVISIONS

Article II. SPECIAL PROVISIONS

In addition to the General Provisions of this solicitation, these Special Provisions, along with the specifications that follow, apply in like force to this solicitation and to any subsequent contract resulting therefrom.

Section 2.01 ADDITION/DELETION

The City of Brooksville's City Council reserves the right to add or delete any item from this bid or resulting award when deemed to be in the best interest of the City.

Section 2.02 BONDS REQUIRED

1. **Bid Bond:** ☒YES ☐NO

A Bid Bond, cashier's check, or certified check, in the amount of five percent (5%) of the amount of the bid, made payable to the City of Brooksville shall accompany each bid. The bid surety of all Proposer/Contractors shall be retained until after the award of the contract is made. The bid surety of the successful Proposer/Contractor shall be retained until the posting of a Performance Bond. The bond shall be a Corporate Surety Bond issued by a surety company authorized to do business in the State of Florida.

*The failure of the Proposer/Contractor to include a Bid Bond, cashier's check, or certified check, in the amount of five percent (5%) of the amount of the bid, **will result in the bid being rejected as 'non-responsive'.** Award will then be made to the next lowest, responsive, and responsible Proposer/Contractor.*

2. **Performance Bond:** ☒YES ☐NO

A Performance Bond, in the amount of 100 percent (100%) of the bid, shall be required of the successful Proposer/Contractor to ensure satisfactory completion of the work. The bond shall be a Corporate Surety Bond issued by a surety company authorized to do business in the State of Florida. The Attorney in Fact, who signs the bond, must file with the bond, a certificate and effective dated copy of a Power of Attorney. The surety company shall have a current, valid Certificate of Authority issued by the State of Florida. The surety company shall have current, valid Certificate of Authority issued by the United States Treasury Department under Sections 9304 to 9308 of Title 31 of the U.S. Code. The surety company shall be in full compliance with the provisions of the Florida Insurance Administrative Code and shall have at least twice the minimum surplus and capital required by the same at the time the Invitation for Bid is issued.

The Proposer/Contractor shall record the Performance Bond in Hernando County public records as required by §255.05 Florida Statutes. The Proposer/Contractor shall furnish a certified copy of the recorded Performance Bond to the City before the Notice to Proceed, when required, or before payment will be issued. The failure of the Proposer/Contractor to accept an award and file and provide an acceptable Performance Bond within fifteen (15) days after receipt of contract but prior to any work activities shall be just cause for cancellation of the award and the forfeiture of the bid surety to the City of Brooksville as liquidated damages. Award may then be made to the next, lowest, responsive, and responsible Proposer/Contractor.

3. **Payment Bond:** ☒YES ☐NO

A Payment Bond, in the amount of 100 percent (100%) of the bid, shall be required of the successful

Proposer/Contractor to guarantee payment of all persons who have and fulfill contracts with the Proposer/Contractor for performing labor or providing equipment or material in the performance of the work provided for in the contract. The bond shall be a Corporate Surety Bond issued by a surety company authorized to do business in the State of Florida. The Attorney in Fact, who signs the bond, must file with the bond, a certificate and effective dated copy of a Power of Attorney. The surety company shall have a current, valid Certificate of Authority issued by the State of Florida. The surety company shall have current, valid Certificate of Authority issued by the United States Treasury Department under Sections 9304 to 9308 of Title 31 of the U.S. Code. The surety company shall be in full compliance with the provisions of the Florida Insurance Administrative Code and shall have at least twice the minimum surplus and capital required by the same at the time the Invitation for Bid is issued.

The Proposer/Contractor shall record the Payment Bond in Hernando County public records as required by §255.05 Florida Statutes. The Proposer/Contractor shall furnish a certified copy of the recorded Payment Bond to the City before the Notice to Proceed, when required, or before payment will be issued. The failure of the Proposer/Contractor to accept an award and file and provide an acceptable Payment Bond within fifteen (15) days after receipt of contract but prior to any work activities shall be just cause for cancellation of the award and the forfeiture of the bid surety to the City of Brooksville as liquidated damages. Award may then be made to the next, lowest, responsive, and responsible Proposer/Contractor.

4. **Alternative Security:** In lieu of the bonds required by this solicitation or contract, the successful Proposer/Contractor may file with the City of Brooksville an alternative form of security that shall be in the form of cash, money order, certified check, or cashier's check. The determination of the value and acceptability of such alternative forms of security shall be made exclusively by the City.

Section 2.03 CONTRACT TERM

The contract period will begin on date of the City of Brooksville City Council approval and continue for the period of time reflected in the contract under the same prices, terms, and conditions as in the original contract approved by the City Council, unless cancelled in writing by the City. All contracts are subject to the appropriation of funds by the City of Brooksville.

Section 2.04 COPYRIGHT

The Proposer/Contractor shall irrevocably transfer, assign, set over, and convey to the City of Brooksville, all rights, title, and interest, including the sole exclusive and complete copyright interest, in any and all copyrightable works created pursuant to the contract. The Proposer/Contractor further agrees to execute such documents as the City of Brooksville and/or City Council may request to affect such transfer or assignment. Further, the Proposer/Contractor agrees that the rights granted to the City by this paragraph are irrevocable. The Proposer/Contractor's remedy in the event of termination of or dispute over any agreement entered into as the result of this Request for Proposal shall not include any right to rescind, terminate, or otherwise revoke or invalidate in any way the rights conferred pursuant to the provisions of this paragraph. Similarly, no termination of any agreement entered into as the result of this Request for Proposal shall have the effect of rescinding, termination, or otherwise invalidating the rights acquired pursuant to the provisions of this paragraph.

Section 2.05 COST REIMBURSEMENT

Unless an alternative cost methodology is specified herein, the Proposer/Contractor agrees that payment by the City of Brooksville to the Proposer/Contractor for materials used in the performance of any work under the contract on a cost plus a percentage of cost basis is specifically prohibited. The cost of all materials provided in the performance of the work is to be reimbursed to the Proposer/Contractor in the following

manner: The City shall reimburse the Proposer/Contractor, in accordance with the contract/agreement documents, only for those materials, equipment parts, supplies, rentals, services, etc., actually used in the performance of the work that are supported by invoices issued by the suppliers of the Proposer/Contractor describing the quantity and cost of the materials purchased. No surcharges shall be added to the suppliers' invoices or included in the Proposer/Contractor's invoice submitted to the City that would increase the dollar amount indicated on the suppliers' invoices for the materials purchased for the assigned job. All incidental costs, including allowances for profit and tools of the trade, must be included in the contract hourly labor rates.

Section 2.06 ECONOMIC PRICE ADJUSTMENT

Any reference in the solicitation to *economic price adjustment* or *price escalation* shall be considered to mean price decreases as well as increases, unless otherwise stipulated.

Bids will be evaluated on the basis of prices bid without consideration of the allowable escalation. If a Proposer/Contractor increased the ceiling stipulated in the Request for Proposal or places limits on the provisions of the Request for Proposal that allow prices to drop in accordance with the movement of the escalator, the bid will be rejected as nonresponsive.

If a Proposer/Contractor deletes the price escalation clause from its bid, the bid will be rejected as nonresponsive. If a Proposer/Contractor lowers the ceiling stipulated in the Request for Proposal, the bid will be evaluated at the base price in the same manner as those bids that do not reduce the stipulated ceiling. If the Proposer/Contractor offering a lower ceiling ultimately receives the award, that ceiling will be incorporated into the contract documents.

Section 2.07 FEDERAL-AID CONSTRUCTION CONTRACT ☐Yes ☒NO

Federal-aid construction projects shall be subject to the provisions under the terms and conditions as set forth by the original contract approved by the City Council.

Section 2.08 INSURANCE REQUIREMENTS

The insurance required must be written by an insurer authorized to do business in the State of Florida and have an "A" policyholder's rating and a financial rating of at least Class VIII in accordance with the most current *Best's Key Rating Guide*. Prior to the time the Proposer/Contractor is entitled to commence any part of the project, work, or services under this contract, the Proposer/Contractor shall procure, pay for, and maintain at least the following insurance coverages and limits. Policies of insurance required by the contract shall be primary insurance and non-contributory with respect to the City, its officials, agents, or employees.

1. WORKERS' COMPENSATION

Coverage is to apply for all employees for statutory limits in compliance with the applicable state and federal laws. The policy must include Employers' Liability with a limit of \$500,000 each accident, \$500,000 each employee, \$500,000 policy limit for disease.

2. COMMERCIAL GENERAL LIABILITY - OCCURRENCE FORM REQUIRED

Proposer/Contractor shall maintain commercial general liability (CGL) insurance with a limit of not less than \$500,000 each occurrence. If such CGL insurance contains a general aggregate limit, it shall apply separately to this location/project in the amount of \$1,000,000. Products and completed operations aggregate shall be \$1,000,000. CGL insurance shall be written on an occurrence form and shall include bodily injury and property damage liability for premises, operations, independent contractors, products and completed operations, contractual liability, broad form property damage and property damage resulting from explosion, collapse or underground (x, c, u) exposures, personal injury and advertising injury. Damage to rented premises shall be included at \$100,000.

3. COMMERCIAL AUTOMOBILE LIABILITY INSURANCE

Proposer/Contractor shall maintain automobile liability insurance with a limit of not less than \$1,000,000 each accident for bodily injury and property damage liability. Such insurance shall cover liability arising out of any auto (including owned, hired and non-owner autos.) The policy shall be endorsed to provide contractual liability coverage.

4. BUILDERS RISK INSURANCE ☒ Yes ☐ No

When a contract includes **construction of and/or additions to above ground buildings or structures**, Builders Risk coverage must be provided. Contract specifications should state whether the owner or contractor takes out this policy. The contract should specify a waiver of subrogation between the owner and contractor to the extent that damage to the project is covered by insurance.

The contractor shall purchase and maintain Builders Risk Insurance to cover the subject property for all risks of loss, subject to a waiver of coinsurance, and covering off-site storage, transit and installation risks.

The policy is to be endorsed to cover the interests of all parties, including the Entity and all contractors and subcontractors. The insurance is to be endorsed to cover testing and to grant permission to occupy the facility under construction/renovation during such activity.

5. EVIDENCE OF INSURANCE

The Proposer/Contractor shall furnish the (Entity) with Certificates of Insurance. The Certificates are to be signed by a person authorized by that insurer to bind coverage on its behalf. The (Entity) is to be specifically included as an additional insured on all policies except Workers' Compensation. In the event the insurance coverage expires prior to the completion of the project, a renewal certificate shall be issued 30 days prior to said expiration date. The policy shall provide a 30-day notification clause in the event of cancellation or modification to the policy. All certificates of insurance must be on file with and approved by the (Entity) before the commencement of any work activities.

PRO

Each insurance policy shall include the following conditions by endorsement to the policy:

1. Each policy shall require that thirty (30) days prior to expiration, cancellation, nonrenewal, or any material change in coverages or limits, a notice thereof shall be given to the City of Brooksville by certified mail to: The City of Brooksville, Procurement Specialist; 201 Howell Street; Brooksville, FL 34601. The Proposer/Contractor shall also notify the City of Brooksville, in a like manner, within twenty-four (24) hours after receipt, of any notices of expiration, cancellation, nonrenewal, or material change in coverage received by the said Proposer/Contractor from its insurer; and nothing contained herein shall absolve the Proposer/Contractor of this requirement to provide notice.
2. Companies issuing the insurance policy, or policies, shall have no recourse against the City of Brooksville for payment of premiums or assessments for any deductibles that all are at the sole responsibility and risk of the Proposer/Contractor.
3. The term "City" or "the City of Brooksville" shall include all Authorities, Boards, Bureaus, Commissions, Divisions, Departments, and Offices of City and individual members, employees thereof in their official capacities, and/or while acting on behalf of the City of Brooksville.
4. The City of Brooksville's Public Works Department shall be endorsed to the required policy or policies as an additional insured, except for Worker's Compensation and Professional Liability, if applicable.
5. The City of Brooksville shall also be listed as a certificate holder.

6. The policy clause "Other Insurance" shall not apply to any insurance coverage currently held by the City of Brooksville to any such future coverage, or to the City of Brooksville's self-insured retentions of whatever nature.

Section 2.09 MOTOR VEHICLE LICENSING

The Proposer/Contractor shall comply with Chapter 320, Florida Statute. Failure to comply may result in a determination of no responsibility on the basis that the Proposer/Contractor is not qualified to legally contract with the City of Brooksville and may further cause such noncompliant offers to be rejected.

Section 2.10 QUANTITIES

The City of Brooksville shall not be required to purchase any minimum or maximum quantities during the term of any award resulting from this specification.

Section 2.11 REPORT STANDARDS

Reports or written material prepared by the Proposer/Contractor in response to the requirements of this contract shall be thoroughly researched for accuracy of content, shall be grammatically correct and not contain spelling errors, shall be submitted in a format approved in advance by the Procurement Manager, and shall be submitted in draft form for advance review and comment by the Procurement Manager. The cost of correcting grammatical errors, correcting report data, or other revisions required to bring the report or written material into compliance with the contract requirements shall be borne by the Proposer/Contractor.

Section 2.12 SALES TAX

The City of Brooksville, as a governmental entity, is exempt from sales tax under Florida Law. A copy of the City's tax-exempt certificate or number will be provided at the time a purchase order is issued.

Section 2.13 SPECIFICATIONS

All items delivered must meet the specifications herein. Items delivered not as specified will be returned at no expense by the City of Brooksville. The City may return, for full credit, any unused items received which fail to meet the City's performance standards. Replacement items meeting specifications must be submitted within a reasonable time after rejection of the non-conforming items.

Section 2.14 TRAFFIC CONTROL

The Proposer/Contractor shall conduct its operations in a manner that will not interrupt pedestrian or vehicle traffic except as approved by the City of Brooksville. The work area shall be confined to the smallest area possible to allow maximum use of the street or sidewalk and to reduce any hazard to traffic or pedestrians to a minimum. At all times, the Proposer/Contractor shall use workers and traffic control signs and devices necessary to comply with all applicable federal, state, and local laws, rules, and regulations. In addition to signs and devices, when the street is obstructed to any extent by contract operations, special workers equipped with flags shall be designated by the Proposer/Contractor to direct vehicle and pedestrian traffic. The workers so designated shall not be assigned to any other duties while engaged in directing traffic. All personnel, signs, barricades, and any other items or devices necessary for the maintenance of traffic and safety shall be provided by the Proposer/Contractor. No separate payment shall be made by the City for this work. All cost of this work is included by the Proposer/Contractor as part of the contract price. The plan for traffic control shall be as directed by the City. A Right-of-Way Use Permit shall be obtained from the City prior to the commencement of any work in such a right-of-way. The cost for securing such permits shall be included in the Bid.

Section 2.15 VENDOR'S EQUIPMENT

Responding vendors must submit a list of owned equipment and major tools, and a list of current employees and respective skill level or discipline. The City of Brooksville's City Council, at its sole discretion, reserves the right to award this work to vendors who are able to demonstrate current ownership and possession of the equipment, tools, and personnel deemed reasonably sufficient to perform the specified work at the lowest possible cost.

It is the City of Brooksville's intent to award this work to a Proposer/Contractor at the lowest possible cost, while securing sufficient quality of services. Preference may be given to those vendors who own and possess the necessary tools, equipment, and services to minimize reimbursement costs associated with rentals and purchases from third parties.

END OF SPECIAL PROVISIONS

ARTICLE III

Specifications for:

**Cortez Boulevard Pump Station
Replacement Project**

Prepared For:

City of Brooksville
600 South Brooksville Avenue
Brooksville, FL 34601

August 2024

Prepared By



CORTEZ BOULEVARD PUMP STATION REPLACEMENT PROJECT

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SECTION 01005

GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Description

The work to be completed consists of the furnishing of all labor, materials and equipment, and the performance of all Work included in this Contract. The work is to be performed in City of Brooksville, Florida.

B. Work Included

The Contractor shall furnish all labor, superintendent, materials, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies and other means of construction necessary or proper for performing and completing the Work. The Contractor shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the Engineer, and in strict accordance with the Contract Documents. The Contractor shall clean up the work and maintain it during and after construction, until accepted, and shall do all work and pay all costs incidental thereto. The Contractor shall repair or restore all structures and property that may be damaged or disturbed during performance of the work.

The cost of incidental work described in these General Requirements, for which there are no specific pay items, shall be considered as part of the general cost of doing the work and shall be included in the price bid. No additional payment will be made therefore.

The Contractor shall provide and maintain such modern plant, tools, and equipment as may be necessary, in the opinion of the Engineer, to perform in a satisfactory and acceptable manner all the work required by this Contract. Only equipment of established reputation and proven efficiency shall be used. The Contractor shall be solely responsible for the adequacy of his workmanship, materials and equipment, prior approval of the Engineer notwithstanding.

C. Public Utility Installation and Structures

Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes and all other appurtenances and facilities pertaining thereto whether owned or controlled by the Owner, other governmental bodies or privately owned by individuals, firms or corporations, used to serve the public with transportation, traffic control, gas, electricity, telephone, sewerage, drainage, water or other public or private property which may be affected by the work shall be deemed included hereunder.

The Contractor shall protect all public utility installations and structures from damage during the work. Access across any buried public utility installation, or structure, shall be made only in such locations and by means approved by the Engineer. The Contractor shall so arrange his operations as to avoid any damage to these facilities. All required

protective devices and construction shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor, which are shown on the Plans or have been located in the field by the utility, shall be repaired by the Contractor, at his expense, as directed by the Engineer. No separate payment shall be made for such protection or repairs to public utility installations or structures.

Public utility installations or structures owned or controlled by the Owner or other governmental body, which are shown on the Drawings to be removed, relocated, replaced or rebuilt by the Contractor, shall be considered as a part of the general cost of doing the work and shall be included in the price bid. No separate payment shall be made therefore.

Where public utility installations or structures owned or controlled by the Owner or other governmental body 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 Engineer, removal, relocation, replacement or rebuilding is necessary to complete the work, such work shall be accomplished by the utility having jurisdiction, or such work may be ordered, in writing by the Engineer, to be accomplished by the Contractor. 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 done in accordance with the Contract Documents and Technical Specifications.

All Owner, other governmental utility departments, and other owners of public utilities that may be affected by the work shall be informed in writing by the Contractor within two weeks after the execution of the Contract or Contract covering the work. Such notice shall set out, in general, and direct attention to, the responsibilities of the Owner and other governmental utility departments and other owners of public utilities for such installations and structures as may be affected by the work and shall be accompanied by one set of Drawings and Specifications covering the work under such Contract or Contracts.

In addition to the general notice given by the Contractor, the Contractor shall give written notice to Owner and other governmental utility departments and other owners of public utilities of the locations of his proposed construction operations, at least forty- eight hours in advance of breaking ground in any area or on any unit of the work.

The maintenance, repair, removal, relocation or rebuilding of public utility installations and structures, when accomplished by the Contractor as herein provided, shall be done by methods approved by the Engineer.

1.02 DRAWINGS AND SPECIFICATIONS

A. Drawings

When obtaining data and information from the Drawings, figures shall be used in preference to scaled dimensions, and large scale drawings in preference to small scale drawings.

B. Copies Furnished to Contractor

The Contractor shall furnish each of the subcontractors, manufacturers, and suppliers such copies of the Contract Documents as may be required for their work. Additional copies of the Drawings and Specifications, when requested, may be furnished to the Contractor at cost of reproduction.

C. Supplementary Drawings

When, in the opinion of the Engineer, it becomes necessary to explain more fully the work to be accomplished, or to illustrate the work further, or to show any changes which may be required, Drawings known as Supplementary Drawings, with Specifications pertaining thereto, will be prepared by the Engineer and prints thereof will be given to the Contractor and to the Owner.

D. Contractor to Check Drawings and Data

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 him of any errors, omissions, conflicts and discrepancies found therein. The Contractor shall submit to the Engineer Requests for Information (RFI), consecutively numbered, detailing all errors, omissions, conflicts and discrepancies using a form provided by the Engineer. Engineer shall promptly provide a response to all RFIs submitted by the Contractor. Contractor will not be allowed to take advantage of any errors or omissions, as full instructions will be furnished by the Engineer, should such errors or omissions be discovered.

E. Specifications

The Technical Specifications consist of three parts: General, Products and Execution. The General Section contains General Requirements that govern the work. Products and Execution modify and supplement these by detailed requirements for the work and shall always govern whenever there appears to be a conflict.

F. Intent

All work called for in the Specifications applicable to this Contract, but not shown on the Drawings in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified in either the Drawings or in the Specifications, but involved in carrying out their intent or in the complete and proper execution of the work, is required and shall be performed by the Contractor as though it were specifically delineated or described.

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.

The inclusion of the Related Requirements (or work specified elsewhere) in the General part of the specifications is only for the convenience of the Contractor and shall not be interpreted as a complete list of related Specification Sections.

1.03 MATERIALS AND EQUIPMENT

A. Manufacturer

The names of proposed manufacturers, suppliers and dealers who are to furnish materials, fixtures, equipment, appliances or other fittings shall be submitted to the Engineer for approval. Such approval must be obtained before shop drawings will be checked. No manufacturer will be approved for any materials to be furnished under this Contract unless he shall be of good reputation and have a plant of ample capacity. He shall, upon the request of the Engineer, be required to submit evidence that he has manufactured a similar product to the one specified and that it has been previously used for a like purpose for a sufficient length of time to demonstrate its satisfactory performance. All transactions with the manufacturers or subcontractors shall be through the Contractor, unless the Contractor shall request, in writing to the Engineer, that the manufacturer or subcontractor deal directly with the Engineer. Any such transactions shall not in any way release the Contractor from his full responsibility under this Contract.

Any two or more pieces of material or equipment of the same kind, type or classification, and being used for identical types of service, shall be made by the same manufacturer.

B. Delivery

The Contractor shall deliver materials in ample quantities to insure the most speedy and uninterrupted progress of the work so as to complete the work within the contract time. The Contractor shall also coordinate deliveries in order to avoid delay in, or impediment of, the progress of the work of any related Contractor.

C. Tools and Accessories

The Contractor shall, unless otherwise stated in the Contract Documents, furnish with each type, kind or size of equipment, one complete set of suitably marked high grade special tools and appliances which may be needed to adjust, operate, maintain or repair the equipment. Such tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with good grade cylinder locks and duplicate keys.

Spare parts shall be furnished as specified.

Each piece of equipment shall be provided with a substantial nameplate, securely fastened in place and clearly inscribed with the manufacturer's name, year of manufacture, serial number, weight and principal rating data.

D. Installation of Equipment

The Contractor shall have on hand sufficient proper equipment and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character.

Equipment shall be erected in a neat and workmanlike manner on 4-inch high housekeeping foundations at the locations and elevations shown on the Drawings, or as directed otherwise by the Engineer during installation. 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.

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 purpose intended. Substantial templates and working drawings for installation shall be furnished.

The Contractor shall furnish all materials and labor for, and shall properly bed in non-shrink grout, each piece of equipment on its supporting base that rests on masonry foundations. Grout shall completely fill the space between the equipment base and the foundation. All metal surfaces coming in contact with concrete or grout shall receive a coat of coal tar epoxy equal to Kop-Coat 300M.

E. Service of Manufacturer's Representative

The Contractor shall include the cost of furnishing a competent and experienced engineer or superintendent who shall represent the manufacturer of each piece of equipment valued at more than \$5,000 who shall assist the Contractor in installing, adjusting, testing and placing in operation the equipment in conformity with the Contract Documents. After the equipment is placed in permanent operation by the Owner, such engineer or superintendent shall make all adjustments and tests required by the Engineer to prove that such equipment is proper and in satisfactory operating condition, and shall submit a written certification that the equipment has been properly installed and, at a later time, when directed by the Engineer, shall instruct such personnel as may be designated by the Owner in the proper operation and maintenance of such equipment.

1.04 INSPECTION AND TESTING

A. General

For tests specified to be made by the Contractor, the testing personnel shall make the necessary inspections and tests and the reports thereof shall be in such form as will facilitate checking to determine compliance with the Contract Documents. Five copies of the reports shall be submitted and authorized certification thereof must be furnished to the Engineer as a prerequisite for the acceptance of any material or equipment.

If, in the making of any test of any material or equipment, it is ascertained by the Engineer that the material or equipment does not comply with the Contract, the Contractor will 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.

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.

The Contractor shall be fully responsible for the proper operation of equipment during tests and instruction periods and shall neither have nor make any claim for damage that may occur to equipment prior to the time when the Owner formally takes over the operation thereof.

B. Costs

All inspection and testing of materials furnished under this Contract will be performed by the Owner or duly authorized inspections engineers or inspection bureaus without cost to the Contractor, unless otherwise expressly specified.

The cost of shop and field tests of equipment and of certain other tests specifically called for in the Contract Documents shall be borne by the Contractor and such costs shall be deemed to be included in the Contract Price.

Materials and equipment submitted by the Contractor as equivalent to those specified may be tested by the Owner for compliance with the specifications. The Contractor shall reimburse the Owner for the expenditures incurred in making such tests on materials and equipment that are rejected for non-compliance.

C. Inspection of Materials

The Contractor shall give notice in writing to the Engineer, sufficiently in advance of his intention to commence the manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. Such notice shall contain a request for inspection, the date of commencement and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice, the Engineer will arrange to have a representative present at such times during the manufacture as maybe necessary to inspect the materials or he will notify the Contractor that the inspection will be made at a point other than the point of manufacture, or he will notify the Contractor that inspection will be waived. The Contractor must comply with these provisions before shipping any material. Such inspection shall not release the Contractor from the responsibility for furnishing materials meeting the requirements of the Contract Documents.

D. Certificate of Manufacture

When inspection is waived or when the Engineer so requires, the Contractor shall furnish to him authoritative evidence in the form of Certificates of Manufacture that the materials to be used in the work have been manufactured and tested in conformity with the Contract Documents. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.

E. Shop Tests of Operating Equipment

Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function or special requirements are specified shall be tested in the shop of the maker in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents. No such equipment shall be shipped to the work until the Engineer notifies the Contractor, in writing, that the results of such tests are acceptable.

Five copies of the manufacturer's actual test data and interpreted results thereof, accompanied by a certificate of authenticity sworn to by a responsible official of the manufacturing company, shall be forwarded to the Engineer for approval.

The cost of shop tests and of furnishing manufacturer's preliminary and shop test data of operating equipment shall be borne by the Contractor.

F. Preliminary Field Tests

As soon as conditions permit, the Contractor shall furnish all labor, materials, and instruments and shall make preliminary field tests of equipment. If the preliminary field tests disclose any equipment furnished under this Contract that does not comply with the requirements of the Contract Documents, the Contractor shall, prior to the acceptance tests, make all changes, adjustments and replacement required. The furnishing Contractor shall assist in the preliminary field tests as applicable.

G. Final Field Tests

Upon completion of the work and prior to final payment, all equipment and piping installed under this Contract shall be subjected to acceptance tests as specified or required to prove compliance with the Contract Documents.

The Contractor shall furnish labor, fuel, energy, water and all other materials, equipment and instruments necessary for all acceptance tests, at no additional cost to the Owner. The Supplier and/or manufacturer shall assist in the final field tests, as applicable.

H. Failure of Tests

Any defects in the materials and equipment or their failure to meet the tests, guarantee or requirements of the Contract Documents shall be promptly corrected by the Contractor by replacements or otherwise as directed by the Engineer. The decision of the Engineer as to whether or not the Contractor has fulfilled his obligations under the Contract shall be final and conclusive. If the Contractor fails to make these corrections or if the improved materials and equipment, when tested, shall again fail to meet the guarantees or specified requirements, the Owner, notwithstanding its partial payment for work, and materials and equipment, may reject the materials and equipment and may order the Contractor to remove them from the site at his own expense.

I. Final Inspection

During such final inspections, the work shall be clean and free from water. In no case will the final estimate be prepared until the Contractor has complied with all requirements set forth and the Engineer has made his final inspection of the entire work and is satisfied that the entire work is properly and satisfactorily constructed in accordance with the requirements of the Contract Documents.

1.05 TEMPORARY STRUCTURES

A. Temporary Fences

If, during the course of the work, it is necessary to remove or disturb any fence or part thereof, the Contractor shall, at his own expense, if so ordered by the Engineer, provide a suitable temporary fence, which shall be maintained until the permanent fence is replaced. The Engineer shall be solely responsible for the determination of the necessity for providing a temporary fence and the type of temporary fence to be used.

1.06 TEMPORARY SERVICES

A. First Aid

The Contractor shall keep upon the site, at each location where work is in progress, a completely equipped first aid kit and shall provide ready access thereto at all times when people are employed on the work.

1.07 LINES AND GRADE

A. Grade

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 rests upon the Contractor.

The Contractor, prior to commencing of construction, shall have established bench marks and base line controlling points. The Contractor shall so place excavation and other materials as to cause no inconvenience in the use of the reference marks provided. He shall remove any obstructions placed by him contrary to this provision.

B. Surveys

The Contractor shall furnish and maintain, at his own expense, stakes and other such materials to establish all working or construction lines and grades, as required, and shall be solely responsible for the accuracy thereof.

All surveying shall be performed in accordance with Specification 01050.

C. Safeguarding Marks

The Contractor shall safeguard all points, stakes, grade marks, monuments and bench marks made or established on the work, bear the cost of re-establishing them if disturbed, and bear the entire expense of rectifying work improperly installed due to not maintaining or protecting or to removing without authorization such established points, stakes and marks.

The Contractor shall safeguard all existing and known property corners, monuments and marks adjacent to but not related to the work and, if required, shall bear the cost of re-establishing them if disturbed or destroyed.

1.08 ADJACENT STRUCTURES AND LANDSCAPING

- A. The Contractor shall also be entirely responsible and liable for all damage or injury as a result of his operations to all other adjacent public and private property, structures of any kind and appurtenances thereto met with during the progress of the work. The cost of protection, replacement in their original locations and conditions or payment of damages for injuries to such adjacent public and private property and structures affected by the work, whether or not shown on the Drawings or specified shall be included in the various Contract Items and no separate payments will be made therefore. Where such public and private property, structures of any kind and appurtenances thereto are not shown

on the Drawings and when, in the opinion to avoid interference with the work, payment therefore will be made as provided for in the General Conditions.

Contractor is expressly advised that the protection of buildings structures, tunnels, tanks, pipelines, etc. and related work adjacent to and in the vicinity of his operations, wherever they may be, is solely his responsibility. Conditional inspection of buildings or structures in the immediate vicinity of the project which may reasonably be expected to be affected by the Work shall be performed by and be the responsibility of the Contractor.

Contractor shall, before starting operations, make an examination of the interior and exterior of the adjacent structures, buildings, facilities, etc., and record by noted, measurements, photographs, etc., conditions which might be aggravated by open excavation and construction. Repairs or replacement of all conditions disturbed by the construction shall be made to the satisfaction of the Owner and to the satisfaction of the Engineer. This does not preclude conforming to the requirements of the insurance underwriters. Copies of surveys, photographs, reports, etc., shall be given to the Engineer.

Prior to the beginning of any excavations the Contractor shall advise the Engineer of all building or structures on which he intends to perform work or which performance of the project work will affect.

B. Protection of Trees

1. The Contractor shall adequately protect all trees and shrubs with boxes or otherwise in accordance with ordinances governing the protection of trees. No excavated materials shall be placed so as to injure such trees or shrubs. Trees or shrubs destroyed through negligence of the Contractor or his employees shall be replaced with new stock of similar size and age, in the proper season and at the sole expense of the Contractor.
2. Beneath trees or other surface structures, where possible, pipelines may be built in short tunnels, backfilled with excavated materials, except as otherwise specified, or the trees or structures carefully supported and protected from damage.
3. The Owner may order the Contractor, for the convenience of the Owner, to remove trees along the line or trench excavation. If so ordered, the Owner will obtain any permits required for removal of trees.

C. Lawn Areas

Lawn areas shall be left in as good condition as before the starting of the work. Where sod is to be removed, it shall be carefully removed, and later replaced, or the area where sod has been removed shall be restored with new sod in the manner described in the Workmanship and Materials section.

D. Restoration of 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. The manner in which the fence is repaired or

replaced and the materials used in such work shall be subject to the approval of the Engineer. The cost of all labor, materials, equipment, and work for the replacement or repair of any fence 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.

1.09 PROTECTION OF WORK AND PUBLIC

A. Barriers and Lights

During the prosecution of the work, the Contractor shall put up and maintain at all times such barriers and lights as will effectively prevent accidents. The Contractor shall provide suitable barricades, red lights, "danger" or "caution" or "street closed" signs and watchmen at all places where the work causes obstructions to the normal traffic or constitutes in any way a hazard to the public.

B. Smoke Prevention

The Contractor shall use hard coal, coke, oil or gas as fuel for equipment generating steam. A strict compliance with ordinances regulating the production of emission of smoke will be required. No open fires will be permitted.

C. Noise

The Contractor shall eliminate noise to as great an extent as practicable 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.

Except in the event of an emergency, no work shall be done between the hours of 7:00 P.M. and 7:00 A.M., or on Sundays. If the proper and efficient prosecution of the work requires operations during the night, the written permission of the Engineer shall be obtained before starting such items of the work.

D. Access to Public Services

Neither the materials excavated nor the materials or plant used in the construction of the work shall be so placed as to prevent free access to all fire hydrants, valves or manholes.

E. Dust Prevention

The Contractor shall prevent dust nuisance from his operations or from traffic by keeping the roads and/or construction areas sprinkled with water at all times.

1.10 CUTTING AND PATCHING

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

The work shall be performed by competent workmen skilled in the trade required by the restoration.

1.11 CLEANING

- 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 Engineer, such material, debris, or rubbish constitutes a nuisance or is objectionable.

The Contractor shall remove from the site all of his surplus materials and temporary structures when no further need therefore develops.

- B. Final Cleaning

At the conclusion of the work, all erection plant, tools, temporary structures and materials belonging to the Contractor shall be promptly taken away, and he shall remove and promptly dispose of all water, dirt, rubbish or any other foreign substances.

The Contractor shall thoroughly clean all equipment and materials installed by him and shall deliver such materials and equipment undamaged in a bright, clean, polished and new operating condition.

1.12 MISCELLANEOUS

- A. Protection Against Siltation and Bank Erosion

1. The Contractor shall arrange his operations to minimize siltation and bank erosion on construction sites and on existing or proposed water courses, drainage ditches, wetlands and other areas of concern.
2. The Contractor, at his own expense, shall remove any siltation deposits and correct any erosion problems as directed by the Engineer that results from his construction operations.
3. The Contractor shall be solely responsible for any fines resulting from the encroachment into any environmentally protected areas.

- B. Protection of Wetland Areas

The Contractor shall properly dispose of all surplus material, including soil, in accordance with Local, State and Federal regulations and the permits issued for this project. Under no circumstances shall surplus material be disposed of in wetland areas as defined by the Florida Department of Environmental Protection, Southwest Florida Water Management District, U.S. Army Corps of Engineers, etc.

- C. Existing Facilities

The work shall be so conducted to maintain existing facilities in operation insofar as is possible. Requirements and schedules of operations for maintaining existing facilities in service during construction shall be as described in the Specific Provisions.

- D. Use of Chemicals

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 manufacturer's instructions.

E. Tree Removal

The Contractor shall notify the Engineer forty-eight (48) hours in advance of any removal of any trees. No clearing shall occur and no earth moving equipment shall be placed on-site until after the notice has been issued. The Contractor shall provide maintenance of the tree barricades and other preventive measures to protect the trees that are to remain.

F. Sanitary and Storm Sewer Systems

The Contractor shall be entirely responsible for the satisfactory installation of storm sewer and sanitary sewer systems to be in substantial conformance to the approved Drawings. It is strongly recommended that no roadway base or paving be constructed until the Contractor has performed lamping of these lines to his and the Engineer's satisfaction, and all storm sewer and sanitary sewer invert grades are verified in the field by the Owner. The lamping of lines and verification of elevations in no way absolves the Contractor from any of his contractual obligations.

G. Related Permits

The Contractor recognizes that the Owner has applied for, and may have received, certain permits pertaining to the work. At the sole discretion of the Owner, the Owner may assign said permits to the Contractor and the Contractor shall accept said assignments upon such request from the Owner.

H. All work in the vicinity of open waters, wetlands or any jurisdictional area is to be performed in strict accordance with the environmental permits and their conditions. Erosion barriers, when shown on the construction Drawings, are the minimum required. If the Contractor's construction methods require that additional erosion control is necessary to satisfy these permits, such controls shall be supplied, installed and maintained throughout the construction process by the Contractor at no additional cost to the Owner or Engineer.

I. It is the sole responsibility of the Contractor to submit, in a timely manner, any information, data, etc. which is required as a condition of a permit. Required information, data, etc. shall be submitted directly to the permitting agency by the Contractor with copies to the Permittee and the Engineer. The Contractor will be held responsible for any fine(s) or other action resulting from a violation of permit conditions.

1.13 RESTORATION OF PROPERTY

A. Responsibility. All damage resulting from construction work on existing structures, wetland areas, roadway pavement, driveways, other paved areas, fences, utilities, traffic control devices and any other obstruction not specifically named herein, shall be repaired, restored or replaced by the Contractor unless otherwise specified.

- B. Temporary Repairs. All damage mentioned in Paragraph A above shall be at least temporarily repaired, restored or replaced immediately following construction efforts at that location. Temporary restoration shall mean putting the affected area back into a safe, usable condition. In no case shall trenches remain open overnight within a street right-of-way unless the Owner grants specific approval.
- C. Permanent Repairs. All damage shall be permanently repaired, restored, or replaced not later than the 25th calendar day following the completion of construction at that location unless otherwise stipulated. Permanent repairs will be accomplished in a professional workmanship-like manner in accordance with Specifications contained herein, or contract documents, if addressed. The Contractor may be relieved of the 25- day time limit above only by specific written agreement with the Engineer.
- D. Owner Retribution. In the event that the Contractor fails to make the permanent repairs within the time specified, the Owner, at its option, will, with its own resources or by contract with others, cause the repair, restoration, or replacement of the affected area to be accomplished. The costs of such work will be deducted either from the next pay request or from any other monies owed the Contractor.

PART 2 -
PRODUCTS
Not Used

PART 3 -
EXECUTION
Not Used

END OF SECTION

SECTION 01014

CONTROL OF WORK

PART 1 - GENERAL

1.01 WORK PROGRESS

The Contractor shall provide equipment which will be efficient, appropriate and large enough to secure a satisfactory quality of work and a rate of progress that will insure the completion of the work within the time stipulated. If at any time such facilities appear to the Engineer to be inefficient, inappropriate, or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, the Engineer may order the Contractor to increase the facilities equipment, and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of its obligations to secure the quality of the work and rate of progress required.

1.02 PRIVATE LAND

The Contractor shall not enter or occupy private land outside of easements, except by permission of the Owner and private land Owner.

1.03 WORK LOCATIONS

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

1.04 OPEN EXCAVATIONS

- A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights, and other means to prevent accidents to persons, and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by Owner's personnel, pedestrians, and workmen. Bridges provided for access to private property during construction shall be removed when no longer required. The length of the open trench will be controlled by the particular surrounding conditions, but shall always be confined to limits, and does not endanger existing facilities. If the excavation becomes a hazard, or if it excessively restricts traffic, construction procedures such as limiting the length of open trench, prohibiting stacking excavated material in the street, and requiring that the trench shall not remain open overnight.
- B. The Contractor shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, of other obstacles which could be dangerous to the public, shall be well lit at night.

1.05 TEST PITS

- A. Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the Contractor so as not to create a hazardous area. Test pits shall be backfilled immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the Engineer.

1.06 MAINTENANCE OF TRAFFIC

- A. Unless permission to close a street is received in writing from the proper authority, 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, he shall repair the road surface, provide temporary ways, erect wheel guards or fences, or take other measures for safety satisfactory to the Engineer.
- B. Detours around construction will be subject to the approval of the Owner and the Engineer. Where detours are permitted, the Contractor shall provide all necessary barricades and signs as required to divert the flow of traffic. While traffic is detoured, the Contractor shall expedite construction operations and those periods when traffic is being detoured will be strictly controlled by the Owner.
- C. The Contractor shall 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.

1.07 CARE AND PROTECTION OF PROPERTY

- A. The Contractor shall be responsible for the preservation of all public and private property and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition similar or equal to that existing before the damage was done, or he shall make good the damage in other manner acceptable to the Engineer.
- B. All sidewalks that are disturbed by the Contractor's operations shall be restored to their original condition with the use of similar or comparable materials. All curbing shall be restored in a condition equal to the original construction and in accordance with the best modern practice.
- C. Along the location of the work all fences, walks, bushes, trees, shrubbery, and other physical features shall be protected and restored in a thoroughly workmanlike manner. Fences and other features removed by the Contractor shall be replaced in the location indicated by the Engineer as soon as conditions permit. All grass areas beyond the limits of construction that have been damaged by the Contractor shall be restored to original conditions.
- D. Trees close to the work shall be boxed or otherwise protected against injury. The Contractor shall trim all branches that are susceptible to damage because of his operations, but in no case shall any tree be cut or removed without prior notification of the appropriate tree authority. All injuries to bark, trunk, limbs, and roots of trees shall be repaired by dressing, cutting, and painting in accordance with approved methods, using only approved tools and materials.
- E. The protection, removal, and replacement of existing physical features shall be part of the work under the Contract and all costs in connection therewith shall be included in the unit and/or lump sum prices established.

1.08 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

- A. The Contractor shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains, and electric and telephone cables, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's operations shall be repaired by him at his expense.
- B. The Contractor shall bear full responsibility for obtaining all locations of underground structures and utilities (including existing water services, irrigation system piping/components, drain lines, and sewers). Services shall be maintained and all costs or charges resulting from damage thereto shall be paid by the Contractor.
- C. If, in the opinion of the Engineer, permanent relocation of a utility owned by the Owner is required, the Engineer may direct the Contractor in writing, to perform the work. Work so ordered will be paid for at the unit prices bid in the Proposal, if applicable, or as extra work under the General Conditions. If relocation of a privately owned utility is required, the Owner will notify the Utility to perform the work as expeditiously as possible. The Contractor shall fully cooperate with the Owner and Utility, and shall have no claim for delay due to such relocation.

1.09 DISTRIBUTION SYSTEMS AND SERVICES

- A. The Contractor shall interrupt water, telephone, Cable TV, sewer, gas, or other related utility services and disrupt the normal functioning of the system as little as possible and shall notify the Engineer and public well in advance of any requirement for dewatering, isolating, or relocating a section of a utility, so that necessary arrangements may be made with the appropriate agency.
- B. If it appears that utility service will be interrupted for an extended period, the Engineer may order the Contractor to provide temporary service lines. Inconvenience of the users shall be the minimum, consistent with the existing conditions. The safety and integrity of the system is of prime importance in scheduling work.

1.10 PROTECTION OF CONSTRUCTION AND EQUIPMENT

- A. All newly constructed work shall be carefully protected from injury or damage in any way. No wheeling or walking or placing of heavy loads shall be allowed and any portion injured or damaged shall be reconstructed by the Contractor at his own expense.
- B. All structures shall be protected in a manner approved by the Engineer. Should any of the floors or other parts of the structures become heaved, cracked, or otherwise damaged, all such damaged portions of the work shall be completely repaired by the Contractor at his own expense and to the satisfaction of the Engineer. If, in the final inspection of the work, any defects, faults, or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship without extra compensation for the materials and labor required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein, for the guarantee period.
- C. Further, the Contractor shall take all necessary precautions to prevent damage to any structure due to water pressure during and after construction and until such structure is accepted by the Owner.

1.11 WATER FOR CONSTRUCTION PURPOSES

- A. The Contractor is responsible for providing all water required for construction purposes. The Contractor shall make all connections and other provisions necessary to obtain said water from the County's potable water system, as required. The Contractor shall pay the County for all water used for construction purposes. Bid prices shall include the costs incurred for water usage.

1.12 MAINTENANCE OF FLOW

- A. The Contractor shall at his own cost, provide for the flow of sewers, drains, and water courses interrupted during the progress of the work, and shall immediately remove all offensive matter. The entire procedure for maintaining existing flows shall be approved by the Engineer in advance of the interruption of any flow.

1.13 COOPERATION WITHIN THIS CONTRACT

- A. All firms or persons authorized to perform any work under this Contract shall cooperate with the General Contractor and his subcontractors or trades, and shall assist in incorporating the work of other trades where necessary or required.
- B. Cutting and patching, drilling and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the Engineer.

1.14 CLEAN-UP

- A. During the course of the work, the Contractor shall keep the site of his operations in as clean and neat a condition as is possible. He shall dispose of all residue resulting from the construction work and, at the conclusion of the work, he shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures, and any other refuse remaining from the construction operation, and shall leave the entire site of the work in a neat and orderly condition.
- B. The Contractor shall provide for the off-site disposal of all excess excavation materials.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 01030

SPECIAL PROJECT PROCEDURES

PART 1 - GENERAL

1.01 WORKMANSHIP, MATERIAL AND EQUIPMENT

- A. When a particular product is specified or called for, it is intended and shall be understood that the proposal tendered by the Contractor included those products in his bid. Should the Contractor desire products equal to those specified, the Contractor shall furnish information as described in the Standard General Conditions. The alternate product or products submitted by the Contractor shall meet the requirements of the Specifications and shall, in all respects, be equal to the products specified by name herein.
- B. All apparatus, mechanism, equipment, machinery and manufactured articles for incorporation into the Work shall be the new and unused standard products of recognized reputable manufacturers.
- C. Contractor shall dispose of all excess materials from the site. Cost associated for disposal of such materials, including dewatering, shall be included in the Contractor's Bid to perform the work.

1.02 CONNECTIONS TO EXISTING SYSTEMS

- A. The Contractor shall perform all work necessary to locate, excavate and prepare for connections to the existing systems, as shown on the Drawings. The cost for this work and for the actual connection to the existing systems shall be included in the various prices bid for the Work and shall not result in any additional cost to the Owner.

1.03 EXISTING UNDERGROUND PIPING, STRUCTURES AND UTILITIES

- A. The attention of the Contractor is drawn to the fact that during excavation, the possibility exists that the Contractor will encounter various water, irrigation, gas, telephone, electrical, or other utility lines not shown on the Drawings. The Contractor shall exercise extreme care before and during excavation to locate and flag these lines so as to avoid damage thereto. Should damage occur to an existing line, the Contractor shall repair the line at no cost to the Owner.
- B. It is the responsibility of the Contractor to ensure that all utility or other poles, the stability of which may be endangered by the close proximity of excavation, are temporarily in position while work proceeds in the vicinity of the pole and that utility or other companies concerned be given reasonable advance notice of any such excavation by the Contractor.
- C. The locations of existing utilities 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. Encountering existing utilities at different depths or locations than shown on the drawings shall not be cause for additional costs to the Owner.

- D. The existing piping and utilities that interfere with new construction shall be rerouted as shown, specified or required. Before any piping and utilities not shown on the Drawings are disturbed, the Contractor shall notify the Engineer of the location of the pipeline or utility and shall reroute or relocate the pipeline or utility as directed.
- E. The Contractor shall exercise care in any excavation to locate all existing piping and utilities. All utilities that do not interfere with 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 Engineer.
- F. It is intended that wherever existing utilities such as water, irrigation, gas, telephone, electrical, or other service lines must be crossed, deflection of the pipe within recommended limits and cover shall be used to satisfactorily clear the obstruction unless otherwise indicated on the Drawings. However, when in the opinion of the Owner or Engineer this procedure is not feasible, he may direct the use of fittings for the utility crossing. The Contractor shall verify utility crossings with test pits prior to construction as required by the Engineer.

1.04 OPERATING AND MAINTENANCE DATA

- A. Operating and maintenance data for each piece of equipment furnished shall be delivered directly to the Engineer for approval within 60 days of shop drawing approval. No payment shall be made for equipment installed or stored on-site until the Engineering has approved the adequacy and completeness of operating and maintenance data. Final approved copies of operating and maintenance data shall have been delivered to the Engineer prior to scheduling the instruction period with the Owner.

1.05 SPARE PARTS

- A. Spare parts for certain equipment to be provided are specified in the pertinent sections of the Specifications. The Contractor shall collect and store all spare parts in a manner approved by the manufacturer. In addition, the Contractor shall furnish to the Engineer a written 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. The Contractor shall deliver the spare parts to the Engineer ten (10) days prior to facility start-up, but not before the written inventory list is provided.
- B. All spare parts shall be furnished in containers clearly identified in indelible markings as to contents. Each container shall be packed for prolonged storage.

1.06 PROVISIONS FOR CONTROL OF EROSION

- A. Sufficient precautions shall be taken during construction to minimize the run-off of polluting substances such as silt, clay, fuels, oils, bitumens, calcium chloride, or other polluting materials harmful to humans, fish, or other life, into the supplies and surface waters of the state. Control measures must be adequate to assure that turbidity in the receiving water will not be increased more than 10 nephelometric turbidity units (NTU), or as otherwise required by the state or other controlling body, in water used for public water supply or fish unless limits have been established for the particular water. In surface water used for other purposes, the turbidity must not exceed 25 NTU unless otherwise permitted. Special precautions shall be taken in the use of construction equipment to prevent operations that promote erosion.

- B. The Contractor shall comply with the requirements of the EPA-NPDES general permit for stormwater discharges and the stormwater pollution prevention plan developed for the project.

1.07 VALVE INDICES

- A. The Contractor shall be responsible for furnishing tags for all valves required on the work and installing the tags required for his own work. Tags on above ground valves shall be stamped brass, 2 inches in diameter, 19-gauge thickness. Tags for buried valves shall be secured to a concrete base as shown on the Drawings. Submit to the Engineer for approval, two (2) samples of each type of tag proposed and manufacturer's standard color chart and letter styles. Tags shall have stamped on them the information shown on the Drawings and the data described herein. The Contractor shall submit to the Engineer for approval, not less than 120 days before start-up, a valve schedule containing all valves required for the work. The schedule shall contain for each valve, the location, type, size, a number, words to identify the valve's function, and the normal operating position. The information contained in the valve schedules shall be coded on the tags in a system provided by the Owner. Above ground valve tags shall be furnished with stainless wire for attachment thereof.

1.08 HURRICANE PREPAREDNESS PLAN

- A. Within 30 days of the date of Notice to Proceed, the Contractor shall submit to the Engineer and Owner a Hurricane Preparedness Plan. The Plan should outline the necessary measures that the Contractor proposes to perform at no additional cost to the Owner in case of a hurricane warning.
- B. In the event of inclement weather, or whenever Engineer shall direct; the Contractor shall carefully protect 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 subcontractors to so protect the Work, such Work and materials shall be removed from site and replaced at the expense of the Contractor.

1.09 WARRANTIES

- A. The Contractor and the equipment manufacturers shall warranty all equipment supplied under these Specifications for a minimum period of one (1) year. Warranty period shall commence on the date that the Work is accepted by the Owner as substantially complete.
- B. The equipment shall be warranted to be free from defects in workmanship, design and materials. If any part of the equipment should fail during the warranty period, it shall be replaced in the machine(s) and the unit(s) restored to service at no expense to the Owner.
- C. If, within the guarantee period, repairs or changes are required in connection with work which, in the opinion of the Engineer, is rendered necessary as the result of the use of materials, equipment or workmanship which are inferior, defective, or not in accordance with the terms of the Contract, the Contractor shall, promptly upon receipt of notice from the Owner and without expense to the Owner, do the following:

1. Place in satisfactory condition in every particular all of such work and correct all defects herein.
 2. Repair or replace all damage to buildings, the site, or equipment or contents thereof, which, in the opinion of the Engineer, is the result of the use of materials, equipment or workmanship which are inferior, defective, or not in accordance with the terms of the Contract.
 3. Repair or replace any work or material or equipment disturbed in fulfilling any such guarantee.
- D. If the Contractor, after notice, fails within ten (10) days to proceed to comply with the terms of this guarantee, the Owner may have the defects corrected, and the Contractor and his surety shall be liable for all expenses incurred, provided, however, that in case of an emergency where, in the opinion of the Owner, delay would cause loss or damage, repairs may be started without notice being given to the Contractor and the Contractor shall pay the cost thereof.
- E. All special guarantees or warranties applicable to specific parts of the work, as may be stipulated in the Contract Documents, shall be subject to the terms of this paragraph during the first year following acceptance. All special guarantees and manufacturers' warranties shall be assembled by the Contractor and delivered to the Engineer, along with a summary list thereof, before the acceptance of the Work.
- F. The manufacturer's warranty period shall run concurrently with the Contractor's warranty or guarantee period. No exception to this provision shall be allowed. The Contractor shall be responsible for obtaining equipment warranties from each of the respective suppliers or manufacturers for all the equipment specified. The form of warranty may be included in the Contract Documents or shall otherwise be acceptable to the Owner.
- G. In the event that the manufacturer is unwilling to provide a one-year warranty commencing at the time of Owner acceptance, the Contractor shall obtain from the manufacturer a two (2) year warranty starting at the time of equipment delivery to the job site. This two-year warranty shall not relieve the Contractor of the one-year warranty commencing upon Owner acceptance.
- H. The Contractor's one-year warranty or guarantee period shall be part of the project performance bond.
- I. Warranty information from the manufacturer shall be included in the O&M manual for each item.

1.10 CONSTRUCTION CONDITIONS

- A. The Contractor shall strictly adhere to the specific requirements of the governmental unit or agencies having jurisdiction over the work. Wherever there is a difference in the requirements of a jurisdictional body and these Specifications, the more stringent shall apply.

1.11 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.

- B. Sound levels measured by the Engineer or Owner personnel shall not exceed 45 dBA 7 PM to 7 AM or 55 dBA 7 AM to 7 PM. This sound level shall be measured at the exterior of the exterior wall of the nearest residence. Levels at the equipment shall not exceed 85 dBA measured five (5) feet from the equipment at any time. Sound levels in excess of these values are sufficient cause to have the work suspended. Work stoppage by the Engineer or Owner for excessive noise shall not relieve the Contractor of completing the Work in accordance with the Contract Time, at no additional cost to the Owner.
- C. No extra charge may be made for time lost due to work stoppage resulting from the creation of a public nuisance.

1.12 HAZARDOUS LOCATIONS

- A. Contractor shall perform work in accordance with OSHA, state and local safety requirements.

1.13 SUSPENSION OF WORK DUE TO WEATHER

- A. During inclement weather, all work that could 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. The ability to issue such an order shall not be interpreted as a requirement to do so. During suspension of the work for 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 shall so direct, rubbish and surplus materials shall be removed.

1.14 RELOCATIONS

- A. The Contractor shall be responsible for the relocation of structures, including but not limited to light poles, signs, sign poles, fences, piping, conduits and drains that interfere with the positioning of the work as set out on the Drawings. The cost of all such relocations shall be borne by the Contractor at no additional cost to the Owner.

1.15 SALVAGE

- A. Any existing equipment or material including, but not limited to, valves, pipes, fittings, couplings, etc., which is removed or replaced as a result of construction under this project may be designated as necessary and delivered, to the Owner at a location directed by the Owner, at the Contractor's expense. Salvaged items shall be cleaned, packaged (e.g. crated) for delivery and storage, labeled, and catalogued at no additional cost to the Owner.

1.16 PERMITS

- A. Upon notice of award, the Contractor shall immediately apply for all applicable permits, not previously obtained by the Owner, from the appropriate governmental agency or agencies. No work shall commence until all applicable permits have been obtained and copies delivered to the Engineer. The costs for obtaining all permits shall be borne by the Owner.

1.17 PUMPING

- A. The Contractor with his own equipment shall do all pumping necessary to prevent flotation of any part of the structures during construction operations.
- B. The Contractor shall, for the duration of the contract and with his own equipment, pump out water and wastewater that may seep or leak into the excavations or structures. Below grade galleries and other operating areas shall be kept dry at all times. The extent of pumping required in tanks, channels and other non-operating areas will be determined by the Owner/Engineer.

1.18 NOTIFICATION OF WORK ON EXISTING FACILITIES

- A. Before commencing work on any of the existing structures or equipment, the Contractor shall notify the Owner/Engineer, in writing, at least 10 calendar days in advance of the date he proposed to commence such work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01040

COORDINATION

PART I - GENERAL

1.1 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 effort of equipment manufacturers during test and checkout.
 - 4. The interrelated work with public and private utilities companies.
 - 5. The interrelated work with the Owner where tie-ins to existing facilities are required.
 - 6. The effort of independent testing agencies..

PART II – Product
(Not Used)

PART III – EXECUTION
(Not Used)

END OF SECTION

SECTION 01050

FIELD ENGINEERING AND SURVEYING

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall provide and pay for field engineering and survey service required. Such work shall include survey work to establish lines and grades and to locate and lay out site improvements, structures, and controlling lines and levels required for the construction of the work. Also included are engineering services as are specified or required to execute the Contractor's construction methods. Engineers and surveyors shall be licensed professionals registered in the State of Florida.
- B. The accuracy of any method of staking shall be the responsibility of the Contractor. All surveying for vertical and horizontal control shall be the responsibility of the Contractor.
- C. The Contractor shall be responsible for the preservation of all stakes and marks. If any stakes or marks are carelessly or willfully disturbed by the Contractor, the Contractor shall not proceed with any work until he has established such points, marks, lines and elevations as may be necessary for the prosecution of the work.

1.02 SURVEY REFERENCE POINTS

- 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 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 construction work, the Contractor shall have them referenced and reset by a Registered Land Surveyor.

1.03 PROJECT SURVEY REQUIREMENTS

- A. The Contractor shall engage the services of a Florida Registered Land Surveyor to establish all lines and grades on the Drawings necessary to fully construct the work in accordance with Chapter 61G17-6 of the Florida Administrative Code.
- B. The Registered Land Surveyor shall establish and stake all pipeline right-of-way adjacent to construction at 100' intervals on tangents, 50' intervals on curves and at all changes in direction. The surveyor shall place lath and hub at such points with stations indicated. Tack in hub shall not be permitted.
 - a. The Registered Land Surveyor shall utilize current right-of-way maps, plats and property deeds, all being of public record, in conjunction with existing monumentation to establish the existing right-of-way lines and utility easement boundaries.
- C. The Registered Land Surveyor shall establish a temporary benchmark system in accordance with Chapter 61G17-6 F.A.C. and shall provide a written list to the Contractor for his use.

1.04 RECORDS

- A. Maintain a complete, accurate log of all control and survey work as construction progresses. Survey notes indicating the information and measurements used in establishing locations and grades shall be kept in notebooks and furnished to the Engineer with the Record Drawings.

1.05 SUBMITTALS

- A. Submit name and address of surveyor to the Engineer.
- B. On request of the Engineer, submit documentation to verify accuracy of field engineering work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01090

REFERENCE STANDARDS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Abbreviations and acronyms are used in the Contract Documents to identify reference standards.

1.02 QUALITY ASSURANCE

- A. Application: When a standard is specified by reference, comply with requirements and recommendations stated in that standard, except when requirements are modified by the Contract Documents, or applicable codes establish stricter standards.
- B. Publication Date: The publication in effect on the date of issue of Contract Documents, except when a specific publication date is specified.

1.03 ABBREVIATIONS, NAMES, AND ADDRESSES OF ORGANIZATIONS

Obtain copies of referenced standards direct from publication source, when needed for proper performance of Work, or when required for submittal by Contract Documents.

AA	Aluminum Association 818 Connecticut Avenue, NW Washington, DC 20006
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, Washington, DC 20001
ACI	American Concrete Institute Box 19150 Redford Station Detroit, MI 48219
AI	Asphalt Institute Asphalt Institute Building College Park, MO 20740
AISC	American Institute of Steel Construction 1221 Avenue of the Americas New York, NY 10020
AISI	American Iron and Steel Institute 1000 16th Street, N.W. Washington, DC 20036
ANSI	American National Standards Institute 1430 Broadway New York, NY 10018

ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017
ASTM	American Society for Testing and Materials 6666 W. Quincy Avenue Denver, CO 80235
AWS	American Welding Society 2501 NW 7th Street Miami, FL 33125
CRSI	Concrete Reinforcing Steel Institute 180 North LaSalle Street, Suite 2110 Chicago, IL 60601
FS	Federal Specification General Services Administration Specifications and Consumer Information Distribution Section (WFSIS) Washington Navy Yard, Bldg. 197 Washington, DC 20407
NEMA	National Electrical Manufacturers' Association 2101 L Street, N.W. Washington, DC 20037
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 20076
PCI	Prestressed Concrete Institute 20 North Wacker Drive Chicago, IL 60606
SSPC	Steel Structures Painting Council Pittsburgh, PA
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road Northbrook, IL

60062 PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01100

MEASUREMENT AND PAYMENT

PART 1.0-GENERAL

1.01 SECTION INCLUDES

- A. Procedures and submittal requirements for schedule of values, applications for payment and unit prices.

1.02 RELATED SECTIONS

- A. Proposal and Bid Form
- B. General Conditions

- 1.03 The Contract Documents set forth intent that the Contractor be responsible for determining the means, methods, and quantities of all work which may be required for the completion of the project. The bid items listed on the bid breakdown are for comparison of the bids and may be used as a method of determining the value of work performed for partial payment requests.
- 1.04 Work not specifically covered by the Contract Bid Schedules but necessary for the completion of the work as described in the Contract Documents will be deemed to be otherwise included in the Contractor's unit prices. No additional payment to the Contractor will be made for items not specifically listed on the Contract Bid Schedules. All construction shall be in accordance with the 2013 Hernando County Utilities Department Specifications Manual and subsequent updates.
- 1.05 The Contractor shall assume all risks in determining the quantities of each bid break down and for including as a part of the prices the appropriate percentage to cover all Contractor's overhead and profit, equipment rental and maintenance, and all other costs not specifically described on the Contract Bid Schedule but necessary to carry out the work as required by the Contract Documents. When totaled together, the totals for each item of the Contract Bid Schedules shall be the total contract price for the work of this Contract. No other payments will be made to the Contractor except as specifically authorized by change order.
- 1.06 Each unit or lump sum price stated on the Bid Form shall constitute full compensation as herein specified for each item of work completed in accordance with the drawings and specifications.
- 1.07 Under the price specified to be paid for each item, the Contractor shall furnish all materials and equipment, furnish all labor, and do all operations necessary to complete all work specified or shown. All supervision, overhead items, protection, and precautions and all other costs incidental to the construction work completed and as specified are included.
- 1.08 A complete, finished, working job, as intended by the general nature of these specifications, shall be produced whether or not any particular wording or direction is omitted or inadvertently not clearly stated.

- 1.09 Measurement for payment shall be by the Owner, except where noted elsewhere in this specification. Measurement for partial payment for lump sum items shall be on the basis of percentage of work complete and in place. Measurement for final payment shall be on the basis of the specified item, in-place, tested and accepted by the Owner or his representative, plus all incidental and supporting requirements fulfilled for the individual item and the project in total.
- 1.10 The prices for those items which involve excavation shall include compensation for disposal of surplus excavated material and handling water.
- 1.11 The prices of all pipe items shall constitute full compensation for furnishing, laying, jointing, and testing of pipe; excavation and backfill; all site restoration including cleanup.
- 1.12 All partial pay descriptions shall be understood as less standard retainage whether stated or not.

PART 2.0-MATERIALS

Not Used

PART 3.0-MEASUREMENT AND PAYMENT

3.01 MOBILIZATION – BID ITEM NO. 1

Shall be paid for lump sum and consist of preparatory work and operation for beginning work on this project. Work includes labor, equipment, materials and any permits necessary to complete the work and not covered by a specific pay item. Initial payment shall not exceed 25% of the total amount for Mobilization/Demobilization. Subsequent payments shall be based on completion percentage of project for each payment application. Lump sum amount shall not exceed 5% of the sum of the unit price pay items.

The standard retainage will be applied to these allowances. Partial payments made on this item shall in no way act to preclude or limit any of the provisions for partial payments otherwise provided for by the contract.

3.02 INSURANCE, PERMITS, & PERFORMANCE AND PAYMENT BOND – BID ITEM NO. 2

- A. Description: The Contractor shall provide Comprehensive general Liability insurance, builders risk including premises, workmen's compensation and automobile insurance as required. Contractor to provide all required permits and bonding.
- B. Measurement: The quantity to be paid for under this Item shall be measured as one lump sum quantity.
- C. Payment: The pay quantities for the work specified under this Item shall be the lump sum price set out in the Proposal, which price and payment constitutes full compensation for all the work described.

3.03 MAINTENANCE OF TRAFFIC – BID ITEM NO. 3

- A. Description: The work specified in this Item consists of maintaining traffic within the limits of the project for the duration of the construction period including any temporary suspensions of the work. It shall include the construction and maintenance of any necessary detour facilities; the preparation of maintenance of traffic plans prepared, signed, and sealed by a Florida Professional Engineer; the providing of necessary facilities for access to residences, businesses, etc. along the project; the furnishing, installing and maintaining of traffic control and safety devices during construction, the control of dust, and any other special requirements for safe and expeditious movement of traffic as may be called for on the plans. The term, maintenance of traffic, as used herein, shall include 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, all as specified in this Section.
- B. Measurement: The quantity of maintenance of traffic to be paid for under this Item shall be measured as one lump sum quantity. Partial payments will be pro rated throughout the duration of construction of this Project in direct proportion to the percent completion of the work, as determined by the ratio of the payment requested to the total contract price.
- C. Payment: The quantities, as determined above, shall be paid for at the contract lump sum price set out in the Proposal, which price and payment constitutes full compensation for all the work.

3.04 SURVEY LAYOUT/AS-BUILT – BID ITEM NO. 4

- A. Description: This bid item describes measurement and payment for establishing all lines and grades required for all work under this contract, as well as “as-built” survey drawings for the proposed water main and force main installation including mains, valves, air relief valves and fittings with horizontal and vertical locations described by bearings, distances and stations. The as-built drawing shall be provided signed and sealed by a Surveyor licensed in the State of Florida. Contractor’s surveyor shall provide four (4) copies certified for as-builts to be distributed to Government agencies and a CAD file on a CD for all work.
- B. Measurement: The quantity of to be paid for under this Item shall be measured as one lump sum quantity. Partial payments will be pro rated throughout the duration of construction of this Project in direct proportion to the percent completion of the work, as determined by the ratio of the payment requested to the total contract price.
- C. Payment: The pay quantities for the work specified under this Item shall be the lump sum price set out in the Proposal, which price and payment constitutes full compensation for all the work described.

3.05 PRE/POST VIDEO – BID ITEM NO. 5

- A. Description: This item shall include payment for all work required as specified to prepare pre-construction and post-construction records of the work area.
- B. Measurement: Measurement shall be as a single lump sum item of activity.

- C. Payment: Payment for the lump sum bid price shall be 50% upon completion and acceptance of the pre-construction video, and 50% upon completion and acceptance of the post-construction video.

3.06 EROSION SEDIMENT CONTROL (INCL. NPDES PERMIT/INSP RPT./NOT – BID ITEM NO. 6

- A. Description: The Contractor shall provide erosion and sediment control in accordance with FDEP, NPDES permit and drawings. Contractor shall erect all erosion control measures as indicated on the drawings, including but not limited to silt fence, hay bales and Turbidity barriers. All turbidity barriers shall be maintained and inspected during construction by a Qualified Stormwater Management Inspector and reporting
- B. Measurement: The quantity to be paid for under this item shall be measured as one lump sum quantity.
- C. Payment: The pay quantities for the work specified under this Item shall be the lump sum price set out in the Proposal, which price and payment constitutes full compensation for all the work described.

3.07 CONSTRUCTION MATERIAL TESTING– BID ITEM NO. 7

- A. Description: The Contractor shall provide geotechnical in-place density testing of soils and pavement, concrete cylinder testing, and other testing by an independent and certified testing laboratory as required by the Engineer and as specified in the Contract Documents.
- B. Measurement: Measurement for payment of Construction Material Testing costs shall be on a lump sum basis. This item includes all costs for geotechnical in-place density testing of soils and pavement, concrete cylinder testing, and other testing as required by the Engineer and as specified in the Contract Documents.
- C. Payment: Payment of the lump sum for Construction Material Testing shall only be the amount properly documented by the Contractor and authorized by the Engineer will be paid to the Contractor. The Contractor shall not request any additional payment above approved laboratory invoice amounts. Failed tests will not be compensated.

3.08 PUMP STATION SITE DEMO AND GRADING- BID ITEM NO. 8

- A. Description: The contractor shall provide all materials, labor, and equipment necessary to provide pump station site demolition and salvage of items as specified in plans.
- B. Measurement: The quantity to be paid for under this Item shall be measured as one lump sum quantity.

- C. Payment: The pay quantities for the work specified under this Item shall be the lump sum price set out in the Proposal, which price and payment constitutes full compensation for all the work described.

3.09 TEMPORARY BYPASS PUMPING-BID ITEM NO. 9

- A. Description: The contractor shall provide all materials, labor, equipment, power, maintenance, etc, to implement a temporary pumping system for the purpose of diverting the existing sanitary sewer flow around the work area for the installation or connection of the proposed project.
- B. Measurement: Measurement for payment of Temporary Bypass Pumping costs shall be on a lump sum basis. This item includes all costs for providing the bypass pumping during the period of time between the shutdown and demolition of the existing lift station and start-up of the new lift station pumps, collection system, and force main.
- C. Payment: The pay quantities for the work specified under this Item shall be the lump sum price set out in the Proposal, which price and payment constitutes full compensation for all the work described.

3.10 REFURBISH EXISTING WET WELL- BID ITEM NO. 10

- A. Description: The Contractor shall provide all materials, labor, and equipment necessary to clean and recoat existing wet well and valve vault as specified in plans.
- B. Measurement: The quantity to be paid for under this Item shall be measured as one lump sum quantity.
- C. Payment: The pay quantities for the work specified under this Item shall be the lump sum price set out in the Proposal, which price and payment constitutes full compensation for all the work described.

3.11 MANHOLE REHABILITATION-BID ITEM NO. 11

- A. Description: The Contractor shall provide all materials, labor, and equipment necessary remove and disposed of existing 8" gravity main and repair manhole as specified in plans.
- B. Method of Measurement: The quantity of manhole rehabilitations to be paid for under this item shall contract lump sum price stated in the Bid Schedule.
- C. Basis of Payment: The lump sum price as stated in the Bid Schedule shall be full compensation for furnishing all labor, materials, tools and equipment as necessary for cleaning and removing all debris, repair of cracks and annular spaces and

recoating of manhole interior. Shall include all necessary material, equipment and appurtenances for manhole rehabilitation as required by the contract documents.

3.12 CONNECT 8" GRAVITY MAIN TO EXISTING MANHOLE

- A. Description: The Contractor shall provide all materials, labor, and equipment necessary connect proposed 8" gravity main to existing collector manhole as specified in plans.
- B. Measurement: The quantity to be paid for under this Item shall be measured as one lump sum quantity.
- C. Payment: The pay quantities for the work specified under this Item shall be the lump sum price set out in the Proposal, which price and payment constitutes full compensation for all the work described.

3.13 REPLACE PUMPS, RAILS, WIRING, PIPING, VALVES, FITTINGS ETC.IN WET WELL AND VALVE VAULT- BID ITEM NO. 13

- A. Description: The contractor shall provide all materials, labor and equipment necessary to replace pumps, rails, wiring, piping, valves, fittings, etc. in wet well as specified in the plans. The Contractor shall provide all materials, labor and equipment necessary to install piping, valves, fittings, etc. in the new valve vault
- B. Measurement: The quantity to be paid for under this Item shall be measured as one lump sum quantity.
- C. Payment: The pay quantities for the work specified under this Item shall be the lump sum price set out in the Proposal, which price and payment constitutes full compensation for all the work described.

3.14 PRECAST VALVE VAULT WITH 6'X10' ACCESS HATCH- BID ITEM NO. 14

- A. Description: The contractor shall provide all materials, labor and equipment necessary to furnish and install precast valve vault lid as specified in plans.
- B. Measurement: The quantity to be paid for under this item shall be measured as one lump sum quantity.
- C. Payment: the pay quantities for the work specified under this item shall be the lump sum price set out in the Proposal, which price and payment constitute full compensation for all the work described.

3.15 6-FT DIAMETER CONCRETE MANHOLE W/COMPOSITE COVER– BID ITEM NO. 15

- A. Description: The Contractor shall provide all labor, materials, equipment, factory testing, operator manuals and all incidentals necessary for furnishment of a complete and operable pump station control system with all applicable connections.
- B. Measurement: The quantity to be paid for under this item shall be measured as one lump sum quantity.
- C. Payment: The pay quantities for the work specified under this item shall be the lump sum price set out in the Proposal, which price and payment constitute full compensation for all the work described.

3.16 5-FT DIAMETER CONCRETE MANHOLE W/COMPOSITE COVER– BID ITEM NO. 16

- A. Description: The Contractor shall provide all labor, materials, equipment, factory testing, operator manuals and all incidentals necessary for furnishment of a complete and operable pump station control system with all applicable connections.
- B. Measurement: The quantity to be paid for under this item shall be measured as one lump sum quantity.
- C. Payment: The pay quantities for the work specified under this item shall be the lump sum price set out in the Proposal, which price and payment constitute full compensation for all the work described.

3.17 REPLACE MANHOLE FRAME & COVERS W/COMPOSITE– BID ITEM NO. 17

- A. Description: The Contractor shall provide all labor, materials, and equipment necessary to replace existing manhole frame and covers with composite manhole frame and covers as specified in plans.
- B. Measurement: The quantity to be paid for under this item shall be measured as one lump sum quantity.
- C. Payment: The pay quantities for the work specified under this item shall be the lump sum price set out in the Proposal, which price and payment constitute full compensation for all the work described.

3.18 PUMP STATION ELECTRICAL CONTROL PANELS & LIGHTING – BID ITEM NO. 18

- A. Description: The contractor shall provide all labor, materials, and equipment necessary for furnishing and installing a complete pump station electrical control panel including lighting, as specified in plans.
- B. Measurement: The quantity to be paid for under this item shall be measured as one lump sum quantity.

- C. Payment: The pay quantities for the work specified under this item shall be the lump sum price set out in the Proposal, which price and payment constitute full compensation for all the work described.

3.19 REMOVE EXISTING 12-INCH FM – BID ITEM NO. 19

- A. Description: The Contractor shall provide all labor, equipment, excavation, materials and hauling necessary to remove and dispose of the existing 12" force main as specified in plans.
- B. Measurement: The quantity to be paid for under this item shall be measured as one lump sum quantity.
- C. Payment: The pay quantities for the work specified under this item shall be the lump sum price set out in the Proposal, which price and payment constitute full compensation for all the work described.

3.20 8" PVC C-900 DR26 – BID ITEM NO. 20

- A. Description: This bid item describes measurement and payment for furnishing and installing 8" C-900 DR26 pipe installed in open cut trenches. The pay quantities for the work specified under this section shall be the number of linear feet of the types and sizes of pipe specified in the applicable pay items actually constructed and accepted.
- B. Measurement: Measurement shall be the number of linear feet installed measured horizontally, at ground elevation, running a measure along the center line of the pipe as laid including fittings. Pipes shall be measured between centers of the manholes minus half the inside diameter of each manhole. Pipes installed inside the manhole will not be measured for payment.
- C. Payment: The contract unit price per linear foot for sewer pipe shall be full compensation for all labor, materials, and equipment necessary to complete this work including excavation, dewatering, bedding, furnishing and installing pipe and fittings, locating wire, making connections to new and existing manholes, installation of impervious material dams, backfill including aggregate base and subbase material, compaction, providing suitable soils, removal and replacement unsuitable soils (including rock), tree/stump removal, protection of trees, property, cleaning, final testing, maintaining existing flows during construction of new facilities and all else incidental thereto for which payment is not provided under other items. The contractor's unit price shall also include any and all hard rock removal required for the successful open cut installation of the pipeline.

3.21 12" PVC C-900 DR18 FM – BID ITEM NO. 21

- A. Description: This bid item describes measurement and payment for furnishing and installing 12" C-900 DR18 pipe installed in open cut trenches. The pay quantities for the work specified under this section shall be the number of linear feet of the types and sizes of pipe specified in the applicable pay items actually constructed and accepted.

- B. Measurement: Measurement will be horizontal above the centerline of the pipe.
- C. Payment: Payment will be per linear foot according to the diameter, thickness class, and type of joint, as set forth on the proposal. The unit bid price includes furnishing and installing all pipe by open cut, and materials above or below ground along the pipeline alignment; polyethylene encasement, joints and jointing materials, joint restraints, making pipe connections, pipe coatings, maintenance of flow, bypass pumping as required, thrust blocking, clearing; sheeting, shoring and bracing; dewatering, excavation; bedding and backfill; compaction and testing; protection and adjusting of existing above ground and underground utilities and service connections; excavation and construction beneath existing ditch blocks including protection or repair of ditch blocks; disposal of spoil; tracer wire, identification tape, hydrostatic testing; flushing, pigging, cleaning, erosion control; protection of culverts and drainage facilities, surface restoration, concrete curb replacement, concrete sidewalk replacement, temporary pavement replacement and all other related and necessary materials, work and equipment required to construct a complete and operable pipeline. For unit price for open cut under paved areas, price includes removal and disposal of asphalt and/or concrete pavement, appropriate compaction, compaction testing, pressure testing, disinfection and testing, resurfacing in kind, and all incidentals necessary to complete the work except where such are shown to be paid for under a separate item.

3.22 24" DIP, CL50 – BID ITEM NO. 22

- A. Description: This bid item describes measurement and payment for furnishing and installing 24" DIP pipe installed in open cut trenches. The pay quantities for the work specified under this section shall be the number of linear feet of the types and sizes of pipe specified in the applicable pay items actually constructed and accepted.
- B. Measurement: Measurement shall be the number of linear feet installed measured horizontally, at ground elevation, running a measure along the center line of the pipe as laid including fittings. Pipes shall be measured between centers of the manholes minus half the inside diameter of each manhole. Pipes installed inside the manhole will not be measured for payment.
- C. Payment: The contract unit price per linear foot for sewer pipe shall be full compensation for all labor, materials, and equipment necessary to complete this work including excavation, dewatering, bedding, furnishing and installing pipe and fittings, locating wire, making connections to new and existing manholes, installation of impervious material dams, backfill including aggregate base and subbase material, compaction, providing suitable soils, removal and replacement unsuitable soils (including rock), tree/stump removal, protection of trees, property, cleaning, final testing, maintaining existing flows during construction of new facilities and all else incidental thereto for which payment is not provided under other items. The contractor's unit price shall also include any and all hard rock removal required for the successful open cut installation of the pipeline.

3.23 8" 316 SS, SCH40 – BID ITEM NO. 23

- A. Description: This bid item describes measurement and payment for furnishing and installing 8" 316 ss pipe installed in open cut trenches. The pay quantities for the work specified under this section shall be the number of linear feet of the types and sizes of pipe specified in the applicable pay items actually constructed and accepted.
- B. Measurement: Measurement will be horizontal above the centerline of the pipe.
- C. Payment: Payment will be per linear foot according to the diameter, thickness class, and type of joint, as set forth in the proposal. The unit bid price includes furnishing and installing all pipe by open cut, and materials above or below ground along the pipeline alignment; polyethylene encasement, joints and jointing materials, joint restraints, making pipe connections, pipe coatings, maintenance of flow, bypass pumping as required, thrust blocking, clearing; sheeting, shoring and bracing; dewatering, excavation; bedding and backfill; compaction and testing; protection and adjusting of existing above ground and underground utilities and service connections; excavation and construction beneath existing ditch blocks including protection or repair of ditch blocks; disposal of spoil; tracer wire, identification tape, hydrostatic testing; flushing, pigging, cleaning, erosion control; protection of culverts and drainage facilities, surface restoration, concrete curb replacement, concrete sidewalk replacement, temporary pavement replacement and all other related and necessary materials, work and equipment required to construct a complete and operable pipeline. For unit price for open cut under paved areas, price includes removal and disposal of asphalt and/or concrete pavement, appropriate compaction, compaction testing, pressure testing, disinfection and testing, resurfacing in kind, and all incidentals necessary to complete the work except where such are shown to be paid for under a separate item.

3.24 8" 45° 316 SS SCH 40 ELBOW– BID ITEM NO. 24

- A. Description: This bid item describes measurement and payment for furnishing and installing 8" 45° Elbow as shown on the Contract Drawings or where directed by the Project Representative.
- B. Measurement: Measurement will be on an individual basis for each 8" 45° Elbow acceptably installed.
- C. Payment: The pay quantities for the work specified under this Item shall be per each 8" 45° Elbow at price set out in the Proposal, which price and payment constitutes full compensation for all the work described

3.25 8" 90° ELBOW 316 SS SCH 40, LONG RADIUS – BID ITEM NO. 25

- A. Description: This bid item describes measurement and payment for furnishing and installing 8" 90° Elbow as shown on the Contract Drawings or where directed by the Project Representative.
- B. Measurement: Measurement will be on an individual basis for each 8" 90° Elbow acceptably installed.
- C. Payment: The pay quantities for the work specified under this Item shall be per each 8" 90° Elbow at price set out in the Proposal, which price and payment constitutes full compensation for all the work described.

3.26 8" 90° ELBOW 316 SS SCH 40– BID ITEM NO. 26

- A. Description: This bid item describes measurement and payment for furnishing and installing 8" 90° Elbow as shown on the Contract Drawings or where directed by the Project Representative.
- B. Measurement: Measurement will be on an individual basis for each 8" 90° Elbow acceptably installed.
- C. Payment: The pay quantities for the work specified under this Item shall be per each 8" 90° Elbow at price set out in the Proposal, which price and payment constitutes full compensation for all the work described.

3.27 12"X8" TEE – BID ITEM NO. 27

- A. Description: This bid item describes measurement and payment for furnishing and installing 16" x 8" Tee as shown on the Contract Drawings or where directed by the Project Representative.
- B. Measurement: Measurement will be on an individual basis for each 12" x 8" Tee acceptably installed.
- C. Payment: The pay quantities for the work specified under this Item shall be per each 12" x 8" Tee at price set out in the Proposal, which price and payment constitutes full compensation for all the work described.

3.28 8" GATE VALVE WITH BOX , FLG, DI W/COATING– BID ITEM NO. 28

- A. Description: This bid item describes measurement and payment for furnishing and installing 8" gate valve, with box, as shown on the Contract Drawings or where directed by the Project Representative.
- B. Measurement: Measurement will be on an individual basis for each 8" gate valve, with box, acceptably installed.
- C. Payment: The pay quantities for the work specified under this Item shall be per each 8" gate valve, with box, at price set out in the Proposal, which price and payment constitutes full compensation for all the work described.

3.29 8" GATE VALVE WITH BOX W/RESTRAINTS– BID ITEM NO. 29

- A. Description: This bid item describes measurement and payment for furnishing and installing 8" gate valve, with box, as shown on the Contract Drawings or where directed by the Project Representative.
- B. Measurement: Measurement will be on an individual basis for each 8" gate valve, with box, acceptably installed.
- C. Payment: The pay quantities for the work specified under this Item shall be per each 8" gate valve, with box, at price set out in the Proposal, which price and payment constitutes full compensation for all the work described.

3.30 12" 45° MJ ELBOW W/RESTRAINTS – BID ITEM NO. 30

- A. Description: This bid item describes measurement and payment for furnishing and installing 12" 45° Elbow as shown on the Contract Drawings or where directed by the Project Representative.
- B. Measurement: Measurement will be on an individual basis for each 12" 45° MJ Elbow acceptably installed.
- C. Payment: The pay quantities for the work specified under this Item shall be per each 12" 45° Elbow at price set out in the Proposal, which price and payment constitutes full compensation for all the work described

3.31 CONNECT TO EXISTING 12" FM– BID ITEM NO. 31

- A. Description: The Contractor shall provide all materials, labor, and equipment necessary connect to existing 12" force main as specified in plans.
- B. Measurement: The quantity to be paid for under this Item shall be measured as one lump sum quantity.
- D. Payment: The pay quantities for the work specified under this Item shall be the lump sum price set out in the Proposal, which price and payment constitutes full compensation for all the work described.

3.32 6" (3,000 PSI W/ FIBERMESH) CONCRETE DRIVEWAY – BID ITEM NO. 32

- A. Description: The Contractor shall provide all excavation, installation and materials, compaction of subgrade, base, testing, and incidentals necessary to furnish and install 6" Fibermesh concrete (3,000 psi) for driveway(s) as specified in plans.
- B. Measurement: The quantities to be paid for this item will be per unit price furnished, installed, completed and accepted.
- C. Payment: The pay quantities for the work specified under this Item shall be per unit price set out in the Proposal, which price and payment constitutes full compensation for all the work described.

3.33 6" #57 STONE – BID ITEM NO. 33

- A. Description: The Contractor shall provide all necessary excavation, grading, filling, compaction, hauling, and removal of excess material necessary to furnish and install 6" #57 stone as specified in plans.
- B. Measurement: The quantities to be paid for this item will be per unit price furnished installed, completed and accepted.
- C. Payment: The pay quantities for the work specified under this Item shall be per unit price set out in the Proposal, which price and payment constitutes full compensation for all the work described.

3.34 6-FT HIGH, GALVANIZED INTERWOVEN FENCE W/CANTILEVER SLIDE GATE-BID ITEM NO. 34

- A. Description: The Contractor shall install a new 6-ft high security fence with slide gate as specified in the plans.
- B. Measurement: The quantity to be paid for under this item shall be measured as one lump sum quantity.
- C. Payment: The pay quantities for the work specified under this item shall be the lump sum price set out in the Proposal, which price and payment constitute full compensation for all the work described.

3.35 SOD RESTORATION OF DISTURBED AREAS – BID ITEM NO. 35

- A. Description: The Contractor shall provide sod for all disturbed areas within project area. All costs of material, including sod, labor, equipment, fertilization, watering, and maintenance shall be included in the linear footage price. Sod placed within FDOT right of way shall be in accordance with FDOT specifications
- B. Measurement: Measurement for payment of the unit price bid for Pay Item shall be based on the actual field measurement per square yard of new sod, including but not limited to grading, placement, rolling, watering, etc. of new sod in the force main installation areas required.
- C. Payment: Payment of the unit price bid for Pay Item shall be made in accordance with the approved Schedule of Values and shall be full compensation for furnishing, installing and testing of the work.

SECTION 01200

MEETINGS AND CONFERENCES

PART I - GENERAL

1.01 PRE-CONSTRUCTION CONFERENCE

- A. In accordance with the Contract Documents, prior to the commencement of Work, a preconstruction conference shall be held at a mutually agreed time at the Owner's designated location.
- B. The purpose of the conference shall be to designate responsible personnel and establish a working relationship. Matters requiring coordination shall be discussed and procedures for handling such matters established. The agenda shall include as a minimum:
 - 1. Contractor's Initial Construction Schedule
 - 2. Procedures for Transmittal, Review and Distribution of Shop Drawings
 - 3. Procedures for Submittal and Review of Monthly Pay Applications
 - 4. Maintaining Record Drawings
 - 5. Critical Work Sequencing and Construction Restrictions
 - 6. Field Decisions and Change Orders
 - 7. Field Office, Storage Areas and Security
 - 8. Equipment and Material Deliveries
 - 9. Safety Meetings and Program
 - 10. Traffic Control Plan
 - 11. Pre-construction Video
- C. The Engineer shall preside at the conference and shall arrange for keeping the minutes and distributing them to all persons in attendance.

1.02 PROGRESS MEETINGS

- A. The Owner shall schedule and conduct regular project meetings at least monthly and at other times as deemed necessary by the progress of the work. The Contractor and the Engineer shall be represented at each meeting. The Contractor and/or Engineer may request attendance by representatives of material Supplier(s) and Subcontractor(s).
- B. The Engineer shall preside at the conference and shall arrange for keeping the minutes and distributing them to all persons in attendance. The purpose of the meetings shall include but not be limited to reviewing the progress of the Work, maintaining coordination of efforts, discussing changes in scheduling and resolving

problems which may develop; claims review; and future scheduling.

1.03 TRAFFIC CONTROL MEETINGS

- A. The Owner shall schedule and conduct meetings as required with the Contractor to attend to matters of traffic control and associated public convenience and safety during the course of the Work.
- B. The Engineer shall preside at the meetings and provide for keeping the minutes and distribution of minutes to the Owner, the Contractor and others. The purpose of the meetings shall be for the Contractor presentation of traffic control plans and any revisions required during performance of the Work and to discuss related matters.

1.04 PUBLIC INFORMATION MEETINGS

- A. The Contractor shall designate a public information specialist for the Project who shall attend and actively participate in periodic public information meetings that may be scheduled by the Owner.

PART II – PRODUCT
(Not Used)

PART III – EXECUTION
(Not Used)

END OF SECTION

SECTION 01300

SUBMITTALS

1.01 CONSTRUCTION SCHEDULE

- A. Before Work is started, Contractor shall submit to Engineer for review a schedule of the proposed construction operations. The construction schedule shall indicate the sequence of the Work, the time of starting and completion of each part, and the installation date for each major item of equipment, and the time for making connections to existing piping, structures, or facilities.
- B. When directed by the Engineer, but not more frequently than every 30 days, the schedule shall be revised as necessary to reflect changes in the progress of the Work.
- C. Owner may require Contractor to add to his equipment, or construction forces, as well as increase the working hours, if operations fall behind schedule at any time during the construction period.

1.02 PROGRESS REPORTS

- A. A progress report shall be furnished to Engineer with each application for progress payment. If the Work falls behind schedule, Contractor shall submit additional progress reports at such intervals as Engineer may request.
- B. Each progress report shall include sufficient narrative to describe current and anticipated delaying factors, their effect on the construction schedule, and proposed corrective actions. Any Work reported complete, but which is not readily apparent to Engineer, must be substantiated with satisfactory evidence.
- C. Each progress report shall also include three prints of the accepted graphic schedule marked to indicate actual progress.

1.03 SCHEDULE OF VALUES

- A. After review of the tentative schedule at the pre-construction conference, and before submission of the first application for payment, Contractor shall prepare and submit to Engineer a schedule of values covering each pay item. The schedule of values, showing the value of each kind of work, shall be acceptable to Engineer before any application for payment is prepared.
- B. The sum of the items listed in the schedule of values shall equal the contract price. Such items as temporary construction facilities, may be listed separately in the schedule of values, provided the amounts can be substantiated. Overhead and profit shall not be listed as separate items.
- C. An unbalanced schedule of values providing for overpayment of Contractor on items of Work that would be performed first will not be accepted. The schedule of values shall be revised and resubmitted until acceptable to Engineer. Final acceptance by Engineer shall indicate only consent to the schedule of values as a basis for preparation of applications for progress payments and shall not constitute an agreement as to the value of each indicated item.

1.04 SCHEDULE OF PAYMENT

- A. If requested, within thirty (30) days after award of contract, Contractor shall furnish to Engineer a schedule of estimated monthly payments. The schedule shall be revised and resubmitted each time an application for payment varies more than 10 percent from the estimated payment schedule.

1.05 SURVEY DATA

- A. All field books, notes, and other data developed by Contractor in performing surveys required as part of the Work shall be available to Engineer for examination throughout the construction period. All such data shall be submitted to Engineer with the other documentation required for final acceptance of the Work.

1.06 SHOP DRAWINGS AND ENGINEERING DATA

- A. The Contractor shall submit a complete shop drawings schedule in accordance with the requirements outlined in Specification 01340, paragraph 1.07.D.
- B. Engineering data covering all equipment and fabricated materials which will become a permanent part of the Work under this contract shall be submitted to Engineer, for review in accordance with the procedures described in Section 01340. These data shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangement, and operation of component materials and devices; the external connections, anchorages, and supports required; performance characteristics; and dimensions needed for installation and correlation with other materials and equipment.
- C. All submittals, regardless of origin, shall be stamped with the approval of Contractor and identified with the name and number of this contract, Contractor's name, and references to applicable specification paragraphs and Contract Drawings. Each submittal shall indicate the intended use of the item in the Work. When catalog pages are submitted, applicable items shall be clearly identified. The current revision, issue number, and date shall be indicated on all drawings and other descriptive data.
- D. Contractor's stamp of approval is a representation to Owner and Engineer that Contractor accepts full responsibility for determining and verifying all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, and that he has reviewed or coordinated each submittal with the requirements of the Work and the Contract Documents.
- E. All deviations from the Contract Documents shall be identified on each submittal and shall be tabulated in Contractor's letter of transmittal. Such submittals shall, as pertinent to the deviation, indicate essential details of all changes proposed by Contractor (including modifications to other facilities that may be a result of the deviation) and all required piping and wiring diagrams.
- F. Contractor shall accept full responsibility for the completeness of each submission, and, in the case of a resubmission, shall verify that all exceptions previously noted by Engineer have been taken into account. In the event that more than one resubmission is required because of failure of Contractor to account for exceptions previously noted, Contractor shall reimburse Owner for the charges of Engineer for

review of the additional resubmissions.

- G. Re-submittals shall be made within seven (7) days of the date of the letter returning the material to be modified or corrected, unless within seven (7) days the Contractor submits an acceptable request for an extension of the stipulated time period, listing the reasons the re-submittal cannot be completed within that time.
- H. Any need for more than one resubmission, or any other delay in obtaining Engineer's review of submittals, will not entitle Contractor to extension of the Contract Time unless delay of the Work is directly caused by a change in the work authorized by a Change Order or by failure of Engineer to return any submittal within 21 days after its receipt in Engineer's office.
- I. Contractor's letter of re-submittal shall list the date of his original submittal letter, the date of the Engineer's letter returning the submittal, and the dates of submission and return of any previous re-submittals. In addition, the Contractor shall reimburse the Engineer in the amount of \$200.00 for review of the second re-submittal and each of any subsequent re-submittals.
- J. Engineer's review of drawings and data submitted by Contractor will cover only general conformity to the drawings and specifications, external connections, and dimensions that affect the layout. Engineer's review does not indicate a thorough review of all dimensions, quantities, and details of the material, equipment, device or item shown. Engineer's review of submittals shall not relieve Contractor from responsibility for errors, omissions, or deviations, nor responsibility for compliance with the Contract Documents.
- K. Engineer will not accept submittals from anyone but Contractor. Submittals shall be consecutively numbered in direct sequence of submittal and without division by subcontracts or trades. Re-submittals shall bear the number of the first submittal followed by a letter (A, B, etc.), to indicate the sequence of the re-submittal.
- L. When the drawings and data are returned to the Contractor marked with corrections, the corrections shall be made as noted thereon and as instructed by Engineer and corrected copies (or one corrected reproducible copy) resubmitted.
- M. When corrected copies are resubmitted, Contractor shall in writing direct specific attention to all revisions and shall list separately any revisions made other than those called for by Engineer on previous submissions.
- N. When the drawings and data are returned marked EXCEPTIONS AS NOTED, NO EXCEPTIONS NOTED, or FOR YOUR INFORMATION, no additional copies need be furnished.
- O. Copies of final, approved shop drawings for all materials and equipment supplied under this Contract shall be furnished in electronic ".pdf" format.

1.07 OPERATIONS AND MAINTENANCE MANUALS

- A. Operation and maintenance manuals shall include the following:
 - 1. Equipment function, normal operating characteristics, and limiting conditions.
 - 2. Assembly, installation, alignment, adjustment, and checking instructions.

3. Lubrication and maintenance instructions.
 4. Guide to "troubleshooting".
 5. Parts lists and predicted life of parts subject to wear.
- B. The operation and maintenance manuals shall be in addition to any instructions or parts lists packed with or attached to the equipment when delivered, or which may be required by Contractor.
- C. Final, approved copies of Operation and Maintenance manuals for all equipment supplied under Div. 11, 13, 14, 15 and 16 shall be furnished in electronic ".pdf" format.

1.08 LAYOUT DATA

- A. Contractor shall keep neat and legible notes of measurements and calculations made by him in connection with the layout of the Work. Copies of such data shall be furnished to the Resident Project Representative for use in checking.
- B. Contractor's layout as provided under Lines and Grades. All such data, considered of value to Owner, shall be transmitted to Owner by Engineer with other records upon completion of the Work.

END OF SECTION

SECTION 01310

CONSTRUCTION

SCHEDULES

PART 1 - GENERAL

1.01 GENERAL

- A. Construction shall be coordinated to assure that the Work is completed within the Contract Times as provided in the Contract Documents. The Contractor shall coordinate his activities with any other contractors, as well as with plant personnel, to allow the orderly and timely completion of all the Work.
- B. All construction schedules shall be of the critical path method, bar chart type, and shall be prepared using SURETRACK, PRIMAVERA P3, or approved equal.

1.02 CONSTRUCTION SCHEDULING GENERAL PROVISIONS

- A. Within 10 calendar days after the effective date of the Agreement, the Contractor shall prepare and submit to the Engineer a preliminary construction progress schedule. The schedule shall contain a sufficient number of tasks such that the total Contract Amount is adequately segregated into separate tasks and the contract amount is allocated accordingly. Partial payments will not be approved until an acceptable construction progress schedule has been approved by the Engineer.
- B. The schedule shall be updated monthly reflecting the approved baseline schedule and the Contractor's progress on each activity. No progress payment will be approved until the updated schedule is submitted and approved by the Engineer.
- C. Night work will not be permitted.
- D. The Contractor shall designate an authorized representative of his firm who shall be responsible for development and maintenance of the schedule and of progress and payment reports. This representative of the Contractor shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the commitments of the Contractor's schedule.

END OF SECTION

SECTION 01340

SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES

PART I - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall submit to the Engineer for review such working drawings, shop drawings, test reports and data on materials and equipment (hereinafter in this Section called data), and material samples (hereinafter in this Section called samples) as are required for the proper control of work, including but not limited to those working drawings, shop drawings, data and samples for materials and equipment specified elsewhere in the Specifications and in the Contract Drawings.
- B. The Contractor shall note that there are specific submittal requirements in other sections of these Specifications.
- C. Administrative Submittals:
 - 1. The Contractor/Installer shall provide all of the submittals required by the General Conditions, Special Conditions, and Technical Specifications of the Contract Documents, and as may be specifically required in other parts of the CONTRACT documents.
 - 2. At the time bid submittal, all contractors must provide copies of all licenses and certifications as per the Contract Documents and Technical Specifications, including all federal and state required licenses and certifications.

1.02 SHOP DRAWINGS

- A. When used in the Contract Documents, the term "shop drawings" shall be considered to mean Contractor's Drawings for material and equipment which become an integral part of the Project. These drawings shall be complete and detailed. Shop drawings shall consist of fabrication, erection and setting drawings and schedule drawings, manufacturer's scale drawings, bills of material, wiring and control diagrams, and inspection and test reports including performance curves and certifications as applicable to the Work.
- B. All details on shop drawings submitted for review shall show clearly the elevations of the various parts to the main members and lines of the structure and/or equipment, and where correct fabrication of the work depends upon field measurements; such measurements shall be made and noted on the shop drawings before being submitted for review.
- C. See Shop Drawing Schedule requirements in Subparagraph 1.07 CONTRACTOR'S RESPONSIBILITY.

1.03 PRODUCT DATA

- A. Product data as specified in individual sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturers product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare-parts listing storage instructions, and printed product warranties, as applicable to the work.

1.04 WORKING DRAWINGS

- A. When used in the Contract Documents, the term "working drawings" shall be considered to mean the Contractor's Drawings for temporary structures such as temporary bulkheads, support of open cut excavation, support of utilities, ground water control systems, forming and falsework; for underpinning; and for such other work as may be required for construction but does not become an integral part of the Project.
- B. Working drawings shall be signed and sealed by a registered Professional Engineer, currently licensed to practice in the State and shall convey, or be accompanied by, calculations or other sufficient information to completely explain the structure, machine, or system described and its intended manner of use. Prior to commencing such work, working drawings must have been reviewed without specific exceptions by the Engineer. Such review will be for general conformance and will not relieve the Contractor in any way from his responsibility with regard to the fulfillment of the terms of the Contract. All risks of error are assumed by the Contractor; the Owner and Engineer shall have no responsibility therefore.

1.05 SAMPLES

- A. The Contractor shall furnish, for review of the Engineer, samples required by the Contract Documents or requested by the Engineer. Samples shall be delivered to the Engineer as specified or directed and in quantities and sizes as specified. A minimum of two samples of each item shall be submitted unless otherwise specified. The Contractor shall prepay all shipping charges on samples. Materials or equipment for which samples are required shall not be used in work until reviewed by the Engineer.
- B. Samples specified in individual sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols, and units of work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the Work.
- C. The Contractor shall prepare a transmittal letter for each shipment of samples. He shall enclose a copy of this letter with the shipment and send a copy of this letter to the Engineer. Review of a sample shall be only for the characteristics or use named in such review and shall not be construed to change or modify any Contract requirements.

1.06 SUBMITTAL REQUIREMENTS

- A. The Contractor shall review, approve, and submit, with reasonable promptness and in such sequence, so as to cause no delay in the Contract Work or in the Work of the Owner or any separate contractor, all shop drawings, product data, working drawings and samples required by the Contract Documents.
- B. The Engineer shall furnish to the Contractor, in Adobe PDF format, a form that will be required for all shop drawing submittals. The Contractor shall complete the "Contractor Information" section of this form for each submittal. A sample copy of the required form is included at the end of this Section.
- C. The Contractor shall submit four (4) copies of descriptive or product data submittals to complement shop drawings to the Engineer. The Engineer will review the submittal and return to the Contractor marked-up copies of the shop drawings with the appropriate review comments.
- D. Shop drawings, product data, working drawings and samples shall be furnished with the following information:
 - 1. Number and title of the drawing.
 - 2. Date of drawing or revision.
 - 3. Name of project building, facility or system.
 - 4. Name of contractor, subcontractor, and manufacturer submitting drawing.
 - 5. Clear identification of contents, location of the work, and the sheet numbers where the product is found in the contract drawings.
 - 6. Contractor Certification Statement.
 - 7. Submittal Identification Number.
 - 8. Contract Drawing Number Reference.
- E. All items specified are not necessarily intended to be a manufacturer's standard product. Variations from specified items will be considered on an "or equal" basis. If submittals show variations from Contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in his letter of transmittal and on the shop drawings along with notification of his intent to seek contract adjustment. 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. Variations submitted but not described may be cause for rejection. Any variations initiated by the Contractor will not be considered as an addition to the scope of work unless specifically noted and then approved as such in writing by the Engineer.

- F. Data on materials and equipment shall include materials and equipment lists giving, for each item thereon, the name and location of the supplier or manufacturer, trade name, catalog reference, material, size, finish and all other pertinent data.
- G. For all mechanical and electrical equipment furnished, the Contractor shall provide a list including the equipment name, and address and telephone number of the manufacturer's representative and service company so that service and/or spare parts can be readily obtained. In addition, a maintenance and lubrication schedule for each piece of equipment shall be submitted as specified in Section 01730.
- H. The Contractor shall use the color "green" to make his remarks on the Submittals. Only the Engineer will utilize the color "red" in marking submittals.

1.07 CONTRACTOR'S RESPONSIBILITY

- A. It is the duty of the Contractor to check and coordinate the work of all trades, all drawings, data, schedules and samples prepared by or for him before submitting them to the Engineer for review. Each copy of any drawing or data sheet larger than 11"x17" shall bear Contractor's stamp showing that they have been checked and approved. Drawings or data sheets 11"x17" and smaller shall be bound together in an orderly fashion and bear the Contractor's stamp on the cover sheet. The cover sheet shall fully describe the packaged data and include a list of all sheet numbers within the package. Shop drawings submitted to the Engineer without the Contractor's stamp will be returned to the Contractor, without review at the Engineer's option, for conformance with this requirement.
- B. The Contractor shall review shop drawings, product data, and samples prior to submission to determine and verify the following:
 - 1. Field measurements.
 - 2. Field construction criteria.
 - 3. Manufacturer's catalog numbers and similar data.
 - 4. Conformance with Specifications.
- C. Shop drawings shall indicate any deviations in the submittal from the requirements of the Contract Documents.
- D. At a time decided upon at the preconstruction meeting the Contractor shall furnish the Engineer a Shop Drawing schedule fixing the respective dates for the initial submission of shop and working drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment. This schedule shall be provided as a separate entity and indicate those submittals that are critical to the progress schedule. The Contractor shall prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work sections of the Specifications, so that the installation will not be delayed by processing times including disapproval and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery, and similar sequenced activities. No

extension of time will be authorized because of the Contractor's failure to transmit complete and acceptable submittals sufficiently in advance of the Work.

- E. The Contractor shall not begin any work affected by a submittal returned, "Rejected. Revise as indicated and resubmit". Before starting this work, all revisions must be corrected by the Contractor. After resubmittal they will be reviewed and returned to him by the Engineer. If returned marked, "No exceptions noted" or "Exceptions as noted", then the Contractor may begin this work. Any corrections made to the shop drawings are to be followed without exception.
- F. The Contractor shall submit to the Engineer all shop drawings and data sufficiently in advance of construction requirements to provide no less than twenty-one (21) calendar days for review from the time the Engineer receives them.
- G. The Contractor shall be responsible for and bear all cost of damages which may result from the ordering of any material or from proceeding with any part of work prior to review by the Engineer of the necessary shop drawings.
- H. All shop drawings, product data, working drawings and samples submitted by subcontractors for review shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission according to the approved shop drawing schedule so as to prevent delays in delivery of materials and project completion.
- I. The Contractor shall check all subcontractors' shop drawings, product data, working drawings and samples regarding measurements, size of members, materials, and details to satisfy himself that they are in conformance to the Contract Documents. Shop drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission to the Engineer.

1.08 ENGINEER'S REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES

- A. The Engineer's review is for general conformance with the design concept and contract drawings. Markings or comments shall not be construed as relieving the Contractor from compliance with the Contract Drawings and Specifications or from departures wherefrom. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.
- B. The review of shop drawings, data, and samples will be general. They shall not be construed:
 - 1. As permitting any departure from the Contract requirements;
 - 2. As relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;
 - 3. As approving departures from details furnished by the Engineer, except as otherwise provided herein.

- C. If the shop drawings, data or samples as submitted describe variations per subparagraph (1.07H) and show a departure from the Contract requirements which 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.

- D. Submittals will be returned to the Contractor under one of the following:

"NO EXCEPTIONS NOTED" is assigned when there are no notations or comments on the submittal. When returned under this code the Contractor may release the equipment and/or material for manufacture.

"EXCEPTIONS AS NOTED" is assigned when notations or comments have been made on the submittal pointing out minor discrepancies as compared with the Contract Documents. Resubmittal or confirmation is not necessary prior to release for manufacturing.

"EXCEPTIONS AS NOTED/CONFIRM." This combination of codes is assigned when a confirmation of the notations and comments is required from the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product. This confirmation is to address the omissions and/or nonconforming items that were noted. Only the items to be "confirmed" need to be resubmitted.

"EXCEPTIONS AS NOTED/RESUBMIT." This combination of codes is assigned when a resubmittal is required by the Contractor. The Contractor may release a portion of the equipment or material for manufacture; however, all notations and comments must be incorporated into the final submittal. This resubmittal is to address the omissions and/or nonconforming items that were noted.

"REJECTED. REVISE AS INDICATED AND RESUBMIT." This combination of codes is assigned when the submittal is in noncompliance with the Contract Documents and must be corrected and the entire package resubmitted. This code generally means that the equipment or material cannot be released for manufacture unless the Contractor takes full responsibility for providing the submitted items in accordance with Contract Documents.

"FOR YOUR INFORMATION" is assigned when the package provides information of a general nature that may or may not require a response.

- E. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing, on the letter of transmittal and on resubmitted shop drawings by use of revision triangles or other similar methods, to revisions other than the corrections requested by the Engineer on previous submissions. Any such revisions which are not clearly identified shall be made at the risk of the Contractor. The Contractor shall make corrections to any work done because of this type revision that is not in accordance to the Contract Documents as may be required by the Engineer.

- F. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the Engineer at least seven (7) working days prior to release for manufacture.
- G. The Engineer will review a submittal/resubmittal a maximum of two (2) times after which cost of review will be borne by the Contractor. The cost of engineering shall be equal to the Engineer's charges to the Owner under the terms of the Engineer's agreement with the Owner.
- H. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.
- I. Partial submittals may not be reviewed. The Engineer will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor. The Engineer may at his option provide a list or mark the submittal directing the Contractor to the areas that are incomplete.

PART 2 – PRODUCTS

- A. Final approved shop drawings shall be submitted in electronic format.

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01385

COLOR AUDIO-VIDEO CONSTRUCTION RECORDS

PART 1 - GENERAL

1.1 DESCRIPTION

A. SCOPE

The Contractor shall prepare color audio/video recordings of all work areas prior to commencing construction in those areas. No separate payment will be made for the work of this Section, and the cost shall be included in the various prices bid for the project.

B. REQUIREMENTS INCLUDED

Prior to commencing work, the Contractor shall have a continuous color audio/video recording taken along the entire length of the Project including all affected project areas. Streets, easements, rights-of way, lots, or construction sites within the Project must be recorded to serve as a record of pre-construction conditions. Two (2) copies of tape recordings and video log shall be submitted to the Owner on a flash drive. The Engineer shall designate those areas, if any, to be omitted from or added to the audio-visual coverage. All recordings and written records shall become property of the Owner.

C. SCHEDULING

No construction shall begin prior to review and approval of the recordings covering the Project construction area(s) by the Owner. The Owner shall have the authority to reject all or any portion of a video recording not conforming to specifications and order that it be redone at no additional charge. The Contractor shall reschedule unacceptable coverage within seven days after being notified. Video recordings shall not be made more than 30 days prior to construction in any area.

D. EQUIPMENT

All equipment, accessories, materials and labor to perform this service shall be furnished by the Contractor. The total audio-video system shall reproduce bright, sharp, clear pictures with accurate colors and shall be free from distortion, tearing, rolls or any other form of imperfection. The audio portion of the recording shall reproduce the commentary of the camera operator with proper volume, clarity and be free from distortion and interruptions. In some instances, audio-video recording coverage may be required in areas not accessible by conventional wheeled vehicles. Such coverage shall be obtained by walking.

F. RECORDED INFORMATION, AUDIO

Each recording shall begin with the current date, project name and be followed by the general location, i.e., viewing side and direction of progress. Accompanying the video recording of each video flash drive shall be a corresponding and simultaneously recorded audio recording. This audio recording, exclusively

containing the commentary of the camera operator or aide, shall assist in viewer orientation and in any needed identification, differentiation, clarification, or objective description of the features being shown in the video portion of the recording. The audio recording shall also be free from any conversations.

G. RECORDED INFORMATION - VIDEO

All video recordings must continuously display transparent digital information to include the date and time of recording. The date information shall contain the month, day and year. The time information shall contain the hour, minutes and seconds. Additional information shall be displayed periodically. Such information shall include, but not be limited to, project name, contract number, direction of travel and the viewing side. This transparent information shall appear on the extreme upper left hand third of the screen. Camera pan, tilt, zoom-in and zoom-out rates shall be sufficiently controlled such that recorded objects will be clearly viewed during video playback. In addition, all other camera and recording system controls, such as lens focus and aperture, video level, pedestal, chrome, white balance, and electrical focus shall be properly controlled or adjusted to maximize picture quality. The construction documentation shall be recorded in SP mode.

H. VIEWER ORIENTATION

The audio and video portions of the recording shall maintain viewer orientation. To this end, overall establishing views of all visible house and business addresses shall be utilized. In areas where the proposed construction location will not be readily apparent to the video recording viewer, highly visible yellow flags shall be placed, by the Contractor, in such a fashion as to clearly indicate the proposed center line of construction. When conventional wheeled vehicles are used as conveyances for the recording system, the vertical distance between the camera lens and the ground shall not exceed 10 feet. The camera shall be firmly mounted such that transport of the camera during the recording process will not cause an unsteady picture.

I. LIGHTING

All recording shall be done during time of good visibility. No recording shall be done during precipitation, mist or fog. The recording shall only be done when sufficient sunlight is present to properly illuminate the subjects of recording and to produce bright, sharp video recordings of those subjects.

J. SPEED OF TRAVEL

The average rate of travel during a particular segment of coverage shall be directly proportional to the number, size and value of the surface features within that construction areas zone of influence. The rate of speed in the general direction of travel of the vehicle used during recording shall not exceed 44 feet per minute.

K. VIDEO LOG/INDEX

All video recordings shall be permanently labeled and shall be properly identified by file number and project title. Each video flash drive shall have a log of that video contents. The log shall describe the various segments of coverage contained on the video file in terms of the names of the streets or location of easements, coverage

beginning and end, directions of coverage, video unit counter numbers, engineering survey or coordinate values (if reasonably available) and the date.

L. AREA OF COVERAGE

Video coverage shall include all surface features located within the zone of influence of construction supported by appropriate audio coverage. Such coverage shall include, but not be limited to, existing driveways, sidewalks, curbs, pavements, drainage system features, mailboxes, landscaping, culverts, fences, signs, Contractor staging areas, adjacent structures, side streets that may be impacted, etc. within the area covered by the project. Of particular concern shall be the existence of any faults, fractures, or defects. Recorded coverage shall be limited to one side of the site, street, easement or right-of-way at any one time.

M. COSTS OF VIDEO SERVICES

The cost to complete the requirements under this section shall be included in the contract items provided in the Bid Form. There is no separate pay item for this work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01410

TESTING AND TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Owner will employ and pay for the services of an Independent Testing Laboratory to perform that 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.
 - 1. Contractor shall cooperate with the laboratory to facilitate the execution of its required services.
 - 2. Employment of the laboratory shall in no way relieve Contractor's obligations to perform the Work of the Contract.

1.02 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

- A. Laboratory is not authorized to:
 - 1. Release, revoke, alter or enlarge on requirements of Contract Documents.
 - 2. Approve or accept any portion of the Work.
 - 3. Perform any duties of the Contractor.

1.03 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with laboratory personnel, provide access to Work, to Manufacturer's operations.
- B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.
- C. 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. Materials and equipment used in the performance of work under this Contract are subject to inspection and testing at the point of manufacture or fabrication. Standard specifications for quality and workmanship are indicated in the Contract Documents. The Engineer may require the Contractor to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the Contract Documents. All costs of this testing and providing statements and certificates shall be a subsidiary obligation of the Contractor, and no extra charge to the Owner shall be allowed on account of such testing and certification.

- E. Furnish incidental labor and facilities:
 - 1. To provide access to work to be tested.
 - 2. To obtain and handle samples at the Project site or at the source of the product to be tested.
 - 3. To facilitate inspections and tests.
 - 4. For storage and curing of test samples.
- F. Notify laboratory sufficiently in advance (minimum 48 hours) of operations to allow for laboratory assignment of personnel and scheduling of tests.
 - 1. When tests or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred due to Contractor's negligence.
- G. 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 Engineer.
- H. 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 may pay for the laboratory costs directly to the testing firm or the total of such costs shall be deducted from any payments due the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 SANITARY FACILITIES

- A. Contractor shall furnish temporary separate male and female sanitary facilities at the site, as provided herein, for the needs of all construction workers and others performing work or furnishing services on the Project.
- B. Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period, and obscured from public view to the greatest practical extent. If toilets of the chemically treated type are used, at least one toilet will be furnished for each 20 men. Contractor shall enforce the use of such sanitary facilities by all personnel at the site.

1.02 MAINTENANCE OF TRAFFIC

- A. Contractor shall conduct his work to interfere as little as possible with public travel, whether vehicular or pedestrian. Whenever it is necessary to cross, obstruct, or close roads, driveways and walks, whether public or private, Contractor shall provide and maintain suitable and safe bridges, detours, or other temporary expedients for the accommodation of public and private travel, and shall give reasonable notice to owners of private drives before interfering with them. Driveway access to commercial properties shall be maintained at all times. Such maintenance of traffic shall not be required when Contractor has obtained permission from the owner and tenant of private property, or from the authority having jurisdiction over public property involved, to obstruct traffic at the designated point. At all times, the Contractor shall perform the Work in accordance with the permits and easement agreements.
- B. Traffic control shall be in accordance with FDOT Roadway and Traffic Design Standards for Traffic Control Through Work Zones.

1.03 BARRICADES AND LIGHTS

- A. All streets, roads, highways, and other public thoroughfares which are closed to traffic shall be protected by effective barricades on which shall be placed acceptable warning signs. Barricades shall be located at the nearest intersecting public highway or street on each side of the blocked section.
- B. All open trenches and other excavations shall have suitable barricades, signs, and lights to provide adequate protection to the public. Obstructions such as material piles and equipment shall be provided with similar warning signs and lights. Contractor shall be responsible for public safety within the construction area.
- C. All barricades and obstructions shall be illuminated with warning lights from sunset to sunrise. Material storage and conduct of the Work on or alongside public streets and highways shall cause the minimum obstruction and inconvenience to the traveling public. All barricades, signs, lights and other protective devices shall be installed and maintained in conformity with applicable statutory requirements and, where within railroad and highway rights-of-way, as required by the authority having jurisdiction thereover.

- D. Open trenches and other excavations shall not be left open over weekends and holidays, or greater than one calendar day, except during adverse weather conditions.

1.04 PROTECTION OF PUBLIC AND PRIVATE PROPERTY

- A. Contractor shall protect, shore, brace, support, and maintain all underground pipes, conduits, drains, and other underground construction uncovered or otherwise affected by his construction operations. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences, and other surface structures affected by construction operations, together with all sod and shrubs in yards and parking areas, shall be restored to their original condition, whether within or outside the easement. All replacements shall be made with new materials.

1.05 PARKING

- A. Contractor shall provide and maintain suitable parking areas for the use of all construction workers and others performing work or furnishing services in connection with the Project, as required to avoid any need for parking personal vehicles where they may interfere with public traffic, Owner's operations, or construction activities.

1.06 DUST CONTROL

- A. Contractor shall take reasonable measures to prevent unnecessary dust. Earth surfaces subject to dusting shall be kept moist with water or by application of a chemical dust suppressant. Dusty materials in piles or in transit shall be covered when practicable to prevent blowing.
- B. Buildings or operating facilities that may be adversely affected by dust shall be adequately protected from dust. Existing or new machinery, motors, instrument panels or similar equipment, shall be protected by suitable dust screens. Proper ventilation shall be included with dust screens.

1.07 SWEEPING

- A. The Contractor shall sweep loose material from all pavement at the end of each workday.

1.08 POLLUTION CONTROL

- A. Contractor shall prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris and other substances resulting from construction activities. No sanitary wastes will be permitted to enter any drain or watercourse other than sanitary sewers. No sediment, debris or other substance will be permitted to enter sanitary sewers and reasonable measures will be taken to prevent such materials from entering any drain or watercourse.

PART II – PRODUCTS

Not Used PART III –

EXECUTION

Not Used

END OF SECTION

SECTION 01505

MOBILIZATION

PART 1 - GENERAL

1.01 DEFINITION AND SCOPE

- A. Mobilization shall include the obtaining of all permits, insurance, and bonds; moving onto the site of all equipment; furnishing and erecting temporary facilities, and other construction facilities; all as required for the proper performance and completion of the Work. Mobilization shall include, but not be limited to, the following principal items:
1. Move onto the site all plant and equipment required for first month's operations.
 2. Install temporary construction power, wiring, and lighting facilities.
 3. Establish fire protection plan and safety program.
 4. Secure construction water supply.
 5. Provide on-site sanitary facilities and potable water facilities.
 6. Arrange for and erect Contractor's work and storage yard and employees' parking facilities.
 7. Submit all required insurance certificates and bonds.
 8. Obtain all required permits.
 9. Post all OSHA, Environmental Protection Agency, Department of Labor, and all other required notices.
 10. Have superintendent at the job site full time.
 11. Submit a detailed construction schedule acceptable to the Engineer.
 12. If required, erect project construction sign(s).
 13. Submit a finalized schedule of values of the Work acceptable to the Owner.
 14. Submit a finalized schedule of submittals.
 15. Construct, maintain, and restore temporary access and haul roads.
 16. Provide a continuous color audio-videotape recording of existing conditions along the pipeline route along the first 30-days of scheduled construction.

END OF SECTION

SECTION 01510
TEMPORARY UTILITIES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnish, install and maintain temporary utilities required for construction, and remove upon completion of Work.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

- A. Comply with National Electric Code.
- B. Comply with Federal, State and local codes and regulations and with utility company requirements.
- C. Comply with County Health Department Regulations.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Materials may be new or used, but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

2.02 TEMPORARY ELECTRICITY AND LIGHTING

- A. Arrange with utility company and Owner to provide service required for power and lighting, and pay all costs for service and for power used in the construction, testing and trial operation prior to final acceptance of the work by the Owner as stipulated by the Engineer. All cost associated with obtaining temporary and permanent power will be at Contractor expense.
- B. Provide adequate artificial lighting for all areas of work when natural light is not adequate for work, and for areas accessible to the public.

2.03 TEMPORARY WATER

- A. If applicable, install at each and every connection to the Owner's water supply a backflow preventer and meter meeting City of Brooksville's requirements.

2.04 TEMPORARY SANITARY FACILITIES

- A. Provide sanitary facilities in compliance with laws and regulations.
- B. Service, clean and maintain facilities and enclosures.

PART 3 - EXECUTION

3.01 GENERAL

- A. Maintain and operate systems to assure continuous service.
- B. Modify and extend systems as work progress requires.

3.02 REMOVAL

- A. Completely remove temporary materials and equipment when their use is no longer required as determined by the Engineer.
- B. Clean and repair damage caused by temporary installations or use of temporary facilities.

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

Material and equipment incorporated into the Work:

1. Conform to applicable specifications and standards.
2. Comply with size, make, type and quality specified, or as specifically approved in writing by the Engineer.
3. 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. Two or more items of the same kind shall be identical, by the same manufacturer.
 - d. Products shall be suitable for service conditions.
 - e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

1.02 APPROVAL OF MATERIALS

- A. 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 review of the Engineer.
- B. Facilities and labor for handling and inspection of all materials and equipment shall be furnished by the Contractor. If the Engineer requires, either prior to beginning or during the progress of the work, the Contractor shall submit samples of materials for such special tests as may be necessary to demonstrate that they conform to the specifications. Such samples shall be furnished, stored, packed, and shipped as directed at the Contractor's expense. Except as otherwise noted, the Owner will make arrangements for and pay for the tests.
- C. The Contractor shall submit data and samples sufficiently early to permit consideration and review before materials are necessary for incorporation in the work. Any delay resulting from the Contractor's failure to submit samples or data promptly shall not be used as a basis of claims against the Owner or the Engineer.

- D. The materials and equipment used on the work shall correspond to the approved samples or other data previously submitted to the Engineer for review.

1.03 MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION

- A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including four copies to the Engineer.
 - 1. Maintain one set of complete instructions at the job site during installation and until completion.
- B. Handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements.
 - 1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Engineer for further instructions.
 - 2. Do not proceed with work without clear instructions.
- C. Perform work in accord with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

D.

1.04 TRANSPORTATION AND HANDLING

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

1.05 STORAGE AND PROTECTION

- A. The Contractor shall furnish a covered, weather-protected storage structure(s) providing a clean, dry, non-corrosive environment for all mechanical equipment, valves, architectural items, electrical and instrumentation equipment, and special equipment to be incorporated into this project. Storage of equipment shall be in strict accordance with the "instructions for storage" of each equipment supplier and manufacturer including connection of heaters, placing of storage lubricants in equipment, etc. The Contractor shall furnish a copy of the manufacturer's instructions for storage to the Engineer prior to storage of all equipment and materials. Corroded, damaged or deteriorated equipment and parts shall be replaced before acceptance of the project. Equipment and materials not properly stored will not be included in a payment estimate.
- B. Store Products in accord with manufacturer's instructions, with seals and labels intact and legible.

1. Store products subject to damage by the elements in weathertight enclosures.
 2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.
 3. Store fabricated products above the ground, on blocking or skids, prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.
 4. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
- C. 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 of any kind whatsoever to the material or equipment.
- D. Cement, sand and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All miscellaneous steel and reinforcing steel shall be stored off the ground or otherwise to prevent accumulations of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Pre-cast concrete sections shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in a manner to reduce breakage, chipping, cracking, and spilling to a minimum.
- E. 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.
- F. 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.
- G. Protection After Installation:
1. Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove covering when no longer needed.
- H. 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. 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.
- I. 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.

1.06 SUBSTITUTIONS AND PRODUCT OPTIONS

A. Contractor's Options:

1. For products specified only by reference standard, select any product meeting that standard.
2. For products specified by naming several products or manufacturers, submit the products or manufacturers named in the Proposal, which complies with the specifications.
3. For products specified by naming one or more products or more products or manufacturers and "or equal", Contractor shall submit a request as for substitutions for any product or manufacturer not specifically named.

B. Substitutions:

1. After the Effective Date of the Agreement, the Engineer will consider written requests from Contractor for substitution of products.
2. Submit a separate request for each product, supported with complete data, with drawings and samples as appropriate, including:
 - a. Comparison of the qualities of the proposed substitution with that specified.
 - b. Changes required in other elements of the work because of the substitution.
 - c. Effect on the construction schedule.
 - d. Cost data comparing the proposed substitution with the products specified.
 - e. Any required license fees or royalties.
 - f. Availability of maintenance service, and source of replacement materials.
3. The Engineer shall be the judge of the acceptability of the proposed substitution.

C. Contractor's Representation:

1. A request for a substitution constitutes a representation that Contractor:
 - a. Has investigated the proposed Product and determined that it is equal to or superior in all respects to that specified.
 - b. Will provide the same warranties or bonds for the substitution as for the product specified.
 - c. Will coordinate the installation of an accepted substitution into the Work, and make such other changes as may be required to make the Work complete in all respects.
 - d. Waives all claims for additional costs, under his responsibility, which may subsequently become apparent.

1.07 SPECIAL TOOLS

A. Manufacturers of equipment and machinery shall furnish any special tools (including grease guns or other lubricating devices) required for normal adjustment, operations and maintenance, together with instructions for their use. The Contractor shall preserve and deliver to the Owner these tools and instructions in good order no later than upon completion of the Contract.

1.08 WARRANTY

A. For all major pieces of equipment, submit a warranty from the equipment manufacturer as specified in Section 01740. The manufacturer's warranty period shall be concurrent with the Contractor's for one (1) year after the time of substantial completion and acceptance.

1.09 SPARE PARTS

A. Spare parts for certain equipment have been specified in the pertinent sections of the Specifications. The Contractor shall collect and store all spare parts so required in an area to be designated by the Engineer. In addition, the Contractor shall furnish to the Engineer 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.

1.10 GREASE, OIL, AND FUEL

- A. All grease, oil, and fuel required for testing of equipment shall be furnished with the respective equipment. The Owner shall be furnished with a year's supply of required lubricants including grease and oil of the type recommended by the manufacturer with each item of equipment supplied.
- B. The Contractor shall be responsible for changing the oil in all drives and intermediate drives of each mechanical equipment after initial break-in of the equipment, which in no event shall be any longer than three weeks of operation.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END SECTION

START-UP AND SYSTEMS TESTING

PART 1 - GENERAL

1.01 GENERAL

- A. Prior to requesting issuance of the Certificate of Substantial Completion, the Contractor shall perform start-up testing services as specified herein.
- B. Start-up of the facilities and appurtenances will require completion of the structures and connections to existing systems.
- C. All equipment shall be tested and approved by the Owner prior to placing the facilities into operation.
- D. All lubricants, fuel and power necessary for initial operation and tests shall be furnished by the Contractor.
- E. In addition to furnishing, delivering, installing, and testing equipment, the Contractor shall provide the services of competent manufacturing representatives for the periods indicated in other sections of these Specifications. Such representative shall assist the Owner's personnel in system start-up by instructing the operating personnel of the Owner in the maintenance and operation of the equipment, conducting tests, and making recommendations for producing the most efficient results. These services shall be made during the initial operation of the completed facilities and be in addition to services necessary during erection or to correct defective materials or workmanship during the guarantee period. These representatives shall be specially trained and qualified for installation, adjustment, start-up, and testing work and shall not be sales representatives only. The cost of such representation, including subsistence and travel, shall be provided at no additional cost to the Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 PRELIMINARY MATTERS

- A. General Requirements:
 - 1. Successfully plan and execute the start-up of the system and demonstrate satisfactory performance thereof.
 - 2. A written start-up and performance demonstration plan, properly scheduled, shall be developed by the Contractor, for approval by the Engineer, and shall be successfully executed prior to substantial completion and acceptance by the Owner.
 - 3. Field acceptance tests shall be witnessed by the Owner and Engineer. At least thirty (30) calendar days prior to scheduled testing, Contractor shall submit details of all start-up and system test procedures to the Engineer for review.

4. All start-up and performance tests and inspections shall be scheduled at least ten (10) working days in advance or as otherwise specified with the Owner and Engineer. All performance tests and inspections shall be conducted during the normal work week of Monday through Friday, unless otherwise specified.
5. The Contractor shall be fully responsible for the proper operation of equipment during start-up systems testing and shall neither have nor make any claim for damage that may occur to equipment prior to the time when the Owner takes over the operation thereof.

B. Preparation for Systems Start-Up:

1. Upon completion of the Work and all related systems, all pipes and tanks shall be flushed with water. All process systems and pipelines shall be filled and flushed with water and hydraulically checked for leaks, cracks, and defects. All sumps, tanks, basins, chambers and wet wells which, under normal operating conditions will contain water or process liquids, shall also be hydraulically checked using water for leaks, cracks and defects.
2. All mechanical and electrical equipment shall be checked to ensure that it is in good working order and properly connected. Preliminary run-ins of the various pumps, compressors, and other remaining equipment shall be made. All systems shall be purged as required. All sumps, tanks, basins, chambers, wet wells, and pipe lines which are hydraulically checked shall be drained and returned to their original condition once the water testing is complete.
3. All instruments and controls shall be calibrated through their full range. Any other adjustments required for proper operation of all instrumentation and control equipment shall be made.
4. The Contractor shall perform all other tasks needed for preparing and conditioning the Work for proper operation.
5. No testing or equipment operation shall take place until it has been verified by the Engineer that all specified safety equipment has been installed and is in good working order.
6. No testing or equipment operation shall take place until it has been verified by the Engineer that all lubricants, tools, maintenance equipment, spare parts, and approved equipment operation and maintenance data manuals have been furnished as specified.

3.02 PRESSURE TESTS AND DISINFECTION

- A. Field pressure tests shall be made to confirm compliance with the Contract Documents. The Contractor shall perform field tests as herein specified. All tanks, water mains, piping and equipment shall be tested in the field in the presence of the Engineer or his authorized assistant.
- B. Hydrostatic and Leakage Tests – All Water Lines: (DI and PVC)

1. Hydrostatic and leakage tests shall be performed in accordance with the applicable sections of the American Water Works Association Standard for Installation of Cast Iron/Ductile Iron Water Mains, AWWA C-600, except as herein modified.
2. After completion of all work and before final acceptance, a hydrostatic and leakage test shall be conducted. Where applicable, the Contractor shall coordinate the development of the water supply with the pipeline work in order that water will be available to meet these requirements. At no time are valves on the distribution system to be operated without the presence of a duly qualified representative or the Owner.
3. The hydrostatic test of the completed pipelines shall be performed under a static water pressure of 50 percent above the working pressure but not less than 150 psi. The duration of this test shall be no less than two (2) hours.
4. A test pump, piping connections, taps into the pipelines, tapping saddles, corporation stops, and all necessary apparatus required for the hydrostatic tests, shall be furnished by the Contractor.
5. All exposed pipe, fittings, valves, air valves, blow-offs and joints shall be carefully examined during the test, and all joints showing a visible leakage shall be made tight. All defective pipe, fittings, valves, hydrants and accessories shall be removed from the line and replaced by the Contractor.
6. The Contractor may backfill the trench before testing the line, but he shall open up the trench at his own expense to repair any leaks.
7. All visible leaks shall be corrected regardless of the total leakage as shown by the test. All lines that fail to meet these tests shall be repaired and retested as necessary, until test requirements are complied with.
8. The installation will not be accepted until the leakage is less than the number of gallons per hour as determined by the formula below:

$$L = \frac{SD(P)^{0.5}}{133,200}$$

in which "L" equals the allowable leakage, in gallons per hour; "S" is the length of the pipe tested, in feet; "D" is the nominal pipe diameter, in inches; and "P" is the average test pressure during the leakage test, in pounds per square inch, gauge.

9. All tests shall be made under the supervision of the Engineer and a representative of the Owner. No additional compensation will be paid to the Contractor for making the above tests; the cost of all labor, materials, lubricants, fuels, power, necessary appliances, and the coordination for testing purposes shall be included in the unit price or prices bid or the various items of work.
10. The Contractor shall give the Engineer 48 hours advance notice of the time when the installation is ready for hydrostatic and leakage tests.

11. All lines shall be cleaned and flushed as thoroughly as possible with the water pressure and outlets available. Flushing shall be done after the line pressure test has been made and approved.

C. Disinfection of Potable Water Lines

1. Prior to disinfection, the lines shall be cleaned and flushed as thoroughly as possible with the water pressure and outlets available. Flushing shall be done after the line pressure test has been made and approved. Lines shall be disinfected in accordance with the applicable requirements of AWWA C651 and as described hereinafter.
2. Before being placed in service, all potable pipe installed under this Contract shall be disinfected by chlorination. Either of the following methods of procedure may be followed upon approval of the Engineer.
 - a. Liquid Chlorine: A chlorine gas-water mixture shall be applied by means of a solution-feed chlorination device. The device must provide a means to prevent the backflow of water into the chlorine cylinder.
 - b. Calcium Hypochlorite Solution: A solution consisting of 5 percent calcium hypochlorite powder and 95 percent water by weight shall be prepared and this solution will be injected or pumped into the line.
3. The point of application of the chlorinating agent shall be at the beginning of the pipeline extension and through a corporation stop inserted in the top of the newly laid pipe. The water injector for delivering the chlorine-bearing water into the pipe may be supplied from a tap on the pressure side of the gate valve controlling the flow into the pipeline extension.
4. Water from the existing distribution system or other source of supply shall be controlled so as to flow slowly into the newly laid pipeline during the application of chlorine. The Contractor shall not allow the chlorine solution in the line being treated to flow back into the line supplying the water.
5. Treated water shall be retained in the line at least 24 hours, after which the chlorine residual in the line shall be at least 50 mg/l. Should the initial procedure fail to result in the conditions specified, the chlorination procedure shall be repeated until results are obtained, at the Contractor's expense.
6. The Contractor shall tap the lines at points designated by the Engineer and provide necessary piping to discharge water from the line.
7. Following chlorination, all treated water shall be thoroughly flushed from the line, at its extremities, until the replacement water throughout its length, upon test, is proved comparable to the quality of water in the existing distribution system.
8. Water for flushing will be provided by the Owner at the expense of the Contractor. At no time are valves on the distribution system to be operated without the presence of a duly qualified representative of the Owner.
9. After the water lines have been disinfected and flushed, samples of water shall be taken from several points in sterilized containers, to be obtained from

the Owner and samples forwarded to the Owner, or its designated representative, for bacterial examination. If repeated tests of such samples show the presence of coliform organisms, the disinfection shall be repeated or continued until tests indicate absence of contamination. Final approval of the bacterial samples shall be received prior to placing the system into operation.

D. Hydrostatic Tests (HDPE Piping)

1. The piping shall be tested between valved sections to a maximum length of 2,000 feet immediately after installation and backfilling has been completed.
2. In testing, the part of the system under test shall be filled with water and subjected to a sustained pressure of 150 pounds per square inch. The piping shall be tested in sections, thereby, testing each valve for secure closure. While the system is being filled with water, air shall be carefully and completely exhausted. If permanent air vents are not located at all high points, the Contractor shall install corporation stops or fittings and valves at such points so the air can be expelled as the pipe system is slowly filled with water.
3. All pumps, gauges and measuring devices shall be furnished, installed and operated by the Contractor and all such equipment and devices and their installation shall be approved by the Owner's Engineer. The pressure gauges or data recorders should be calibrated and sufficiently sized to provide mid-range data, easy reading, interpretation, and accuracy of resolution to ± 2.0 psi. The test pressure should be taken at the position in the pipeline at the lowest point in elevation along the test section's vertical pipeline profile. All pressure and leakage testing shall be done in the presence of a representative of the Owner.
4. Water for testing and flushing shall be potable water provided by the Contractor, at no cost to the Owner, from a source approved by the Engineer. Flow velocity during line filling should not exceed 2 f.p.s.
5. If the contractor elects to perform hydrostatic testing against valves in an existing distribution system, he does so at his own risk and will bear the cost of any damages to the existing valve, piping system, private or public property, or the new pipeline under test.
6. The Contractor may backfill fittings, valves and service connections prior to testing at his own risk. Any section of piping system which fails to meet the testing criteria will be excavated and repaired by the Contractor, including restoration, at his own expense.
7. Test pressure shall be maintained by pumping for at least 2 hours and until all sections under test have been checked for evidence of leakage. Rate of loss shall not exceed that specified, in Table 1, "Allowance for Expansion Under Pressure". Visible leaks shall be corrected regardless of total leakage shown by test.

Table 1: Allowance for Expansion Under Test Pressure*
Allowance for Expansion (U.S. Gals/100 ft of pipe)

Nominal Pipe Size, in.	1-Hour Test	2-Hour Test	3-Hour Test
3	0.10	0.15	0.25
4	0.13	0.25	0.40
6	0.30	0.60	0.90
8	0.50	1.0	1.5
10	0.75	1.3	2.1
11	1.0	2.0	3.0
12	1.1	2.3	3.4
14	1.4	2.8	4.2
16	1.7	3.3	5.0
18	2.2	4.3	6.5
20	2.8	5.5	8.0
22	3.5	7.0	10.5
24	4.5	8.9	13.3
28	5.5	11.1	16.8
32	7.0	14.3	21.5
36	9.0	18.0	27.0
40	11.0	22.0	33.0
48	15.0	27.0	43.0
54	22.0	35.0	55.0

*These allowances only apply to the test period and not to the initial expansion phase.

E. Leakage Test - Gravity Sewers

1. General

- a. All gravity sewer will be tested by the Contractor prior to final acceptance of the work. All tests will be conducted in a manner to minimize any interference with the Contractor's work or progress. The Contractor shall notify the Engineer 48 hours in advance of such tests and, at his option, the Engineer shall witness such tests.
- b. The Contractor shall notify the Engineer when the work is ready for testing, and tests shall be made as soon thereafter as practicable, under the observation of the Engineer. Reading meters, gauges or other measuring devices will be new and furnished by the Contractor. The Contractor shall furnish all other labor, materials, services and

equipment including power, fuel, meters and gauges; water and other items and apparatus necessary for making leakage tests, preparing guidelines for testing, assembling, placing, and removing testing equipment and placing in service.

2. Air Leakage Test

- a. Tests by this method shall be limited to sewers 30 inches in diameter and smaller. The maximum allowable air leakage is based on pre-wetted pipe walls. The Contractor may therefore fill the pipe with clear water and then empty the pipe prior to air testing. When pipe walls are pre-wetted, air leakage tests shall be completed within 24 hours after filling the sewer section to be tested.
- b. Air pressure tests shall be made by placing the sewer under 3.0 psig air pressure and measuring the volume of air required to maintain this pressure. The rate of air leakage shall be determined when the system reaches an equilibrium state and air flow shall be read by means of an approved rotometer.
- c. The maximum rate of air loss shall be 0.003 cfm per square foot of interior pipe surface and the maximum air flow shall not exceed 2.0 cfm when the total pressure on the sewer is maintained at 3.0 psig. When the groundwater level is above the invert of the sewer, but below a level adequate for infiltration testing, the maximum air loss shall be reduced 6 percent for each foot of groundwater above the sewer invert.
- d. Air testing equipment shall be arranged so that compressors, valving, gauges, and other test devices are located at the ground surface. Air testing equipment shall have an approved air relief arrangement to prevent the sewer from being pressurized to greater than 10.0 psig.

3. Lamp Test

- a. The installed gravity sewer shall be "lamped" between manholes or other structures in order to ascertain that they are clear and in correct alignment. The concentricity of the lamp image received shall be such that the diameter of said image shall have no vertical reduction from that of the inside pipe diameter and not more than 20 percent horizontal reduction.
- b. Testing shall not proceed until all facilities are complete in place and concrete cured. All piping shall be thoroughly cleaned prior to testing to clear lines of all foreign matter. Lines shall be flushed with water prior to lamping to aid in the detection of dips in the line. Lines which have dips which are greater than one inch of water may be subject to repair at the discretion of the Engineer.

4. Deflection Testing:

- a. New gravity sewer lines are subject to deflection testing at the discretion of the Engineer. The intent is to require testing of lines which appear to be defective or otherwise unsatisfactory.
 - b. Tests will be conducted using a 92.5 percent mandrel. The mandrel shall be pulled through the sewer line by hand, using a 150-pound test line. If the mandrel cannot traverse the pipe as such, then the deficiency shall be corrected.
5. **Repairing Leaks:** When leakage occurs in excess of the specified amount, defective manholes, pipe, pipe joints, or other appurtenances shall be located and repaired at the expense of the Contractor. If the defective portions cannot be located, the Contractor shall remove, reconstruct, and retest as much of the original work as necessary to obtain satisfactory test results.

3.03 SYSTEMS START-UP

A. Contractor Responsibilities

1. In accordance with the approved start-up and testing plan, the Contractor shall provide the Owner ten (10) days notice in writing of his intent to perform systems start-up.
2. In accordance with the approved start-up and testing plan, the Contractor shall provide sufficient personnel to test equipment, assist in establishing set points, monitor and record data, as approved by the Engineer.
3. In accordance with the approved start-up and testing plan, the Contractor shall obtain, install, calibrate and operate all test equipment, gauges, pressure recorders, communications systems, etc., as directed by the Engineer.
4. The Contractor shall cooperate with the Engineer, provide access to the work, provide all incidental labor and facilities, and provide any temporary utilities or construction aids required.
5. The Contractor shall ensure that all equipment, subsystems, and other separable parts of the Work have been adjusted and balanced and that any and all field tests have been conducted and demonstrated to be in proper operating condition to the satisfaction of the Engineer.
6. The Contractor shall ensure that operation of the existing plant systems are not disrupted in anyway during start-up.

B. Start-Up Tests

1. In general, start-up systems testing of the water pipelines and facilities shall include, but not be limited to, the following:
 - a. The Contractor shall assure that all valves are in their proper operating position in accordance with the intended operating scenario.

- b. The Contractor shall fill the pipelines with water, in an approved manner, taking care to allow the gradual release of air from all high points, blow-offs and the like.
 - c. The Contractor shall demonstrate proper operation of all hydraulic and electronic, level, pressure, and flow sensing and control systems. The Contractor shall demonstrate the proper operation of the automatic pump shutdown controls on both low level and high discharge pressure. The Contractor shall demonstrate the proper operation of the automatic pressure sustaining/check valve and pressure sustaining/level control valve hydraulic control systems.
2. Should the Contractor fail to demonstrate satisfactory performance on the first and any subsequent attempt, he shall make all necessary alterations, adjustments, repairs and replacements. When the piping or facilities are again ready for operation, new tests shall be started. This procedure shall be repeated as often as necessary until the piping or facilities have operated continuously to the satisfaction of the Owner and Engineer, for the specified test duration.

3.04 SYSTEMS ACCEPTANCE

- A. A system, process, and/or piece of equipment shall not be considered accepted until it has met all of the following criteria.
 1. Manufacturer's certification that equipment has been installed properly has been received by the Engineer.
 2. All equipment has been calibrated and calibration certificates have been received by the Engineer.
 3. Testing and Startup has been completed without any outstanding issues.
 4. All spare parts have been furnished to the Owner in accordance with Section 01700.
 5. Operations and Maintenance manuals have been approved.
 6. Operations and Maintenance manuals have been distributed to Owner.
 7. Operator Training has been conducted.
- B. Approved O&M Manuals, Manufacturer's certification, calibration certificates, and spare parts shall be delivered to the Owner in a single submittal in accordance with Section 01700.

- C. Only one certificate of substantial completion will be issued for this project. The date of the Certificate of Substantial Completion will be the starting date for the warranty for the entire project and all equipment.

END OF SECTION

SECTION 01670

SUBSTITUTIONS AND PRODUCT OPTIONS

PART 1 - GENERAL

1.01 DESCRIPTION

A. General

1. This section covers furnishing of all labor, materials, tools, equipment, and performing all work and services for furnishing, submission, processing and handling of requests for substitution and product options. See items as indicated on drawings and as specified. Any substitution or option shall be in accord with provisions of Contract Documents, and completely coordinated with work of other trades.
2. Although such work is not specifically indicated, furnish all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
3. See appropriate sections for specific items specified. See General Conditions for additional information.

B. Procedure

1. For equipment and materials which are listed in the proposal, observe procedures outlined in Information for Bidders.
2. For products, equipment, and materials which are named in drawings or specifications for which a request for substitution is made, observe procedures outlined in these specifications.

- C. Costs: Cost incurred by requester in providing information, catalogs, and samples - including but not limited to labor, materials, freight postage, and transportation - are sole cost of "Requestor" with no cost assessed Owner or Engineer.

1.02 REQUESTS FOR SUBSTITUTION - GENERAL

- A. Base all bids on materials, equipment and procedures specified.
- B. Certain types of equipment and kinds of material are described in specifications by means of trade names and catalog numbers and/or manufacturer's names. Where this occurs, it was not intended to exclude from consideration such types of equipment and kinds of material bearing other trade names, catalog numbers and/or manufacturer's names, capable of accomplishing purpose of types of equipment or kinds of material specifically indicated.
- C. Other types of equipment and kinds of material may be acceptable to Owner and Engineer.
- D. Types of equipment, kinds of material and methods of construction, if not specifically indicated must be approved in writing by Engineer and be agreed upon by Owner.

- E. Conditional bids will not be accepted.

1.03 SUBMISSION OF REQUESTS FOR SUBSTITUTION

- A. Within no more than 30 days after award of the Contract, the Engineer will consider requests for substitutions of products, materials, systems or other items. Requests must be received by Engineer within 30 calendar days after the date of Contract award. All requests for substitution shall be completed as specified below.
- B. Substitute items must comply with color and pattern of base specified items unless specifically approved otherwise.
- C. Submit two (2) copies of request for substitution. Include in request:
 - 1. Name of product located by Drawing No. or Specification No., followed by a detail or line number the particular item(s) for which request for substitution is initiated.
 - 2. Complete data substantiating compliance of proposed substitution with Contract Documents.
 - 3. For products:
 - a. Product identification by schedule or tag no., including manufacturer's name.
 - b. Manufacturer's literature, marked to indicate specific model, type, size, and options to be considered:
 - 1) Product Description
 - 2) Performance and test data
 - 3) Reference standards
 - 4) Difference in power demand
 - 5) Dimensional differences for specified unit
 - c. Submit samples, full size if so required. Engineer reserves right to impound sample until physical units are installed on project for comparison purposes. All costs of furnishing and return of samples shall be paid by requester. Engineer is not responsible for loss of or damage to samples.
 - d. Name and address of similar projects on which product was used, date of installation, and field performance data on installation.
 - 4. For construction methods:
 - a. Detailed description of proposed method.
 - b. Drawings illustrating methods.
 - 5. Itemized comparison of proposed substitution with product or method specified.
 - 6. Data relating to changes in construction schedule.

7. Accurate cost data on proposed substitution in comparison with product or method specified.
 8. Include with any request a specific statement defining changes in contract time or amount.
- D. In making request for substitution, or in using an approved substitute item, Supplier/Manufacturer represents:
1. He has personally investigated proposed product or method, and has determined that it is equal or superior in all respects to that specified, and that it will perform function for which it is intended.
 2. Will provide same or better warranty for substitute item as for product or method specified.
 3. Will coordinate installation of accepted substitution into work, to include but not be limited to the following:
 - a. Building and structure modifications as necessary;
 - b. Additional ancillary equipment to accommodate change;
 - c. Piping, valving, mechanical, electrical, or instrumentation changes; and,
 - d. All other changes required for work to be complete in all respects to permit incorporation of substitution into project.
 4. Waives all claims for additional costs related to substitution which subsequently become apparent.
- E. Written acceptance or rejection of items presented for alternative consideration will be given within two weeks after request is received.
- F. In the event the acceptance of an alternate results in a change in contract price or time, or is a deviation from the Contract Documents, a change order will be issued to reflect such change. In the event the acceptance of an alternate does not result in a change in Contract price or time, a field order shall be issued.
- G. Alternates may be rejected for the following reasons:
1. Acceptance will require substantial revision of Contract Documents or building spaces.
 2. If they are in Engineer's opinion, not equal to base product specified, or will not adequately perform function for which intended.
 3. If request is not initiated by the Contractor in accordance with this specification section.

1.04 SUBSTITUTION DUE TO UNAVAILABILITY

- A. Unavailability of specified item due to strikes, lockouts, bankruptcy, discontinuance of production, proven shortage, or similar occurrences are reasons for substitution

after Contract award.

- B. Notify Engineer in writing, as soon as condition of unavailability becomes apparent; include substantiating data. Submit request for substitution sufficiently in advance to avoid delays.
- C. Submit data as required in paragraph 1.3 above.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01720
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Maintain at the site of work for the Owner one record copy of the following documents:

1. Drawings
2. Specifications
3. Addenda
4. Change Orders and other Modifications to the Contract
5. Engineer's Field Orders or written instructions
6. Approved Shop Drawings, Working Drawings and Samples
7. Field Test Records
8. Construction Photographs on digital mass storage (USB)
9. Detailed progress schedule, in color, minimum 24" x 36" in size

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Store documents and samples in Contractor's field office or other Owner-approved location, apart from documents used for construction.

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

B. File documents and samples in accordance with CSI format.

C. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.

D. Make documents and samples available at all times for inspection by the Engineer.

E. As a pre-requisite for monthly progress payments, the Contractor is to exhibit the currently updated "record documents" for review by the Engineer and Owner.

1.03 MARKING DEVICES

A. Provide felt tip marking pens for recording information in the color code designated by the Engineer.

1.04 RECORDING

- A. Label each document "PROJECT RECORD" in neat large printed letters.
- B. Record information concurrently with construction progress.
 - 1. Do not conceal any work until required information is recorded.
- C. Drawings: Legibly mark to record actual construction:
 - 1. Depths of various elements of foundation in relation to finish first floor datum.
 - 2. Denote all underground piping elevations and dimensions; all changes to piping location; horizontal and vertical locations of underground utilities and appurtenances, all referenced to permanent surface improvements. Actual installed pipe material, class, etc.
 - 3. Locations of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
 - 4. Field changes of dimension and detail.
 - 5. Changes made by Field Order or by Change Order.
 - 6. Details not on original Contract Documents.
 - 7. Equipment and piping relocations.
 - 8. Major architectural and structural changes including relocation of doors, windows, etc.
 - 9. Architectural schedule changes according to Contractor's records and shop drawings.
- D. Specifications and Addenda; legibly mark each Section to record:
 - 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
 - 2. Changes made by Field Order or by Change Order.
- E. Shop Drawings (after final review and approval):
 - 1. Three (3) sets of record drawings for each piece of process equipment, piping, electrical and instrumentation system.
 - 2. Complete electronic copy of the record drawings, including AutoCAD and Adobe pdf formats.

1.05 SUBMITTAL

- A. At contract close-out, deliver Record Documents to the Engineer for the Owner.
- B. Accompany submittal with 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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END SECTION

SUBSURFACE INVESTIGATION

PART 1. GENERAL

- 1.1. SCOPE: The Contractor shall be responsible for having determined to his satisfaction, prior to the submission of his bid, the nature and location of the work, the ground conformation, the character and quality of the substrata, the types and quantity of materials to be encountered, the nature of the groundwater conditions, the character of equipment and facilities needed preliminary to and during the prosecution of the work, the general and local conditions and all other matters which can, in any way affect the work under this Contract. The prices established for the work to be done will reflect all costs pertaining to the work described above.
- 1.2. DEFINITIONS: Substrata - a layer of earth beneath the surface soil.

PART 2. PRODUCTS (Not Applicable)

PART 3. EXECUTION

- 3.1. EXAMINATION: The Contractor will notify the Engineer promptly in writing of any subsurface or adverse physical conditions at the site which differ materially from those that may be indicated by the Contract Documents or earlier subsurface information. The Engineer will promptly investigate the conditions and advise the Contractor in writing if further surveys or subsurface tests are necessary. The Owner will promptly obtain the necessary additional surveys and tests and furnish copies to the Contractor. If the Owner finds the results of such surveys or tests indicate subsurface or physical conditions differing significantly from those indicated by the Contract Documents or earlier subsurface information, a Change Order shall be issued incorporating the necessary revisions.
- 3.2. PREPARATION: Soils testing information when available will be furnished to Bidders so that Bidders have access to identical subsurface information.

END OF SECTION

02090

WASTE MATERIAL DISPOSAL

PART 1. GENERAL

- 1.1. SCOPE: The Contractor shall remove and dispose of all debris and excess spoil resulting from clearings, demolition and excavation operations. Natural waterways or bodies of water shall not be used for disposal of debris.
- 1.2. DELIVERY, STORAGE, HANDLING, & ENVIRONMENTAL REQUIREMENTS: All debris shall be disposed of at a site approved and permitted by the state for such disposal. Clean spoil may be disposed on private property only with written authorization of the Owner.

PART 2. PRODUCTS

2.1. QUALITY CONTROL: Burning of brush or debris may be permitted subject to the Contractor's securing permits and providing such fire watch and notification of local fire companies as may be required by local law or ordinance. Such permits, however, shall not relieve the Contractor of his responsibilities or liabilities with regard to protecting public health or properties.

PART 3. EXECUTION (Not Applicable)

END OF SECTION

02100
SITE PREPARATION

PART 1. GENERAL

1.1. SCOPE: The work area shall be cleared of all obstructions and vegetation within the limits required for proper execution of the work in accordance with the Contract Documents to a depth of 12 inches, except as directed in environmentally sensitive areas. Selective clearing shall also be conducted for other areas. Shrubs and trees will be relocated wherever feasible, except in environmentally sensitive areas.

1.2. DEFINITIONS: Selective Clearing - includes the removal of underbrush and vegetation from the work site, removal of or cutting off of stumps below finished grade lines and harrowing or otherwise working the ground as necessary to prepare it for grassing and for landscape planting.

PART 2. PRODUCTS

2.1. MATERIALS: Tree wound paint shall be one of the following approved products:

A.	Ortho Company	-	Pruning Paint
B.	Buhl Chemical Co.	-	B&B Protective Pruning Paint
C.	Ferti-lome Co.	-	Pruning Paint (brush) or Pruning Sealant (spray)

PART 3. EXECUTION

3.1. PREPARATION: Trees, stumps, and large roots within the area outlined in the scope shall be removed, unless otherwise directed. Trees more than 12 feet from building lines shall be preserved in their natural state, unless their removal is directed. Selective clearing shall be conducted within the limits shown for all areas not requiring clearing and grubbing. Trees with trunk diameters in excess of four inches shall be preserved unless:

- A. their removal is directed;
- B. they are located within 12 feet of new structure lines;
- C. they are located within areas scheduled to be paved; or
- D. they interfere with utility or pipe trench alignment.

Shrubbery, trees and plants shall be protected as required by the Owner. Where necessary to remove plantings in order to accomplish the work, such shrubbery shall be replaced. Trees will be transplanted when feasible, and when a successful transplant is probable. Shrubbery and trees shall be replaced before the work is accepted.

3.2. INSTALLATION: Foliage, trunks and roots of trees to remain shall be safeguarded by encircling with stakes and flagging at a distance equal to the branch spread. Stockpiling of materials and movement equipment shall be avoided within this area. Interfering branches shall be removed without injury to trunks. Scars shall be covered with tree wound paint as specified under Materials.

3.3. MAINTENANCE: Newly planted trees and shrubs will be kept well watered and shall be alive, healthy and vigorous at the time of acceptance of the project by the Owner, or shall be replaced. Trees will be braced or tied to resist wind conditions until they have taken root.

END OF SECTION

SECTION 02101

EROSION AND SILTATION CONTROL

PART 1 - GENERAL

1.01 SCOPE

The following controls will be enforced for the purposes of preventing soil loss and sediment deposition to adjacent properties, wetlands and other environmentally sensitive areas. Sod or staked straw bale diversions, interceptor ditches or other approved control measures are to be placed as shown on the plans prior to or as the first step in excavation. Failure to comply with these requirements may result in the issuance of a "STOP WORK ORDER".

Whether otherwise shown on the plans or not, the Contractor shall be responsible for providing adequate protection to eliminate contamination of drainage retention ponds, drainage swales, culverts, streams, canals, lakes, and other impoundments by oil, fuels, bitumen, calcium chloride and other harmful materials, as well as the transport of sediments from erosion. He shall take positive steps to minimize erosion and resultant siltation.

Where air pollution is a factor, contractor shall water the area and construction areas to alleviate fugitive particulate emissions.

Where soil or other materials from the work area have been allowed, for whatever reason, to enter private lands, roads or streams, the Contractor shall remove the materials and repair any damage to the public facility.

PART 2 - PRODUCTS

Hay Bales - Baled hay, straw or mulch of rectangular proportion and not exceeding the dimensions of 2.4 Ft. x 6 Ft. x 2 Ft.

Silt Screen - Non-corrosive flexible membrane, netting or screening designed and manufactured for the purpose of screening silts, soils and floating debris.

PART 3 - EXECUTION

- A. Contractor shall install prior to commencing construction, erosion and siltation control systems.
- B. Erosion and Siltation Control Systems shall be maintained for the duration of construction activities and for a period of time until a good stand of grass or soil stabilization has taken place.
- C. Contractor shall be responsible for removing silt screens and related items following approval by the Engineer.

END OF SECTION

02110

SITE CLEARING

PART 1. GENERAL

- 1.1. SCOPE: Clearing shall be conducted to the limits required for the proper execution of the work in accordance with the Contract Documents.
- 1.2. QUALITY ASSURANCE: Clearing operations shall conform to the requirements of Section 110, DOT Standard Specifications, latest edition.

PART 2. PRODUCTS (Not Applicable)

PART 3. EXECUTION

3.1. INSTALLATION: Surface vegetation and organic material including topsoil shall be stockpiled for future use. Stumps and roots shall be removed to a depth of at least one foot, to protect new facilities from settlement caused by decay of organic material. All organic and other unsuitable materials shall be removed from the site and properly disposed of by the Contractor, at his expense.

END OF SECTION

02140

DEWATERING

PART 1. GENERAL

- 1.1. SCOPE: If subsurface water is encountered in trenching or structural excavation work, the Contractor shall provide a system to adequately dewater the excavation.

1.2. SUBMITTALS:

1.2.1. Shop Drawings: Prior to starting dewatering activities, the Contractor shall submit a plan of operation to the Engineer for review and comment. This plan shall address the scope of work, disposal of water and schedule. Work shall not begin until the method of dewatering has been reviewed and all materials and equipment are on hand. The Contractor shall comply with all applicable permit conditions governing these activities.

PART 2. PRODUCTS

(Not Applicable) PART 3.

EXECUTION

- 3.1. INSTALLATION: The Contractor shall provide all necessary pumps, underdrains, well points, sumps and other means for adequately removing water from excavations. Groundwater levels shall be maintained at a level of two (2) feet, minimum, below the bottom of the excavation until backfilling is complete.
- 3.1.1. All water collected and pumped shall be disposed of in a manner which will cause no health hazard, flooding or nuisance to the surrounding waters or violate any environmental ordinances or requirements. The Contractor shall anticipate the need to extend discharge headers to upland areas, as required by regulatory mandate, and have sufficient pipe ($\pm$ 1500 ft) to convey water to such locations, at no additional cost to the owner.

END OF SECTION

02210

GRADING - ROUGH

PART 1. GENERAL

1.1. SCOPE: Upon completion of clearing and grubbing operations, the Contractor shall rough grade the work sites.

PART 2. PRODUCTS (Not Applicable)

PART 3. EXECUTION

3.1. INSTALLATION: Where required, temporary access roads for trucks, equipment and storage areas shall be prepared. Sites shall be brought to as near finish grade as is practical.

END OF SECTION

02211

GRADING - FINISH

PART 1. GENERAL

1.1. SCOPE: Areas within the limits of work shall be graded to the elevations indicated on the construction drawings.

PART 2. PRODUCTS

(Not Applicable) PART 3.

EXECUTION

3.1. INSTALLATION: Finished grade shall be sloped away from structures. The areas so graded shall be left free of trash, rocks, rubbish and clods. Materials required for filling shall be obtained from the excavated areas whenever possible. Fill material required in addition to that available from the excavated areas shall be furnished by the Contractor from satisfactory sources to the Owner or his representative. The Contractor shall make adjustments to manhole covers, valve boxes, grates, etc., as required to match finished grade.

END OF SECTION

GRADING - FINISH, GRASSING AND LAWNS

PART 1 GENERAL

1.1. SCOPE: This section covers the work necessary for the finish grading, grassing and lawn establishment, complete, including furnishing and delivery of material, and maintenance of lawns and grass. Areas which require grassing by seeding, and/or sodding include all damaged areas caused by construction and those areas noted on the Drawings.

1.2. SUBMITTALS:

1.2.1. Shop drawings: Within 20 calendar days of the date specified for commencement of work, submit to the Engineer a proposed time schedule indicating dates for beginning and completion of material delivery, planting and maintenance.

1.2.2. Warranties: If, at the end of the 4 week lawn maintenance period, a satisfactory stand of lawn or grass has not been produced, the Contractor shall renovate and resod the lawn or grass or unsatisfactory portions thereof immediately. A satisfactory stand is defined as a lawn or grass or section of that has:

- A. No bare spots larger than 3 square feet
- B. Not more than 10 percent of total area with bare spots larger than 1 square foot
- C. Not more than 15 percent of total area with bare spots larger than 6 inches square

PART 2 PRODUCTS:

2.1. MATERIALS:

2.1.1. Topsoil: Topsoil is to be separated during trench excavation and stockpiled on the site. If more topsoil is needed than has been stockpiled, supply imported topsoil at no additional cost to the Owner.

2.1.2. Imported Topsoil: Imported topsoil shall be a natural, friable soil, representative of productive soils in the vicinity. It shall be obtained from well-drained areas, free from admixture of subsoil and foreign matter, and objects larger than 2 inches in diameter, toxic substances, and any other deleterious material which may be harmful to plant growth and be a hindrance to grading, planting, and maintenance operations.

2.1.3. Fertilizer: Fertilizer shall be a complete plant food containing 16 percent nitrogen, 4 percent available phosphoric acid, and 8 percent potash, conforming to applicable state fertilizer laws, availability of plant nutrients conforming to standards of the AOAC, uniform in composition, dry, free-flowing, and delivered in original, unopened containers bearing manufacturer's guaranteed analysis of a minimum 40 percent of nitrogen from organic sources.

2.1.4. Sand: Clean, coarse, well-graded material meeting all of the requirements of ASTM C 33 for fine aggregate.

2.1.5. Soil Sterilant: Granular calcium cyanimid, as manufactured for use as a herbicide by the American Cyanimid Company.

2.1.6. Seed: Certified, blue tag, clean, delivered in original, unopened packages and bearing an analysis of the contents, guaranteed 95 percent pure and to have a minimum germination rate of 85

percent, within 1 year of test.

2.8. QUALITY CONTROL:

2.8.1. Inspections: Four weeks after the start of maintenance on the last section of completed lawn, and on written notice from the Contractor, the Engineer will, within 15 days of such written notice, make an inspection to determine if a satisfactory stand has been produced. If a satisfactory stand has not been established, another inspection will be made after written notice from the Contractor that the lawn is ready for inspection.

PART 3 EXECUTION

3.1. PREPARATION:

3.1.1. Delivery: Deliver sod immediately on lifting and after lawn bed is prepared for planting. Deliver sprigs on the same day that they are cut from established grass and after lawn area is prepared for planting. Give advance notice to Engineer of days on which deliveries of sod will be made.

3.1.2. Protection: Protect sod from drying by covering during delivery to protect from sun and wind and keeping sod moist until it is laid.

3.1.3. Storage: Store materials only in areas of site designated. If sod is not laid within 2 days of delivery, spread out flat with grass side up in cool place and keep moist. Rolled or stacked sod that becomes yellow will not be accepted.

3.2. INSTALLATION:

3.2.1. Methods:

3.2.1.1. If sod is to be reused, lift sod and stockpile; if sod is not to be reused, remove sod. Remove topsoil and stockpile. Remove subsoil and stockpile

3.2.1.2. Preparation of Subgrade: After construction has been properly completed, backfill with stockpiled subsoil and rough grade. Thoroughly scarify ground to a minimum depth of 8 inches.

3.2.1.3. Spreading of Topsoil: Spread stockpiled topsoil over the prepared rough grade using a rubber-tired tractor with grader blade or equivalent not weighing more than 3-1/2 tons.

3.2.1.4. Finish Grading: Thoroughly mix the applied topsoil to a depth of 8 inches by running a rototiller over the entire area in two directions at right angles. Rake the topsoiled area to a uniform grade so that all areas drain. Lightly compact with a cultipacker before laying sod. Remove all trash and stones exceeding 2 inches in diameter from area to a depth of 2-inches prior to preparation and planting grass.

3.2.2. Guidelines:

3.2.2.1. Seeding: Conduct seeding under favorable weather conditions during seasons which are normal for such work as determined by accepted practice in locality of project. Method of seeding may be varied at discretion of Contractor on his own responsibility to establish a smooth, uniformly grassed area.

3.2.2.2. Sodding: Before sod is laid, correct soft spots and inequalities in grade of prepared bed. Lay so that no voids occur and tamp or roll, brush or rake screened topsoil with no lumps or stones larger than 3/4 inch over sodded area, water sod thoroughly. Complete sod surface true to finished grade, even, firm, and match existing sod. Top dress sod with a 1/4-inch layer of topsoil. Hand rake this topsoil to provide a

smooth and uniform layer and water thoroughly.

3.3. MAINTENANCE:

3.3.1. Maintenance Period: Begin maintenance immediately after each portion of lawn and grass is planted and continue for 4 weeks after all lawn planting is completed.

3.3.2. Maintenance Period: Water to keep surface soil moist. Repair washed out areas by filling with topsoil, fertilizing, and sodding. Mow to 2-inches after grass reaches 3-inches in height, and mow frequently enough to keep grass from exceeding 3-1/2 inches. Weed by local spot application of selective herbicide only after first planting season when grass is established.

END OF SECTION

EXCAVATION, BACKFILLING, AND COMPACTION

PART 1. GENERAL

1.1. SCOPE: The Contractor shall perform all excavation required to the dimensions and depths shown.

1.2. DELIVERY, STORAGE, HANDLING, & ENVIRONMENTAL REQUIREMENTS: The Contractor shall transport and stockpile excess excavation or material deemed to be unsuitable by the Engineer, at locations designated by the Owner or the RPR. Should the Owner not desire to utilize excavated materials, the Contractor shall remove all spoil from the site and dispose of it at a suitable spoil area. Under no circumstances, shall the Contractor dump spoil on private property without the prior written consent of the property owner.

PART 2. PRODUCTS

2.1. MATERIALS: Backfill materials shall be clean earth fill composed of sand, sand and clay, gravel, crushed rock or other materials from Groups A-1, A-2, or A-3, AASHTO Classifications, and shall be free from organic matter and vegetation, debris, large clods of earth or stones and be acceptable to the Owner or his representative.

PART 3. EXECUTION

3.1. EXAMINATION: If in the opinion of the Owner or his representative, unsuitable material is encountered which will not afford an acceptable foundation or pipe bedding, the excavation shall be carried to the depth directed, and refilled with suitable compacted backfill to the satisfaction of the Owner or his representative.

3.2. INSTALLATION: Unless otherwise directed, excavations shall be made by open cut. Banks of excavation shall not be steeper than the angle of repose of the material being excavated. If the available space does not permit this slope, the excavation shall be sheeted and braced or otherwise supported.

All existing structures, utilities, roads and other existing features shall be protected to the maximum extent practicable. Reasonable caution and due care shall be exercised by the Contractor to protect any surrounding right-of-way from excessive disturbance, and in no case shall the Contractor exceed the limits of the right-of-way or enter upon private property without the prior written consent of the property owner.

The Contractor shall provide all necessary pumps, underdrains, well points, sumps and other means for adequately removing water from excavations. Groundwater levels shall be maintained at a level of two (2) feet, minimum, below the bottom of the excavation until backfilling is complete. All water collected and pumped shall be disposed of in a manner which will cause no health hazard, flooding or nuisance to the surrounding area and in a manner so as not to degrade the water quality of surrounding waters or violate any environmental ordinances or requirements.

Unless otherwise indicated on the drawings, compaction shall be done by mechanical compaction equipment to attain a minimum of 95% of maximum density as determined by AASHTO T 180/ASTM D-1557 (Modified Proctor). Compaction under roadways, driveways, curbs, gutters, walks, pipes, structures, etc. shall be to a density of 98% of the maximum density as determined by AASHTO T 180/ASTM D-1557 (Modified Proctor).

3.3. TESTING: Testing of backfill shall be conducted in accordance with the General Requirements.

END OF SECTION

EXCAVATION, BACKFILLING, AND COMPACTION - STRUCTURES

PART 1 GENERAL

- 1.1. SCOPE: Structural excavation shall be carried out to the depths shown on the drawings and, unless specific limits are designated, shall be of sufficient dimensions to permit adequate working room, but shall not exceed the limits of the working area indicated by the drawings.
- 1.2. DEFINITIONS:
- A. Common Fill: Sand that is free from stones, rocks, concrete, rubble, trash, debris, organic, or other deleterious material that is easy to spread and compact. Maximum size shall be ½ inch with no more than 12 percent by weight finer than the U.S. No. 200 mesh sieve.
 - B. Select Fill: Clean granular material, free from trash, debris, organic, or other deleterious material, maximum size ¾ inch, with no more than 5 percent by weight finer than the U.S. No. 200 mesh sieve.
 - C. Structural Fill: Clean hard durable crushed stone or gravel free from trash, debris, organic, or other deleterious material, FDOT Standard Coarse Aggregate Size #57, or equivalent.
- 1.5. SUBMITTALS:
- 1.5.1. Shop drawings: Shop drawings shall include descriptive information as required to fully describe the products, materials, installation, overall performance, and to state deviations from specified requirements. Submittals shall include, but shall not be limited to the following:
- A. Source of supply and sieve analysis for all imported Common, Select, and Structural Fill material.

PART 2 PRODUCTS:

2.1. MATERIALS: The best available materials from the excavation shall be utilized for backfill, if the material is acceptable to the Owner or his representative.

PART 3 EXECUTION

3.1. FOUNDATION PREPARATION:

- 3.1.1. Building and structure areas (plus a 10-foot margin) shall be stripped and cleared of surface vegetation, organic laden topsoil, and grubbed of roots and stumps to a minimum depth of two (2) feet below the final structure elevation.
- 3.1.2. The stripped areas and the shallow cut areas shall be leveled sufficiently to permit equipment traffic. The Contractor shall proof roll the excavated surface with a minimum of 15 overlapping passes, in a crisscross pattern, with a 4-ton or heavier vibratory roller (DYNAPAC CA-25 or equivalent). The vibratory roller shall be capable of exerting a minimum impact force of 36,000 lbs.
- 3.1.3. Unless specified elsewhere the existing subgrade shall be backfilled and compacted with Select

Fill to at least 95% ASTM D-1557 (Modified Proctor) to a depth of one (1) foot below the final structure elevation. The remaining one (1) foot shall be backfilled with Structural Fill and compacted to at least 98% ASTM D-1557 (Modified Proctor) in order to provide a working platform for form work and reinforcing steel.

- 3.2. INSTALLATION: No backfilling around structures shall commence until reviewed by the Owner or his representative. Backfill shall be placed and compacted in layers not exceeding six inches when compacted, and shall be placed around the periphery of the structure so as to raise the level of the backfill uniformly. Allowance for shrinkage and settlement shall be made by backfilling to an elevation above finished grade sufficient to provide for the anticipated settlement. Flooding will be permitted only when the material so used is free draining, and the water table is below the elevation of the fill and remains there during the period of compaction.

END OF SECTION

EXCAVATION, BACKFILLING, AND COMPACTION - UTILITY

PART 1 GENERAL

1.1. SCOPE: This section covers general provisions for trench excavation, backfilling, and compaction excluding pipe zone requirements specific to individual pipe materials, types, and configurations. Trenching shall be conducted to the limits and grades shown on the drawings.

1.2. DEFINITIONS:

1.2.1. Pipe Zone: The pipe zone shall include the full width of the trench from the bottom of the pipe to a point 12 inches above the top of the pipe barrel.

1.2.2. Unsuitable Trench Foundation Material: Native material found at the proposed elevation of the pipe bed or trench bottom which, in the opinion of the owner's representative, would not make a good foundation for the proposed pipeline. Examples of unsuitable foundation material might include continuous rock, boulders, muck, organic materials, etc.

1.2.3. Unsuitable Trench Backfill Material: Excavated or imported material, material found at trench side which, in the opinion of the owner's representative, would not make good backfill material in or above the pipe zone. Examples of unsuitable backfill material might include clay, rock, muck, organic material, etc.

1.2.4. Suitable Foundation or Backfill Material: Clean sand, #57 rock, or other compactable material that will not cause injury to the pipe yet provide a good foundation for the pipe or above ground use of the trench.

1.2.5. Continuous Rock: Rock encountered during trench excavation and backfill, excluding loose rock and boulders, which cannot be removed with the trenching equipment on hand at the job site.

PART 2 PRODUCTS:

2.1. QUALITY CONTROL:

2.1.1. Inspections: Backfilling of trenches shall not proceed until consent has been granted by the Owner or his representative and he has had the opportunity to conduct whatever inspections and testing he deems to be necessary. Any work which has been concealed without the knowledge and consent of the Owner or his representative shall be uncovered for inspection and testing at no cost to the Owner. The Contractor may partially backfill sufficient to restrain the pipe during testing, but shall not conceal any joints in so doing.

PART 3 EXECUTION

3.1. INSTALLATION:

3.3.1. Guidelines:

3.3.1.1. Mechanical excavation shall be terminated slightly above the pipe bed and the trench bottom shaped so as to provide uniform bearing on the barrel of the pipe. Particular care shall be taken to recess the bottom of the trench at the bell of the pipe to relieve the bell of all load. An appropriate trench width shall be maintained, allowing room for the joining and proper backfilling of the pipe, as shown on the

drawing(s). In the event the Contractor excavates below the elevation required without approval, he shall backfill with selected sand or gravel and compact to obtain a suitable pipe bedding, all to the satisfaction of the RPR and at his own expense, since no additional payment will be made for trench excavations exceeding approved limits.

3.3.1.2. Where sheeting and bracing is installed for purposes of convenience to the Contractor or for reasons of safety, the sheeting shall be cut off at a level of one (1) foot above the top of the installed pipe and left in place, so as not to disturb the bedding or alignment of the pipe.

3.3.1.3. Trenches shall not be excavated in excess of 100 feet ahead of pipe laying operations without prior review of the Owner or his representative. Backfilling shall be kept as close to the pipe laying as is feasible, in keeping with good construction practices, but no work shall be covered without affording the opportunity for the Owner, or his representative, to observe the work in place.

3.3.1.4. Backfill shall be carefully placed and compacted around the pipe. Materials shall be lowered into the trench to within two feet above the top of the pipe before allowing it to fall on the pipe, unless using approved chutes or other devices which will protect the pipe from the impact of falling materials. The initial backfill shall utilize the best available materials from the excavation, if approved. Up to the pipe centerline backfill shall be placed in layers not to exceed six inches, compacted thickness, for the full width of the trench. These lifts shall be mechanically tamped, or compacted by other approved means to produce the density required elsewhere in these specifications. From the pipe centerline to the final grade of the trench, backfilling methods shall be dependent upon the location of the trench. Compaction under roadways, curbs, gutters, walks, pipes, structures, etc. shall be to a density of 100% of maximum density as determined by AASHTO T 180/ASTM D-1557 (Modified Proctor). In open areas, not subject to vehicular traffic, backfill shall be placed and compacted to a density approximately equal to the soil adjacent to the pipe trench.

3.3.1.5. Where limits cannot be maintained because of requirements of safety for workmen, trenches shall be properly sheeted and braced, shored or otherwise protected, but in no case shall the width exceed the limits shown on the drawings up to a point twelve inches above the top of the pipe. No additional payment will be made for sheeting and shoring except where specifically called for and when properly installed and left in place.

3.3.1.6. Dewatering operations shall be maintained until pipe laying is complete and the trench backfilled sufficiently to prevent movement or flotation of the pipe. No additional payment will be considered for costs incurred for stabilization of trench foundations, where foundations have been rendered unsuitable as a result of construction methods, such as inadequate water control or insufficient sheeting, bracing or other causes. In no case, shall pipe be installed where, in the opinion of the Owner or his representative, such conditions exist and the Contractor shall correct such conditions to provide proper bedding and foundations at no additional cost to the Owner.

3.3.1.7. Payment for removal and replacement of unsuitable material shall be a part of the appropriate payment item found in the proposal (unit price, lump sum, etc.).

END OF SECTION

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EXCAVATION, BACKFILLING, AND COMPACTION - PAVEMENT

PART 1. GENERAL

- 1.1. SCOPE: Upon completion of clearing operations, relocation of any utilities and installation of new utilities interfering with the roadway construction by the respective utility owners, plus installation of other interfering structures, excavation of the roadway and any parking areas to the lines and grades of the subgrade may be performed. Existing material removed shall be temporarily stockpiled for subsequent use on the project unless deemed by the Engineer to be unsuitable. Suitable material shall be used in filling and forming shoulders, embankments, swales, etc. and shall not be removed from the project site until authorized by the Owner. The extent of excavation and grading shall be as indicated on the drawings and shall include excavation and/or filling and grading together with the removal of trees, shrubs, existing asphalt, concrete or other material as required to facilitate construction and restoration as directed by the Owner.
- 1.2. QUALITY ASSURANCE: Work shall conform to the requirements of Section 120, DOT Standard Specifications as supplemented or modified herein.

The subgrade shall be graded to the configuration, crown and elevations required by the drawings, and need not be removed, replaced or stabilized if it meets the required degree of compaction as specified elsewhere. Proof rolling shall be carried out on the subgrade after grading, for a minimum of eight (8) complete coverages and until the required compaction is achieved, as measured at a depth of 12 inches below subgrade.

PART 3. EXECUTION

3.1. INSTALLATION: The base construction shall proceed as outlined in the Paving related portions of these contract documents.

END OF SECTION

WALK, ROAD, AND PARKING PAVING

PART 1. GENERAL

- 1.1. SCOPE: Paving shall be installed/replaced to the lines, grades and thickness shown on the drawings.
- 1.2. QUALITY ASSURANCE: The applicable standard referred to is the Standard Specification for Road and Bridge Construction of the Florida Department of Transportation, 1986, Supplemental Specifications to the Standard Specifications, 1986, or latest revision.

PART 2. PRODUCTS

2.1. MATERIALS

- 2.1.1. Road and Parking Area Base: Base materials shall consist of one of the following types of materials as shown on the drawings and meeting the following requirements:
 - A. Stabilized Materials: Shall conform to all applicable requirements of DOT Standard Specifications, Section 160-4, 914-2, and 914-4.
 - B. Shell: Shall conform to all applicable requirements of DOT Standard Specifications, Section 913.
 - C. Soil-Cement: Shall conform to all applicable requirements of DOT Standard Specifications, Section 921 for Portland Cement and Section 923 for water. Portland Cement shall be applied at a rate required to produce a compressive strength at seven (7) days of 300 psi.
 - D. Limerock: Shall conform to all applicable requirements of DOT Standard Specifications, Section 911.
- 2.1.2. Walks: The Concrete shall be 3000 psi, while other materials and workmanship shall conform to applicable requirements of Section 522 of the DOT Standard Specifications.

PART 3. EXECUTION

- 3.1. PREPARATION: At locations indicated on the drawings or at the direction of the Owner or his representative, the materials on existing roadways in conjunction with or adjoining proposed paving or resurfacing under this Contract shall be scarified and completely remixed to a minimum depth of six (6) inches after removal of existing asphalt. After mixing, the material shall be reshaped to required contour, watered, and compacted to ninety-eight percent (98%) of maximum density at optimum moisture as determined by AASHTO T 180/ASTM D-1557 (Modified Proctor).
- 3.2. INSTALLATION: The base shall be constructed to the configuration, crown and elevations required to produce the finished surface as indicated on the drawings. Construction methods shall conform to all applicable requirements of Section 200,

210, 230, 250, 260, and 270 of the DOT Standard Specifications as supplemented by these Specifications. Compaction shall be carried out to a density of 98% of the maximum density as determined by AASHTO T 180/ASTM D-1557 (Modified Proctor). The base course shall be finished by blading, or with automated equipment designed for this purpose, and rolled with a steel-wheeled roller. Thin layers of fine materials shall not be applied to the top of the base course to meet grade requirements.

- 3.2.1. Prime and Tack Coats: Materials and construction methods shall conform to DOT Standard Specifications, Section 300-1 through 300-8.
- 3.2.2. Leveling Course: Where required by the Owner, a leveling course shall be applied. Construction material and workmanship shall conform to applicable requirements of Section 330 of the DOT Standard Specifications.
- 3.2.3. Surface Treatment: Double or triple surface treatment shall be applied as shown on the drawings or as directed by the Owner. All materials and workmanship shall conform to applicable requirements of Section 330 of the DOT Standard Specifications.

END OF SECTION

WALK, ROAD, AND PARKING PAVING - ASPHALT CONCRETE

PART 1 GENERAL

- 1.1. SCOPE: The extent of work includes all construction necessary for asphalt concrete roads, parking areas, and playcourts including preparation of subgrade, base construction, asphalt paving and pavement striping as shown on the drawings.
- 1.2. DESIGN REQUIREMENTS:
 - A. Subgrade: Shape subgrade to the proper grades and cross section shown on the drawings. Compact as shown on the drawings. Stabilization, where required shall comply with the FDOT Standard Specifications, Section 914 for Type B or Type C stabilization.
 - B. Base Course: Construct the base course at the locations and to the grades and cross sections shown on the Drawings. Materials and workmanship for the limerock base course shall be in strict conformance with the applicable requirements of the FDOT Standard Specifications Section 200 for construction methods; Section 911 for materials.
 - C. Surface Course: Checking for surface irregularities and elevations shall be done by template or with surveyor's instrument. Materials, equipment, methods of placement and other requirements shall conform to the applicable requirements of the FDOT Standard Specifications as follows:
 1. Plant, Methods and Equipment - Section 320 General
 2. Construction Requirements - Section 330
 3. Type S Asphaltic Concrete - Section 331
 - D. Striping: Striping shall be provided in parking areas as shown on the drawings. Road striping shall be applied in accordance with USDOT Manual on Uniform Traffic Control Devices, FDOT and local ordinances and requirements. Materials shall comply with FDOT Standard Specifications, Section 711.
- 1.3. SUBMITTALS:
 - A. Shop drawings: Shop drawings shall include descriptive information as required to fully describe the products, materials, installation, overall performance, and to state deviations from specified requirements. Submittals shall include, but shall not be limited to the following:
 - B. Material Certificates: Provide copies of all materials certificates of compliance and delivery tickets for subgrade, base course, and surface course materials indicating tonnages of each load, temperature and other information required by FDOT.
 - C. Product Data: Provide manufacturer's product data and installation instructions for prime coat, tack coat, lane marking compound, and wheel stops, etc.
 - D.

PART 2 PRODUCTS:

2.1. MATERIALS:

- A. General: Use locally available materials and gradations which exhibit a satisfactory record of previous installations.
- B. Base Course Aggregate: Sound, angular crushed stone, crushed gravel, or crushed slag, sand, stone or slag screenings.
- C. Surface Course Aggregate: Crushed stone, crushed gravel, crushed slag, and sharp-edged natural sand.
 - 1. Sand prepared from stone, blast-furnace slag, or gravel, or combinations thereof may be used if required to suit local material availability.
- D. Mineral Filler: Rock or slag dust, hydraulic cement, or other inert material complying with AASHTO M 17 (ASTM D 242).
- E. Asphalt Cement: Comply with AASHTO M 226 (ASTM D 3381).
 - 1. Viscosity Grade: AC-20, AR-80.
- F. Prime Coat: Cut-back asphalt type; AASHTO M 82 (ASTM D 2027) RC-70.
- G. Tack Coat: Emulsified asphalt, AASHTO M 140 (ASTM D 997) or M 208 (D2397), SS-1, diluted with one part water to one part emulsified asphalt or other grades approved by FDOT standard specifications.
- H. Thermoplastic Traffic Stripes and Markings; Thermoplastic Compound (FDOT 711, AASHTO M 249-79). Striping shall be 6-inches wide except for crosswalk striping which shall be 12-inches and Stop Bars which shall be 24-inches. Striping for road shall be as required by FDOT and Pasco County.
 - 1. Color:

Parking Spaces	-	White
Stop Bars	-	White
Handicapped Parking	-	Blue and White
Traffic Lanes	-	White and/or Yellow (As indicated)
- I. Wheel Stops: 2,500-psi compressive strength precast, air-entrained concrete, 6 inches high, 9 inches wide, and 7 feet long. Provide chamfered corners and drainage slots on underside.

2.2. MIXES:

- A. Asphalt/Aggregate Mixture: Provide asphalt concrete mix conforming to FDOT Standard Specifications.

PART 3 EXECUTION

3.1. SUBGRADE PREPARATION:

- A. Shape subgrade to the proper grades and cross section shown and proof-roll with at least

10 overlapping passes using a vibratory roller weighing not less than 5 tons, or other suitable equipment of a type approved by the Owner's Representative. As the rolling of the subgrade proceeds, dig out and replace all soft or spongy areas. Stabilize as necessary. Compact subgrade as shown on the drawings. Dispose of excess materials resulting from the road grading as directed. Do not use rollers adjacent to structures where such use may cause damage. Where the roadbed abuts the structure and compaction with a roller is not possible for practicable reasons, compact the area with pneumatic tampers or other approved equipment. No new materials shall be added to any portion of the roadbed until proof-rolling and all preparation work has been satisfactorily completed by the Contractor and approved by the Owner's Representative.

- B. Remove loose material from compacted subgrade surface immediately before applying herbicide treatment or prime coat.

3.2. BASE COURSE CONSTRUCTION:

- A. Construct the base course to the depths, lines, grades and cross sections shown on the drawings, after satisfactory completion of the subgrade. Compact immediately after mixing or placing. Shape to the required lines, grades and cross sections. Test surface for proper shaping no later than the next day after completing each section.
- B. Prime Coat: Grade RC-70, cut-back asphalt, applied at a rate of 0.15 to 0.20 gal. per sq. yd., or equal parts of Grade SS-1, emulsified asphalt and water applied at a rate of 0.20 to 0.25 gal. per sq. yd. over the completed base course. Apply material to penetrate and seal, but not flood, surface. Maintain and re-prime as necessary to assure good surface for paving.

3.3. ASPHALT CONCRETE PAVING:

- A. General: Place asphalt concrete mixture on prepared surface, spread and strike-off. Spread mixture at minimum temperature of 225 deg. F. (107 deg. C). Place inaccessible and small areas by hand. Place each course to required lines, grades, cross-sections, and compacted thicknesses.
- B. Paver Placing: Place in strips not less than 12-feet wide, unless otherwise acceptable to the Owner's Representative. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for a section before placing surface course.
- C. Joints: Make joints between old and new pavements or between successive day's work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density and smoothness as other sections of asphalt concrete course. Clean contact surfaces and apply tack coat.
- D. Tack Coat: Apply to contact surfaces of previously constructed asphalt or portland cement concrete and surfaces abutting or projecting into asphalt concrete pavement. Distribute at rate of 0.02 to 0.08 gal. per sq. yd. of surface. The rate of application may exceed the upper limit for concrete pavement, which is to be surfaced, if directed by the Owner's Representative.
- E. Rolling:
 - 1. General: Begin rolling when mixture will bear roller weight without excessive

displacement.

2. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
3. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.
4. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.
5. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.
6. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.
7. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
8. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.4. TRAFFIC AND LANE MARKINGS:

- A. Cleaning: Sweep and clean surface to eliminate loose material and dust.
- B. Apply thermoplastic compound with mechanical equipment to produce uniform straight edges. Apply at manufacturer's recommended rates to provide consistent opaque coverage. Protect from disturbance until cured.

3.5. WHEEL STOPS:

- A. General: Secure wheel stops to hot-mixed asphalt surface with not less than two 3/4-inch diameter galvanized steel dowels embedded in precast concrete at 1/3 points. Size length of dowel to penetrate full depth of pavement base.

3.6. FIELD QUALITY CONTROL:

- A. General: Test in-place asphalt concrete courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by the Owner's Representative.
- B. Thickness: In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness:
 1. For pavement of a specified thickness of 2-1/2" or more: 1/2".
 2. For pavement of a specified thickness of less than 2-1/2": 1/4".

- C. Surface Smoothness: Test finished surface of each asphalt concrete course for smoothness, using 15' rolling straightedge applied parallel with, and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness.
 - 1. Wearing Course Surface: 3/16".
- D. Check surface areas at intervals as directed by the Owner's Representative. A 15' manual straightedge shall be furnished by the Contractor and shall be available at the job site at all times during the paving operation for checking joints and surface irregularities.
- E. Contractor shall provide sufficient notice to the Owner's Representative prior to covering up any work which may require testing to confirm compliance with these Contract Documents.

END OF SECTION

BITUMINOUS CONCRETE PAVEMENT

PART 1. GENERAL

- 1.1. SCOPE: Bituminous (asphaltic) concrete pavement shall be constructed of the type and thickness shown on the drawings.
- 1.2. QUALITY ASSURANCE: Checking for surface irregularities and elevation shall be done by template or with surveyor's instrument. Materials, equipment, methods of placement and other requirements shall conform to the applicable requirements of the DOT Standard Specifications as follows:

Plant, Methods and Equipment -
Section 320 General Construction
Requirements - Section 330 Type
S-I or S-II Asphaltic Concrete -
Section 331 Type II Asphaltic
Concrete - Section 332

PART 2. PRODUCTS

- 2.1. MIXES: Unless specified elsewhere, all asphaltic concrete shall be Type S-1 mix with a minimum batch plant temperature of 270 degrees F and a maximum batch plant temperature of 300 degrees F (temperatures in the lower range of said limits are preferred), and shall have a minimum stability of two thousand pounds as determined by the Marshall Test (ASTM D-1559).
- 2.2. QUALITY CONTROL: The Contractor shall submit to the Owner in writing the proposed asphalt mixes with supporting independent laboratory design/test data. Attention is directed to the provisions of Section 331-5 of the DOT Standard Specifications which outline the procedure for acceptance of job mix formulas. The submitted formula should be derived, or approved, by the testing laboratory accepted by the Owner to make tests on the project. Costs for such job mix formulation will be paid by the Owner directly to the testing laboratory.

PART 3. EXECUTION (Not Applicable)

END OF SECTION

EXCAVATION, BACKFILLING, AND COMPACTION

PART 1. GENERAL

1.1. SCOPE: The Contractor shall perform all excavation required to the dimensions and depths shown.

1.2. DELIVERY, STORAGE, HANDLING, & ENVIRONMENTAL REQUIREMENTS: The Contractor shall transport and stockpile excess excavation or material deemed to be unsuitable by the Engineer, at locations designated by the Owner or the RPR. Should the Owner not desire to utilize excavated materials, the Contractor shall remove all spoil from the site and dispose of it at a suitable spoil area. Under no circumstances, shall the Contractor dump spoil on private property without the prior written consent of the property owner.

PART 2. PRODUCTS

2.1. MATERIALS: Backfill materials shall be clean earth fill composed of sand, sand and clay, gravel, crushed rock or other materials from Groups A-1, A-2, or A-3, AASHTO Classifications, and shall be free from organic matter and vegetation, debris, large clods of earth or stones and be acceptable to the Owner or his representative.

PART 3. EXECUTION

3.1. EXAMINATION: If in the opinion of the Owner or his representative, unsuitable material is encountered which will not afford an acceptable foundation or pipe bedding, the excavation shall be carried to the depth directed, and refilled with suitable compacted backfill to the satisfaction of the Owner or his representative.

3.2. INSTALLATION: Unless otherwise directed, excavations shall be made by open cut. Banks of excavation shall not be steeper than the angle of repose of the material being excavated. If the available space does not permit this slope, the excavation shall be sheeted and braced or otherwise supported.

All existing structures, utilities, roads and other existing features shall be protected to the maximum extent practicable. Reasonable caution and due care shall be exercised by the Contractor to protect any surrounding right-of-way from excessive disturbance, and in no case shall the Contractor exceed the limits of the right-of-way or enter upon private property without the prior written consent of the property owner.

The Contractor shall provide all necessary pumps, underdrains, well points, sumps and other means for adequately removing water from excavations. Groundwater levels shall be maintained at a level of two (2) feet, minimum, below the bottom of the excavation until backfilling is complete. All water collected and pumped shall be disposed of in a manner which will cause no health hazard, flooding or nuisance to the surrounding area and in a manner so as not to degrade the water quality of surrounding waters or violate any environmental ordinances or requirements.

Unless otherwise indicated on the drawings, compaction shall be done by mechanical compaction equipment to attain a minimum of 95% of maximum density as determined by AASHTO T 180/ASTM D-1557 (Modified Proctor). Compaction under roadways, driveways, curbs, gutters, walks, pipes, structures, etc. shall be to a density of 98% of the maximum density as determined by AASHTO T 180/ASTM D-1557 (Modified Proctor).

3.3. TESTING: Testing of backfill shall be conducted in accordance with the General Requirements.

END OF SECTION

EXCAVATION, BACKFILLING, AND COMPACTION - STRUCTURES

PART 1 GENERAL

- 1.1. SCOPE: Structural excavation shall be carried out to the depths shown on the drawings and, unless specific limits are designated, shall be of sufficient dimensions to permit adequate working room, but shall not exceed the limits of the working area indicated by the drawings.
- 1.2. DEFINITIONS:
- A. Common Fill: Sand that is free from stones, rocks, concrete, rubble, trash, debris, organic, or other deleterious material that is easy to spread and compact. Maximum size shall be ½ inch with no more than 12 percent by weight finer than the U.S. No. 200 mesh sieve.
 - B. Select Fill: Clean granular material, free from trash, debris, organic, or other deleterious material, maximum size ¾ inch, with no more than 5 percent by weight finer than the U.S. No. 200 mesh sieve.
 - C. Structural Fill: Clean hard durable crushed stone or gravel free from trash, debris, organic, or other deleterious material, FDOT Standard Coarse Aggregate Size #57, or equivalent.
- 1.5. SUBMITTALS:
- 1.5.1. Shop drawings: Shop drawings shall include descriptive information as required to fully describe the products, materials, installation, overall performance, and to state deviations from specified requirements. Submittals shall include, but shall not be limited to the following:
- A. Source of supply and sieve analysis for all imported Common, Select, and Structural Fill material.

PART 2 PRODUCTS:

2.1. MATERIALS: The best available materials from the excavation shall be utilized for backfill, if the material is acceptable to the Owner or his representative.

PART 3 EXECUTION

3.1. FOUNDATION PREPARATION:

- 3.1.1. Building and structure areas (plus a 10-foot margin) shall be stripped and cleared of surface vegetation, organic laden topsoil, and grubbed of roots and stumps to a minimum depth of two (2) feet below the final structure elevation.
- 3.1.2. The stripped areas and the shallow cut areas shall be leveled sufficiently to permit equipment traffic. The Contractor shall proof roll the excavated surface with a minimum of 15 overlapping passes, in a crisscross pattern, with a 4-ton or heavier vibratory roller (DYNAPAC CA-25 or equivalent). The vibratory roller shall be capable of exerting a minimum impact force of 36,000 lbs.
- 3.1.3. Unless specified elsewhere the existing subgrade shall be backfilled and compacted with Select

Fill to at least 95% ASTM D-1557 (Modified Proctor) to a depth of one (1) foot below the final structure elevation. The remaining one (1) foot shall be backfilled with Structural Fill and compacted to at least 98% ASTM D-1557 (Modified Proctor) in order to provide a working platform for form work and reinforcing steel.

- 3.2. INSTALLATION: No backfilling around structures shall commence until reviewed by the Owner or his representative. Backfill shall be placed and compacted in layers not exceeding six inches when compacted, and shall be placed around the periphery of the structure so as to raise the level of the backfill uniformly. Allowance for shrinkage and settlement shall be made by backfilling to an elevation above finished grade sufficient to provide for the anticipated settlement. Flooding will be permitted only when the material so used is free draining, and the water table is below the elevation of the fill and remains there during the period of compaction.

END OF SECTION

EXCAVATION, BACKFILLING, AND COMPACTION - UTILITY

PART 1 GENERAL

1.1. SCOPE: This section covers general provisions for trench excavation, backfilling, and compaction excluding pipe zone requirements specific to individual pipe materials, types, and configurations. Trenching shall be conducted to the limits and grades shown on the drawings.

1.2. DEFINITIONS:

1.2.1. Pipe Zone: The pipe zone shall include the full width of the trench from the bottom of the pipe to a point 12 inches above the top of the pipe barrel.

1.2.2. Unsuitable Trench Foundation Material: Native material found at the proposed elevation of the pipe bed or trench bottom which, in the opinion of the owner's representative, would not make a good foundation for the proposed pipeline. Examples of unsuitable foundation material might include continuous rock, boulders, muck, organic materials, etc.

1.2.3. Unsuitable Trench Backfill Material: Excavated or imported material, material found at trench side which, in the opinion of the owner's representative, would not make good backfill material in or above the pipe zone. Examples of unsuitable backfill material might include clay, rock, muck, organic material, etc.

1.2.4. Suitable Foundation or Backfill Material: Clean sand, #57 rock, or other compactable material that will not cause injury to the pipe yet provide a good foundation for the pipe or above ground use of the trench.

1.2.5. Continuous Rock: Rock encountered during trench excavation and backfill, excluding loose rock and boulders, which cannot be removed with the trenching equipment on hand at the job site.

PART 2 PRODUCTS:

2.1. QUALITY CONTROL:

2.1.1. Inspections: Backfilling of trenches shall not proceed until consent has been granted by the Owner or his representative and he has had the opportunity to conduct whatever inspections and testing he deems to be necessary. Any work which has been concealed without the knowledge and consent of the Owner or his representative shall be uncovered for inspection and testing at no cost to the Owner. The Contractor may partially backfill sufficient to restrain the pipe during testing, but shall not conceal any joints in so doing.

PART 3 EXECUTION

3.1. INSTALLATION:

3.3.1. Guidelines:

3.3.1.1. Mechanical excavation shall be terminated slightly above the pipe bed and the trench bottom shaped so as to provide uniform bearing on the barrel of the pipe. Particular care shall be taken to recess the bottom of the trench at the bell of the pipe to relieve the bell of all load. An appropriate trench width shall be maintained, allowing room for the joining and proper backfilling of the pipe, as shown on the

drawing(s). In the event the Contractor excavates below the elevation required without approval, he shall backfill with selected sand or gravel and compact to obtain a suitable pipe bedding, all to the satisfaction of the RPR and at his own expense, since no additional payment will be made for trench excavations exceeding approved limits.

3.3.1.2. Where sheeting and bracing is installed for purposes of convenience to the Contractor or for reasons of safety, the sheeting shall be cut off at a level of one (1) foot above the top of the installed pipe and left in place, so as not to disturb the bedding or alignment of the pipe.

3.3.1.3. Trenches shall not be excavated in excess of 100 feet ahead of pipe laying operations without prior review of the Owner or his representative. Backfilling shall be kept as close to the pipe laying as is feasible, in keeping with good construction practices, but no work shall be covered without affording the opportunity for the Owner, or his representative, to observe the work in place.

3.3.1.4. Backfill shall be carefully placed and compacted around the pipe. Materials shall be lowered into the trench to within two feet above the top of the pipe before allowing it to fall on the pipe, unless using approved chutes or other devices which will protect the pipe from the impact of falling materials. The initial backfill shall utilize the best available materials from the excavation, if approved. Up to the pipe centerline backfill shall be placed in layers not to exceed six inches, compacted thickness, for the full width of the trench. These lifts shall be mechanically tamped, or compacted by other approved means to produce the density required elsewhere in these specifications. From the pipe centerline to the final grade of the trench, backfilling methods shall be dependent upon the location of the trench. Compaction under roadways, curbs, gutters, walks, pipes, structures, etc. shall be to a density of 100% of maximum density as determined by AASHTO T 180/ASTM D-1557 (Modified Proctor). In open areas, not subject to vehicular traffic, backfill shall be placed and compacted to a density approximately equal to the soil adjacent to the pipe trench.

3.3.1.5. Where limits cannot be maintained because of requirements of safety for workmen, trenches shall be properly sheeted and braced, shored or otherwise protected, but in no case shall the width exceed the limits shown on the drawings up to a point twelve inches above the top of the pipe. No additional payment will be made for sheeting and shoring except where specifically called for and when properly installed and left in place.

3.3.1.6. Dewatering operations shall be maintained until pipe laying is complete and the trench backfilled sufficiently to prevent movement or flotation of the pipe. No additional payment will be considered for costs incurred for stabilization of trench foundations, where foundations have been rendered unsuitable as a result of construction methods, such as inadequate water control or insufficient sheeting, bracing or other causes. In no case, shall pipe be installed where, in the opinion of the Owner or his representative, such conditions exist and the Contractor shall correct such conditions to provide proper bedding and foundations at no additional cost to the Owner.

3.3.1.7. Payment for removal and replacement of unsuitable material shall be a part of the appropriate payment item found in the proposal (unit price, lump sum, etc.).

END OF SECTION

EXCAVATION, BACKFILLING, AND COMPACTION - PAVEMENT

PART 1. GENERAL

- 1.1. SCOPE: Upon completion of clearing operations, relocation of any utilities and installation of new utilities interfering with the roadway construction by the respective utility owners, plus installation of other interfering structures, excavation of the roadway and any parking areas to the lines and grades of the subgrade may be performed. Existing material removed shall be temporarily stockpiled for subsequent use on the project unless deemed by the Engineer to be unsuitable. Suitable material shall be used in filling and forming shoulders, embankments, swales, etc. and shall not be removed from the project site until authorized by the Owner. The extent of excavation and grading shall be as indicated on the drawings and shall include excavation and/or filling and grading together with the removal of trees, shrubs, existing asphalt, concrete or other material as required to facilitate construction and restoration as directed by the Owner.
- 1.2. QUALITY ASSURANCE: Work shall conform to the requirements of Section 120, DOT Standard Specifications as supplemented or modified herein.

The subgrade shall be graded to the configuration, crown and elevations required by the drawings, and need not be removed, replaced or stabilized if it meets the required degree of compaction as specified elsewhere. Proof rolling shall be carried out on the subgrade after grading, for a minimum of eight (8) complete coverages and until the required compaction is achieved, as measured at a depth of 12 inches below subgrade.

PART 3. EXECUTION

- 3.1. INSTALLATION: The base construction shall proceed as outlined in the Paving related portions of these contract documents.

END OF SECTION

WALK, ROAD, AND PARKING PAVING

PART 1. GENERAL

- 1.1. SCOPE: Paving shall be installed/replaced to the lines, grades and thickness shown on the drawings.
- 1.2. QUALITY ASSURANCE: The applicable standard referred to is the Standard Specification for Road and Bridge Construction of the Florida Department of Transportation, 1986, Supplemental Specifications to the Standard Specifications, 1986, or latest revision.

PART 2. PRODUCTS

2.1. MATERIALS

- 2.1.1. Road and Parking Area Base: Base materials shall consist of one of the following types of materials as shown on the drawings and meeting the following requirements:
 - A. Stabilized Materials: Shall conform to all applicable requirements of DOT Standard Specifications, Section 160-4, 914-2, and 914-4.
 - B. Shell: Shall conform to all applicable requirements of DOT Standard Specifications, Section 913.
 - C. Soil-Cement: Shall conform to all applicable requirements of DOT Standard Specifications, Section 921 for Portland Cement and Section 923 for water. Portland Cement shall be applied at a rate required to produce a compressive strength at seven (7) days of 300 psi.
 - D. Limerock: Shall conform to all applicable requirements of DOT Standard Specifications, Section 911.
- 2.1.2. Walks: The Concrete shall be 3000 psi, while other materials and workmanship shall conform to applicable requirements of Section 522 of the DOT Standard Specifications.

PART 3. EXECUTION

- 3.1. PREPARATION: At locations indicated on the drawings or at the direction of the Owner or his representative, the materials on existing roadways in conjunction with or adjoining proposed paving or resurfacing under this Contract shall be scarified and completely remixed to a minimum depth of six (6) inches after removal of existing asphalt. After mixing, the material shall be reshaped to required contour, watered, and compacted to ninety-eight percent (98%) of maximum density at optimum moisture as determined by AASHTO T 180/ASTM D-1557 (Modified Proctor).
- 3.2. INSTALLATION: The base shall be constructed to the configuration, crown and elevations required to produce the finished surface as indicated on the drawings. Construction methods shall conform to all applicable requirements of Section 200,

210, 230, 250, 260, and 270 of the DOT Standard Specifications as supplemented by these Specifications. Compaction shall be carried out to a density of 98% of the maximum density as determined by AASHTO T 180/ASTM D-1557 (Modified Proctor). The base course shall be finished by blading, or with automated equipment designed for this purpose, and rolled with a steel-wheeled roller. Thin layers of fine materials shall not be applied to the top of the base course to meet grade requirements.

- 3.2.1. Prime and Tack Coats: Materials and construction methods shall conform to DOT Standard Specifications, Section 300-1 through 300-8.
- 3.2.2. Leveling Course: Where required by the Owner, a leveling course shall be applied. Construction material and workmanship shall conform to applicable requirements of Section 330 of the DOT Standard Specifications.
- 3.2.3. Surface Treatment: Double or triple surface treatment shall be applied as shown on the drawings or as directed by the Owner. All materials and workmanship shall conform to applicable requirements of Section 330 of the DOT Standard Specifications.

END OF SECTION

WALK, ROAD, AND PARKING PAVING - ASPHALT CONCRETE

PART 1 GENERAL

- 1.1. SCOPE: The extent of work includes all construction necessary for asphalt concrete roads, parking areas, and playcourts including preparation of subgrade, base construction, asphalt paving and pavement striping as shown on the drawings.
- 1.2. DESIGN REQUIREMENTS:
 - A. Subgrade: Shape subgrade to the proper grades and cross section shown on the drawings. Compact as shown on the drawings. Stabilization, where required shall comply with the FDOT Standard Specifications, Section 914 for Type B or Type C stabilization.
 - B. Base Course: Construct the base course at the locations and to the grades and cross sections shown on the Drawings. Materials and workmanship for the limerock base course shall be in strict conformance with the applicable requirements of the FDOT Standard Specifications Section 200 for construction methods; Section 911 for materials.
 - C. Surface Course: Checking for surface irregularities and elevations shall be done by template or with surveyor's instrument. Materials, equipment, methods of placement and other requirements shall conform to the applicable requirements of the FDOT Standard Specifications as follows:
 1. Plant, Methods and Equipment - Section 320 General
 2. Construction Requirements - Section 330
 3. Type S Asphaltic Concrete - Section 331
 - D. Striping: Striping shall be provided in parking areas as shown on the drawings. Road striping shall be applied in accordance with USDOT Manual on Uniform Traffic Control Devices, FDOT and local ordinances and requirements. Materials shall comply with FDOT Standard Specifications, Section 711.
- 1.3. SUBMITTALS:
 - A. Shop drawings: Shop drawings shall include descriptive information as required to fully describe the products, materials, installation, overall performance, and to state deviations from specified requirements. Submittals shall include, but shall not be limited to the following:
 - B. Material Certificates: Provide copies of all materials certificates of compliance and delivery tickets for subgrade, base course, and surface course materials indicating tonnages of each load, temperature and other information required by FDOT.
 - C. Product Data: Provide manufacturer's product data and installation instructions for prime coat, tack coat, lane marking compound, and wheel stops, etc.
 - D.

PART 2 PRODUCTS:

2.1. MATERIALS:

- A. General: Use locally available materials and gradations which exhibit a satisfactory record of previous installations.
- B. Base Course Aggregate: Sound, angular crushed stone, crushed gravel, or crushed slag, sand, stone or slag screenings.
- C. Surface Course Aggregate: Crushed stone, crushed gravel, crushed slag, and sharp-edged natural sand.
 - 1. Sand prepared from stone, blast-furnace slag, or gravel, or combinations thereof may be used if required to suit local material availability.
- D. Mineral Filler: Rock or slag dust, hydraulic cement, or other inert material complying with AASHTO M 17 (ASTM D 242).
- E. Asphalt Cement: Comply with AASHTO M 226 (ASTM D 3381).
 - 1. Viscosity Grade: AC-20, AR-80.
- F. Prime Coat: Cut-back asphalt type; AASHTO M 82 (ASTM D 2027) RC-70.
- G. Tack Coat: Emulsified asphalt, AASHTO M 140 (ASTM D 997) or M 208 (D2397), SS-1, diluted with one part water to one part emulsified asphalt or other grades approved by FDOT standard specifications.
- H. Thermoplastic Traffic Stripes and Markings; Thermoplastic Compound (FDOT 711, AASHTO M 249-79). Striping shall be 6-inches wide except for crosswalk striping which shall be 12-inches and Stop Bars which shall be 24-inches. Striping for road shall be as required by FDOT and Pasco County.
 - 1. Color:

Parking Spaces	-	White
Stop Bars	-	White
Handicapped Parking	-	Blue and White
Traffic Lanes	-	White and/or Yellow (As indicated)
- I. Wheel Stops: 2,500-psi compressive strength precast, air-entrained concrete, 6 inches high, 9 inches wide, and 7 feet long. Provide chamfered corners and drainage slots on underside.

2.2. MIXES:

- A. Asphalt/Aggregate Mixture: Provide asphalt concrete mix conforming to FDOT Standard Specifications.

PART 3 EXECUTION

3.1. SUBGRADE PREPARATION:

- A. Shape subgrade to the proper grades and cross section shown and proof-roll with at least

10 overlapping passes using a vibratory roller weighing not less than 5 tons, or other suitable equipment of a type approved by the Owner's Representative. As the rolling of the subgrade proceeds, dig out and replace all soft or spongy areas. Stabilize as necessary. Compact subgrade as shown on the drawings. Dispose of excess materials resulting from the road grading as directed. Do not use rollers adjacent to structures where such use may cause damage. Where the roadbed abuts the structure and compaction with a roller is not possible for practicable reasons, compact the area with pneumatic tampers or other approved equipment. No new materials shall be added to any portion of the roadbed until proof-rolling and all preparation work has been satisfactorily completed by the Contractor and approved by the Owner's Representative.

- B. Remove loose material from compacted subgrade surface immediately before applying herbicide treatment or prime coat.

3.2. BASE COURSE CONSTRUCTION:

- A. Construct the base course to the depths, lines, grades and cross sections shown on the drawings, after satisfactory completion of the subgrade. Compact immediately after mixing or placing. Shape to the required lines, grades and cross sections. Test surface for proper shaping no later than the next day after completing each section.
- B. Prime Coat: Grade RC-70, cut-back asphalt, applied at a rate of 0.15 to 0.20 gal. per sq. yd., or equal parts of Grade SS-1, emulsified asphalt and water applied at a rate of 0.20 to 0.25 gal. per sq. yd. over the completed base course. Apply material to penetrate and seal, but not flood, surface. Maintain and re-prime as necessary to assure good surface for paving.

3.3. ASPHALT CONCRETE PAVING:

- A. General: Place asphalt concrete mixture on prepared surface, spread and strike-off. Spread mixture at minimum temperature of 225 deg. F. (107 deg. C). Place inaccessible and small areas by hand. Place each course to required lines, grades, cross-sections, and compacted thicknesses.
- B. Paver Placing: Place in strips not less than 12-feet wide, unless otherwise acceptable to the Owner's Representative. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for a section before placing surface course.
- C. Joints: Make joints between old and new pavements or between successive day's work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density and smoothness as other sections of asphalt concrete course. Clean contact surfaces and apply tack coat.
- D. Tack Coat: Apply to contact surfaces of previously constructed asphalt or portland cement concrete and surfaces abutting or projecting into asphalt concrete pavement. Distribute at rate of 0.02 to 0.08 gal. per sq. yd. of surface. The rate of application may exceed the upper limit for concrete pavement, which is to be surfaced, if directed by the Owner's Representative.
- E. Rolling:
 - 1. General: Begin rolling when mixture will bear roller weight without excessive

displacement.

2. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
3. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.
4. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.
5. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.
6. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.
7. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
8. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.4. TRAFFIC AND LANE MARKINGS:

- A. Cleaning: Sweep and clean surface to eliminate loose material and dust.
- B. Apply thermoplastic compound with mechanical equipment to produce uniform straight edges. Apply at manufacturer's recommended rates to provide consistent opaque coverage. Protect from disturbance until cured.

3.5. WHEEL STOPS:

- A. General: Secure wheel stops to hot-mixed asphalt surface with not less than two 3/4-inch diameter galvanized steel dowels embedded in precast concrete at 1/3 points. Size length of dowel to penetrate full depth of pavement base.

3.6. FIELD QUALITY CONTROL:

- A. General: Test in-place asphalt concrete courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by the Owner's Representative.
- B. Thickness: In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness:
 1. For pavement of a specified thickness of 2-1/2" or more: 1/2".
 2. For pavement of a specified thickness of less than 2-1/2": 1/4".

- C. Surface Smoothness: Test finished surface of each asphalt concrete course for smoothness, using 15' rolling straightedge applied parallel with, and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness.
 - 1. Wearing Course Surface: 3/16".
- D. Check surface areas at intervals as directed by the Owner's Representative. A 15' manual straightedge shall be furnished by the Contractor and shall be available at the job site at all times during the paving operation for checking joints and surface irregularities.
- E. Contractor shall provide sufficient notice to the Owner's Representative prior to covering up any work which may require testing to confirm compliance with these Contract Documents.

END OF SECTION

PAVEMENT REPAIR

PART 1. GENERAL

- 1.1. SCOPE: Where street paving, driveways, sidewalks or curb and gutter is disturbed, restoration shall be made to a condition at least equal to the original, as determined by the RPR. Replacement or restoration materials shall match the existing as nearly as possible. The Contractor shall obtain at his cost any permits as may be necessary for open cutting of streets and shall determine, to his own satisfaction, any requirements and procedures, other than those set forth herein, which may affect the type, quality and method of carrying out the restoration to the satisfaction of the Owner of areas to be restored.
- 1.2. Backfilling and compacting requirements under paved areas up to the subgrade, are set elsewhere in these specifications.

PART 2. PRODUCTS

2.1. MATERIALS: Base material shall be limerock unless the Engineer directs otherwise due to soil or groundwater conditions. Existing base material from the excavation shall not be reused as base material unless acceptable to the Engineer, but may be used as a stabilizer or for trench backfill unless it is determined by the Engineer to be unsuitable.

PART 3. EXECUTION

3.1. INSTALLATION: Edges of pavement shall be cut to provide a neat, straight edge to the width shown on the drawings, or greater if necessary, prior to replacement. Base material shall be placed to the depths shown on the drawings and thoroughly compacted to 98% of the maximum density as determined by AASHTO T 180/ASTM D-1557 (Modified Proctor).

Pavement replacement shall be with the same materials as removed and installation methods and procedures shall comply with the appropriate procedures established by the DOT Standard Specifications.

Permanent pavement replacement shall not commence until acceptable to the RPR. Until such replacement is completed, the Contractor shall maintain all trenches and disturbed areas, providing additional base materials as is necessary to maintain smooth transiting of the areas by vehicular traffic and providing dust control as necessary.

END OF SECTION

02580

PAVEMENT MARKING

PART 1. GENERAL

1.1. SCOPE: Where shown or required for repaired/replaced pavement, pavement marking shall be a suitable road marking thermoplastic, meeting the provisions of DOT Standard Specifications, Section 971.

PART 2. PRODUCTS

(Not Applicable) PART 3.

EXECUTION

3.1. INSTALLATION: Markings shall be to the dimensions shown on the drawings or required to match existing marking and shall be applied with template or shall be machine applied. Preparation of paved surfaces and thermoplastic application shall be in accordance with the thermoplastic manufacturer's recommendations. Surfaces shall be swept clean of dirt, sand, dust or other foreign matter. Surfaces shall be dry and free of "bleeding" asphalt prior to the application of thermoplastic. Deviations in thermoplastic marking greater than 1/2" in 20 feet shall be obliterated and corrected. Marked surfaces shall be protected from traffic and dirt until thoroughly dry.

END OF SECTION

LAWNS AND GRASSES - SEEDING

PART 1. GENERAL

1.1. SCOPE: All areas designated to be seeded shall be according to installation procedures and materials outlined.

PART 2. PRODUCTS

2.1. MATERIALS: Materials for topsoiling and seeding, including fertilization, shall comply with the applicable requirements of DOT Standard Specifications, Section 570.

PART 3. EXECUTION

- 3.1. INSTALLATION: Areas designated to be seeded shall first be fine graded to match the surrounding areas and shall be sown only where the soil is moist and in proper condition to induce growth. Seeding operations shall not be undertaken when wind velocities exceed 15 mph or the soil is unduly wet or otherwise not in a tillable condition. Grass seed shall be in accordance with FDOT Standard Specifications, Section 570 or as accepted by the Owner. The Contractor shall properly water and otherwise maintain all seeded and mulched areas until final acceptance by the Owner. Any areas which fail to show a "catch" or uniform stand shall be reseeded and such reseeding shall be repeated, at no additional cost to the Owner, until final acceptance. Procedures for topsoiling and seeding, including fertilization, shall comply with the applicable requirements of DOT Standard Specifications, Section 570.
- 3.2. MAINTENANCE: Maintenance procedures shall comply with the applicable requirements of DOT Standard Specifications, Section 570.

END OF SECTION

LAWNS AND GRASSES - SODDING

PART 1. GENERAL

1.1. SCOPE: All areas designated to be sodded shall be according to installation procedures and materials outlined.

PART 2. PRODUCTS

2.1. MATERIALS: Sod shall be of the same type as the surrounding grassed areas (unless specified otherwise by the Owner), be free of weeds, and have well matted roots. The sod shall be live, fresh, and uninjured at the time of placing. Materials for sodding shall meet the applicable requirements of Section 575 of the DOT Standard Specifications. Sod may be St. Augustine, Bahia, or other varieties as selected by the Owner or his representative.

PART 3. EXECUTION

- 3.1. INSTALLATION: Areas designated to be sodded shall first be fine graded to match surrounding areas and scarified or loosened to a suitable depth. Sod shall be placed as soon as possible after being cut and shall be shaded and kept moist from the time it is cut, until it is planted. Methods for sodding shall meet the applicable requirements of Section 575 of the DOT Standard Specifications.
- 3.2. MAINTENANCE: The Contractor shall properly water and otherwise maintain all sodded areas until final acceptance by the Owner. Any areas which fail to show a "catch" or uniform stand shall be re-sodded with the same type sod and such re-sodding shall be repeated until final acceptance, all at no additional cost to the Owner.

END OF SECTION

SECTION 02960

TEMPORARY BYPASS PUMPING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

Contractor to furnish all materials, labor, equipment, power, maintenance, etc, to implement a temporary pumping system for the purpose of diverting the existing sanitary sewer flow around the work area for the installation or connection of the proposed project.

1.02 SUBMITTALS

- A. The design, installation and operation of the temporary pumping system shall be the Contractor's responsibility. The Contractor shall demonstrate to the County or their representative that he specializes in the design and operation of temporary bypass pumping systems, or employ the services of a Contractor who specializes in temporary bypass pumping systems. The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.
- B. The Contractor shall prepare and submit to the County or their representative for review and acceptance a specific, detailed plan describing the proposed bypass system as prescribed in the bid.
- C. The Contractor shall submit to the County a description as well as detailed information outlining all provisions and precautions to be taken by the Contractor regarding the handling of existing sanitary sewer flows. This plan must be specific and complete, including such items as schedules, locations, elevations, capacities of equipment, materials and all other incidental items necessary and/or required to insure proper protection of the facilities, including protection of the access and bypass pumping locations from damage due to the discharge flows, and compliance with the requirements and permit conditions specified in these Bid Proposal. No work shall begin until all provisions and requirements have been reviewed and accepted by the County or their representative.
- D. The plan shall include but not limited to details of the following:
 - 1. Staging areas for pumps;
 - 2. Sewer plugging method and types of plugs;
 - 3. Number, size, material, location and method of installation of suction piping;
 - 4. Number, size, material, method of installation and location of installation of discharge piping;
 - 5. A detail of the discharge connection;
 - 6. Bypass pump sizes, capacity, number of each size to be on-site and power requirements;
 - 7. Calculations of static lift, friction losses, and flow velocity (pump curves showing pump operating range shall be submitted); estimated system curves shall be submitted showing multiple pump applications.
 - 8. Method of protecting discharge manholes or structures from erosion and damage;
 - 9. Thrust and restraint block sizes and locations;
 - 10. Sections showing suction and discharge pipe depth, embedment, select fill and special backfill;
 - 11. Method of noise control for each pump and/or generator;

12. Any temporary pipe supports and anchoring required;
13. Calculations for selection of bypass pumping pipe size;
14. Plan to outline fueling of pump engines and spill control.

PART 2 - PRODUCTS

2.01 DESIGN REQUIREMENTS

- A. A dual pump system shall be used with each pump provided capable of handling the full flow required. The bypass pumping system shall have sufficient capacity to pump the peak flow provided by the County. This flow number is based on best available information at the time. Contractor should perform independent evaluation prior to beginning work.
- B. The Contractor shall provide all pipeline plugs, pumps of adequate size to pump peak flow, and temporary discharge piping to ensure that the total flow of the sanitary sewer can be safely diverted around the work. Bypass pumping systems will be required to operate 24 hours per day. During overnight operation, an auto-dialer and automatic alarm activation shall be provided.
- C. The Contractor shall provide at least two (2) telephone numbers where his designated personnel can be reached 24 hours a day in case of an emergency.
- D. Contractor shall have a response time of 30 minutes or less for a high-alarm notification.
- E. The Contractor shall provide adequate standby equipment installed and ready for immediate operation and use in the event of an emergency or breakdown. One standby bypass pump system for each pump system utilized shall be installed at the bypass location ready for use in the event of primary pump system failure. Each stand-by pump system shall have an automatic start/stop control.

2.02 EQUIPMENT

- A. All pumps shall be fully automatic, self-priming or submersible units that do not require foot valves or vacuum pumps in the priming system. The pumps may be electric motor driven or diesel powered. All pumps used must be constructed to allow dry running for long periods of time to accommodate the cyclical nature of sanitary sewer flow.
- B. The Contractor shall provide the necessary stop/start controls for each pump. The controls shall include automatic start up on a high level and stop on a low level.
- C. The Contractor shall include one stand-by pump system of equal capacity for each temporary bypass pump system to be maintained on site.
- D. In order to prevent the accidental spillage of flows all discharge systems shall be constructed of steel pipe utilizing quick-disconnect joints, or fused, high-density polyethylene pipe. Under no circumstances will aluminum "irrigation" type piping or glued PVC pipe be allowed.
- E. Bypass system to meet same sound attenuation requirements as permanent bypass pump.

PART 3 - EXECUTION

3.01 FIELD QUALITY CONTROL

- A. It The Contractor shall perform leakage and pressure tests of the bypass pumping discharge piping using clean water prior to actual operation. The County or their representative will be given 24 hours' notice prior to testing.
- B. The Contractor shall insure that the temporary pumping system is properly maintained and a responsible operator shall be attending to the pumps during operation.
- C. Spare parts for pumps and piping shall be kept on site as required. Adequate hoisting equipment for each pump and accessories shall be maintained on the site.

3.02 INSTALLATION AND REMOVAL

- A. Plugging or blocking of sewage flows shall incorporate a primary and secondary plugging device. When plugging or blocking is no longer needed for performance and acceptance of work, it is to be removed in a manner that permits the flow of sewage to slowly return to normal without surge to prevent surcharging or causing other major disturbances downstream.
- B. When working inside manhole or sewer line, the Contractor shall exercise caution and comply with OSHA requirements when working in the presence of sewer gases, combustible or oxygen-deficient atmospheres, and confined spaces.
- C. When the bypass pipeline crosses local streets and private driveways, the Contractor must place the bypass pipelines in trenches and cover with plating or temporary pavement. Upon completion of the bypass pumping operations, and after the receipt of written permission from the County or their representative, the Contractor shall remove all the piping, restore all property to previously existing condition and restore all pavement. The Contractor is responsible for obtaining any approvals for placement of the temporary pipeline within public ways from the agency with jurisdiction.

03000

CONCRETE MATERIALS

PART 1 GENERAL

1.1. SCOPE: This Section covers the material required for cast-in-place concrete with reinforcing.

PART 2 PRODUCTS

- 2.1. MATERIALS: Materials for cast-in-place and precast concrete shall meet the following requirements:
 - 2.1.1. Portland Cement - Type I or II - ASTM C 150, latest revision, American Manufacture (FDOT Standard Specifications, Section 345)
 - 2.1.2. Aggregate - ASTM C 33, latest revision (FDOT Standard Specifications, Sections 901 and 902)
 - 2.1.3. Water - Potable, free of oil, acid, alkali, salt or other deleterious substances (FDOT Standard Specifications, Section 923)
 - 2.1.4. Reinforcing Bars - ASTM A 615, latest revision, American Manufacture (FDOT Standard Specifications, Section 931)
 - 2.1.5. Welded Steel Wire Fabric - ASTM A 185, latest revision, American

Manufacture PART 3 EXECUTION (Not Applicable)

END OF SECTION

03010

CONCRETE ADMIXTURES

PART 1. GENERAL

1.1. SCOPE: Admixtures selected by the Engineer to improve workability, plasticity or rate of curing of the concrete shall be included in the design mix. Admixtures proposed for use by the Contractor or his supplier shall be submitted to the Engineer for review and shall likewise, be included in the mix design. Manufacturer's literature shall be provided to the Engineer for all admixtures.

1.1.2. All walls for water holding structures shall be constructed with a concrete having a plasticizer additive, to improve placement and minimize flaws.

1.2. QUALITY ASSURANCE: No admixtures other than those included as part of the design mix shall be used without the prior written acceptance of the Engineer.

1.3. DELIVERY, STORAGE, HANDLING, & ENVIRONMENTAL REQUIREMENTS: Storage, handling and batching of admixtures shall be in accordance with the recommendations of ACI and the manufacturer.

PART 2. PRODUCTS

2.1. MIXES: Water reducing and retarding admixtures shall comply with ASTM C 494, latest edition. Air entraining admixtures shall comply with ASTM C 260, latest edition.

2.2. PLASTICIZER:

- A. Master Builders "Rheobuild"
- B. Or Equivalent

PART 3. EXECUTION (Not Applicable)

END OF SECTION

CONCRETING PROCEDURES

PART 1. GENERAL

- 1.1. SCOPE: All workmanship for concrete work, whether cast-in-place or precast shall conform with the recommendations, requirements and procedures of the American Society for Testing and Materials, the American Concrete Institute, the American National Standards Institute, the Standard Building Code and the Florida Department of Transportation Standard Specifications, as applicable.
- 1.2. SUBMITTALS: The Contractor shall supply the name of the manufacturers and suppliers of all materials to be incorporated in the work for review by the Engineer. Laboratory certifications shall be provided as delineated elsewhere in this division of the Contract Documents.

Design mixes and certified copies of 7-day and 28-day cylinder breaks by a recognized testing laboratory shall be provided for all concrete. Certified copies of gradation and analyses shall be provided for both fine and coarse aggregate.

- 1.3. DELIVERY, STORAGE, HANDLING, & ENVIRONMENTAL REQUIREMENTS: Proper storage and protection of all materials to be utilized in the concrete work shall be the responsibility of the Contractor.

PART 2. PRODUCTS

2.1. QUALITY CONTROL: When cylinder tests result in less than design strength and, in the opinion of the Engineer, additional testing such as coring or other means of testing hardened concrete is required to evaluate the adequacy of concrete, the Contractor shall bear the expense of all testing deemed necessary. If the additional testing indicates the concrete to be inadequate, such remedial measures as directed by the Engineer, shall be performed by the Contractor at his own expense. Remedial action may include the removal or discarding and replacement of the understrength concrete.

PART 3. EXECUTION (Not Applicable)

END OF SECTION

CONCRETE FORMWORK

PART 1. GENERAL

- 1.1. SCOPE: This Section is intended to include form materials required to form cast-in-place concrete and maintain structural integrity until stripping.

PART 2. PRODUCTS

- 2.1. MATERIALS: Forms shall be constructed of wood, plywood, metal or other approved material that will produce the required surface finish and shall be constructed true to line and grade.
- 2.2. ACCESSORIES: Chamfer strips, made from nominal 1-inch by 1-inch lumber sawed diagonally or pre-molded PVC strips, shall be provided on all exposed edges of walls, slabs, beams, columns, pedestals, footings, and other structures above grade, unless indicated otherwise on the drawings.

PART 3. EXECUTION

- 3.1. EXAMINATION: The Contractor is solely responsible for the adequacy and safety of formwork.
- 3.2. PREPARATION: Surfaces of forms shall be clean and smooth and properly treated with a suitable, non-staining form oil or other coating material which will effectively prevent absorption of moisture and prevent sticking of the concrete. The oil or other form coating shall be evenly applied by brush or spray so as to cover form surfaces uniformly without excess or drip. Care shall be exercised to avoid contact with construction joint surfaces and reinforcing bars.
- 3.3. INSTALLATION: Forms shall be sufficiently strong, unyielding and adequately braced and shored to contain the concrete without sagging or without apparent deviation from the desired shape or position, and shall be designed to withstand the additional forces of vibration. Forms shall be sufficiently tight to retain the wet concrete without leakage or loss of mortar.
- 3.3.1. Form Removal: Under normal circumstances the minimum form removal times shall be as follows:
- A. Columns, walls, side forms of girders and beams, and other vertical surfaces - 72 hours.
 - B. Bottom forms of girders, beams and slabs - 7 days and at attainment 75% of design strength.

Immediately after stripping forms, the bottoms of all beams, girders and slabs shall be re-shored until sufficient strength has been attained to safely support its own weight and the construction live loads upon it. The use of this schedule shall not relieve the Contractor of responsibility for the safety of the structure. The Engineer may require longer times prior to stripping.

END OF SECTION

03140

FORM TIES AND ACCESSORIES

PART 1. GENERAL

1.1. SCOPE: This Section is intended to include form ties and accessories required to form cast-in-place concrete and maintain structural integrity until stripping.

- 1.2. SYSTEM DESCRIPTION: Form ties shall be of approved design, such that when forms are removed, no metal is left within 1 inch of the finished surface. Ties shall be spaced sufficiently far away from corners or edges to prevent spalling of the adjacent concrete when the tie is released and snapped.

PART 2. PRODUCTS (Not Applicable)

PART 3. EXECUTION (Not

Applicable)

END OF SECTION

CONCRETE REINFORCEMENT

PART 1. GENERAL

- 1.1. SCOPE: This Section covers placement of reinforcing steel.
- 1.2. DELIVERY, STORAGE, HANDLING, & ENVIRONMENTAL REQUIREMENTS: All reinforcing steel and welded wire fabric shall be stored off the ground and protected from damage and surface deterioration. When placed in the work, all reinforcement shall be free from defects, kinks or bends and shall be cleaned of rust, mill scale and other coatings and all other foreign substances such as dirt, grease and oil. If concreting is delayed for a period of time, which the Engineer considers to be lengthy, all reinforcement in place shall be protected by canvas, visqueen or other satisfactory covering.

PART 2. PRODUCTS (Not

Applicable) PART 3.

EXECUTION

3.1. INSTALLATION: All reinforcement shall be supported and held in place so that it will remain in proper position after concrete has been placed and compacted. Support shall be provided by metal chairs or spacers or other acceptable means. Welding of reinforcement shall not be permitted. Unless otherwise shown or directed, concrete cover measured from the surface of the reinforcement shall not be less than the following:

Concrete deposited against the ground, without the use of forms

3 inches Formed concrete in contact with the ground 2 inches

Slabs and walls contacting water or sewage 1 3/4 inches

Beams, girders and columns not directly exposed to ground & weather 1

1/2 inches Formed concrete exposed to weather 1 1/2 inches

Slabs and walls not directly exposed to ground, weather, water or sewage 3/4 inches

All reinforcement must be in place, and the Engineer so notified, at least twenty-four (24) hours prior to the placement of any concrete.

END OF SECTION

REINFORCING STEEL

PART 1. GENERAL

- 1.1. SCOPE: This section covers fabrication of reinforcing steel.
- 1.2. SUBMITTALS: Complete, detailed working drawings and bar schedules shall be submitted to the Engineer clearly indicating bar sizes, spacings, locations, lengths, splices, hooks and quantities following the procedures for submittal of shop drawings. Submit steel producer's certificates of mill analysis. No work on fabricating or placing steel shall be done until such drawings, schedules, and submittals have been reviewed and accepted.
- 1.3. DELIVERY, STORAGE, HANDLING & ENVIRONMENTAL REQUIREMENTS: Reinforcing steel shall be fabricated to the proper shapes and dimensions and shall be delivered to the work in strongly tied bundles identified with tags corresponding to bar schedules and diagrams. Storage shall be as outlined elsewhere in these specifications.

PART 2. PRODUCTS

- 2.1. MATERIALS: Reinforcing steel shall be ASTM A-615 Grade 60.
- 2.2. FABRICATION: Reinforcing steel shall be fabricated in accordance with the Manual of Standard Practice, latest edition, published by the Concrete Reinforcing Steel Institute. Bar hooks, development lengths and lap lengths shall be in compliance with ACI 318, Chapter 12. Lap lengths, in particular, shall be no less than the lengths specified on the structural detail sheets. Bars shall be bent in the shop to the shapes required. Field bending shall be done only when directed or accepted by the Engineer and shall not be done after embedment in concrete. Fabricating and placing tolerances shall be in accordance with ACI 301, latest edition. All bars shall be bent cold.

PART 3. EXECUTION

- 3.1. INSTALLATION: Bar hooks, development lengths and splice lengths shall meet tension requirements, unless noted otherwise on the drawings. Bar splices shall be staggered wherever possible. Bars shall be fastened together with soft pliable wire of 16-gauge minimum diameter which can be readily bent and twisted without breaking, and which is strong enough to hold the steel in its proper position during concrete placement. Placement of reinforcing steel shall be in accordance with ACI 301 and 318, latest editions.

END OF SECTION

03220

WELDED WIRE FABRIC

PART 1 GENERAL

1.1. SCOPE: This Section covers requirements and placement of welded wire fabric.

PART 2 PRODUCTS

2.1. MATERIALS: Unless otherwise shown, all fabric shall be 6" X 6" - W2 X W2, electrically welded.

PART 3 EXECUTION

3.1. INSTALLATION: Prior to concreting, wire fabric shall be placed in its proper position and fastened securely to prevent its displacement. Fabric shall be straightened as required before placement. Fabric shall be lapped sufficiently to avoid any reduction in strength and shall be securely fastened at the ends and edges.

END OF SECTION

03221

FIBER MESH REINFORCING

PART 1. GENERAL

1.1. SCOPE: This Section covers requirements and placement of fiber mesh reinforcement. Fiber mesh shall be allowed in sidewalks and driveways in lieu of welded wire fabric, unless otherwise designated. Fiber mesh shall act to increase the tensile strength of the concrete to reduce visible cracking.

PART 2. PRODUCTS

2.1. MATERIALS: Synthetic fibers, at a mix of 0.75 - 1.5 pounds per cubic yard of concrete, as necessary to provide the strength of concrete required. Fiber mesh shall be totally inert and shall not affect the finishing characteristics of the concrete. Fiber mesh shall not stain surfaces.

PART 3. EXECUTION

3.1. INSTALLATION: The fiber mesh shall be mixed into the concrete mix at the concrete yard. Upon placement of concrete, the concrete shall be given a broom finish. Visible mesh shall be removed, so that concrete has a smooth, broom finish.

END OF SECTION

CONCRETE ACCESSORIES

PART 1. GENERAL

1.1. SCOPE: This section covers requirements for concrete accessories.

1.2. SUBMITTALS:

1.2.1. Hardener and Epoxy Adhesive: Manufacturer's literature shall be submitted for review by the Engineer.

1.2.2. Curing Compound: Product information shall be submitted for review by the Engineer.

1.2.3. Preformed Joint Filler: Samples of preformed joint filler shall be submitted for review by the Engineer.

PART 2. PRODUCTS

2.1. ACCESSORIES:

2.1.1. Hardener and Epoxy Adhesive: Products shall be compatible with later finishes.

2.1.2. Curing Compound: Shall comply with ASTM C 309, latest edition, with fugitive dye.

2.1.3. Preformed Joint Filler: Shall meet all requirements of ASTM D 994, and DOT Standard Specifications, latest editions.

2.1.4. Vapor Barrier: Vapor barrier shall be a minimum 6 mil polyethylene film.

2.1.5. Reglets: Reglets shall be constructed of polyvinyl chloride, zinc alloy or other approved non-ferrous metal.

2.1.6. Masonry Anchorage: Dovetail slots for masonry anchorage shall be compatible with anchors for masonry and shall be fabricated with 24-gage galvanized sheet steel, and felt-filled.

PART 3. EXECUTION

3.1. INSTALLATION: Application and installation of all concrete accessories shall be in accordance with manufacturer's specifications and instructions.

3.1.1. Curing Compound: Shall not be applied on surfaces to receive hardener, ceramic tile finish, or other surfaces specifically called out by these specifications.

3.1.2. Vapor Barrier: Shall not be punctured or otherwise damaged, and shall be installed with 6-inch side and end laps. End laps shall be in the direction of concrete placement.

3.1.3. Preformed Joint Fillers, Reglets and Masonry Anchorages: Shall be placed as shown on the drawings.

END OF SECTION

CAST-IN-PLACE CONCRETE

PART 1. GENERAL

1.1. SCOPE:

1.1.1. This Section covers the requirements and placement of cast-in-place concrete. Admixtures selected by the Engineer to improve plasticity or rate of curing of the concrete shall be included in the design mix. Admixtures proposed for use by the contractor or its supplier shall be submitted to the Engineer for review and shall likewise, be included in the mix design. Manufacturer's literature shall be provided to the Engineer for all admixtures.

1.1.2. All walls for liquid holding structures shall be constructed with a concrete having a plasticizer additive to improve placement and minimize flaws.

1.2. SYSTEM DESCRIPTION:

1.2.1. Design requirements: Unless otherwise indicated, the following concrete applications and minimum strengths shall govern:

	Application	28 Day Strength (psi)
1.	Reinforced Concrete Structures	4000
2.	Wire Mesh Reinforced Slabs	3000
3.	Non-reinforced Applications (Encasements, Thrust Blocking)	2500

1.3. SUBMITTALS:

1.3.1. The Contractor shall furnish a mix design calculated by a recognized testing laboratory to produce a workable mix for each concrete mix to be used on the project, for review by the Engineer. The design mixes shall be accompanied by 7-day and 28-day cylinder field test results. Certified copies of a gradation and analysis report by a recognized testing laboratory shall also be submitted for both coarse and fine aggregate.

1.3.2. The design mixes for liquid holding structures shall be submitted with documentation showing that each design mix has been used for at least five (5) previous similar projects including any special curing and placement recommendations to insure watertight structures.

1.3.3. Well in advance of planned concrete placement, shop drawings for reinforcing steel shall be submitted to and reviewed by the Engineer. Shop drawings shall also be provided for all accessories and inserts prior to concrete placement.

1.3.4. An anticipated schedule and sequence of concreting operations shall be provided for the review of the Engineer. Major revisions to the schedule shall also be submitted for the Engineer's review.

1.3. QUALITY ASSURANCE: Workmanship shall be performed in accordance with the practices and requirements of ACI 315, ACI 318, ASTM C 94 and applicable FDOT Standard Specifications, including

Sections 400,415,425 and 520. No admixtures other than those included as part of the design mix shall be used without the prior written acceptance of the Engineer.

1.4. DELIVERY, STORAGE, HANDLING, & ENVIRONMENTAL REQUIREMENTS: If any truck is deemed to be not in good state of repair and is determined to be a cause of poor quality of concrete, that truck shall be removed from service to the project. Storage, handling and batching of admixtures shall be in accordance with the recommendations of ACI and the manufacturer.

PART 2. PRODUCTS

2.1. QUALITY CONTROL: Should any concrete not be properly mixed, have an excessive slump, or if the concrete shall remain in the mixer for a period of time considered to be excessive for the conditions by the Engineer, normally 90 minutes, that concrete shall be removed from the site as directed by the Engineer.

2.2. MIXES: Water reducing and retarding admixtures shall comply with ASTM C 494, latest edition. Air entraining admixtures shall comply with ASTM C 260, latest edition.

2.3. PLASTICIZER: Master Builders "Rhoebuild" or an equivalent product.

PART 3. EXECUTION

3.1. EXAMINATION: The Contractor shall provide the Engineer with sufficient notice after reinforcing steel is in place, and prior to the time when concreting operations are planned, to enable the Engineer to review the placement of reinforcing steel. This notice shall normally be at least 24 hours. No concrete should be placed without the prior review of the Engineer.

3.2. PREPARATION:

3.2.1. Prior to placing any concrete, the Contractor shall have furnished, and the Engineer shall have reviewed, mix designs for each of the concrete mixes required for the project.

3.2.2. Prior to commencement of concreting, the Contractor shall inspect the forms, remove all foreign materials, insure the adequacy and integrity of the forms and the proper placement and security of all reinforcing steel and inserts. During concreting, he shall have a representative to continuously observe the forms to guard against collapse or leakage of grout.

3.3. INSTALLATION:

3.3.1. Concreting shall be continuous, once started, until the completion of the scheduled pour. If a structure is too large to be completed in a single placement, the Contractor shall so indicate to the Engineer well in advance and shall submit the location of proposed construction joints for review.

3.3.2. Delivery tickets shall be furnished with each load of concrete delivered to the site prior to unloading. Delivery tickets shall contain all information required by FDOT Standard Specifications, Section 345. Concrete shall be delivered to the site only in trucks which are in good operating condition.

3.3.3. Concrete shall be conveyed as close as possible to the place of final deposit and as rapidly as possible by methods which will prevent segregation, loss of ingredients or degradation of quality. All buckets, hoppers, pumping equipment, chutes and other equipment for conveyance of the concrete shall be inspected for suitability, operating condition and cleanliness prior to commencement of concreting. Elephant trunks and hoppers shall be utilized to prevent the free fall of concrete from exceeding five (5) feet.

3.3.4. Concrete shall be deposited in layers not exceeding two (2) feet and shall be timely placed and consolidated so as to prevent a "cold joint" with the previously deposited lift. If a "cold joint" should result, the defective structure, or portion of structure, shall be removed and replaced at no additional cost to the owner. In the event that the "cold joint" is minor, in a not critical structure or location, and/or readily repairable, the Contractor may request that the Engineer accept the defective work based upon a corrective plan of action and applicable portions of the Contract Documents dealing with defective work. Unless otherwise directed, all concrete shall be consolidated by means of internal vibrators operated only by experienced and competent workmen. Vibrators shall be of proper size and operating characteristics for the particular pour on which employed. Equipment and consolidating procedures shall be in accordance with ACI 301. All vibrators shall be tested for proper operation prior to the commencement of concreting operations. At least one spare vibrator, also in good working order, shall be on site.

3.4. TESTING: Compressive strength tests shall be made in accordance with the procedures of ASTM C 31 and C 39 on each concrete placement, unless the tests are waived by the Engineer. Four (4) concrete test cylinders will be taken for every 75 or less cubic yards of concrete placed. One (1) slump test will be taken with each set of test cylinders. One cylinder from each set will be broken at seven (7) days. Two cylinders shall be broken at twenty-eight (28) days. The remaining cylinder shall be retained by the testing laboratory to await instructions from the Engineer, should either of the 28-day tests indicate less than the specified design strength. If both the 28-day breaks meet or exceed the 28-day strength requirement, the unbroken cylinder may be discarded. The test cylinders shall be tested by a recognized commercial testing laboratory and the cost of the described tests shall be paid by the Owner. Should any additional testing be required by the Contractor, for any purpose, such as stripping of forms, etc., the cost of the additional testing shall be borne by the Contractor.

END OF SECTION

CONCRETE FINISHING

PART 1. GENERAL

1.1. SCOPE: Immediately upon removing forms, all concrete surfaces shall be inspected and any surface defects shall be promptly repaired. All honeycombed and other defective concrete shall be removed by cutting back to sound concrete.

PART 2. PRODUCTS

2.1. MIXES: The grout mixture shall consist of one part sand and one part of the same brand of cement as used in the original concrete placement, mixed to a consistency of thick cream.

PART 3. EXECUTION

3.1. EXAMINATION: If, in the opinion of the Engineer, the extent of the defective concrete is excessive, or if the structure appears weakened by the voids, complete removal of the concrete may be required.

3.2. INSTALLATION: Edges shall be cut perpendicular to the surface or slightly undercut. Areas to be patched shall be thoroughly wetted and brushed with a coat of bonding grout as described elsewhere. Feathering of patch edges shall not be permitted. Patches shall be kept moist for a minimum of three (3) days. Tie holes shall also be cleaned, thoroughly dampened and patched.

3.2.1. Exposed Formed Surfaces: As soon as practicable after removal of forms, exposed formed surfaces shall be rubbed to eliminate fines, burrs, bubbles and other surface imperfections. Rubbing shall be done with carborundum or brick and water. Grout or mortar shall not be used in the rubbing process. Unless otherwise directed by the Contract Documents, rubbed finishes shall be applied to all exposed walls, columns and beams, exterior tank surfaces above finished grade, interior tank surfaces to a point six (6) inches below water level and any other concrete exposed to view and for which no other finish is prescribed.

3.2.2. Concrete Slabs: Floor slabs, in general, shall be floated and steel-troweled to effect a smooth impervious surface and shall be level to within 1/8-inch in ten (10) feet. Troweling shall not be commenced until the mortar has hardened sufficiently to prevent excess fine material from being worked to the surface. Liquid hardener shall be applied to all troweled slabs in accordance with manufacturer's directions. Slabs to receive roofing, insulation, or ceramic tile shall be screeded to an even plane and float finished only.

3.2.3. Curb, Curb and Gutter, and Valley Gutter: Forms shall be removed within 24 hours and minor defects repaired. All exposed surfaces shall be brush finished while the concrete is still green, unless surface defects make additional finishing necessary in the opinion of the Engineer.

END OF SECTION

03370

CONCRETE CURING

PART 1. GENERAL

1.1. SCOPE: All concrete shall be cured by continuous-moisture curing, or by using an impervious covering for a minimum period of seven (7) days. Curing compound may also be used except for surfaces which are required to receive hardener, a tile finish, or other areas specifically called for by the Engineer where the compound is not allowable.

1.2. DELIVERY, STORAGE, HANDLING, & ENVIRONMENTAL REQUIREMENTS: Fresh concrete shall be protected from sun, rain, flowing water and mechanical injury.

PART 2. PRODUCTS

2.1. MATERIALS: Water for curing shall be clean and free from any substances which would stain or discolor the concrete. Cover materials shall consist of a double layer of burlap kept continuously wet, waterproof paper or polyethylene film and shall meet the requirements of FDOT Standard Specifications, Section 925. Curing compound shall comply with the requirements of appropriate sections of these specifications.

PART 3. EXECUTION

3.1. INSTALLATION: Curing shall commence immediately upon removal of forms, or in the case of unformed top surfaces, as soon as the concrete has hardened sufficiently to prevent damage.

END OF SECTION

03400

PRECAST CONCRETE

PART 1. GENERAL

- 1.1. SCOPE: This Section covers the requirements for precast items and units.
- 1.2. ALTERNATES: Precast reinforced concrete manholes, inlets and boxes may be used in lieu of cast-in-place concrete or brick masonry, unless otherwise indicated on the drawings.
- 1.3. SUBMITTALS: Shop drawings shall be provided for each type of unit.

PART 2. PRODUCTS

- 2.1. MIXES: Concrete shall attain a compressive strength of 4000 psi in 28 days. Type II Portland Cement shall be used in the concrete.

PART 3. EXECUTION

- 3.1. PREPARATION: All structures shall be free from fractures, honeycombs and other defects. The Contractor shall be responsible to assure that all units are installed at the proper location and elevation to accommodate actual field requirements.
- 3.2. INSTALLATION: Construction and installation of precast units shall be in accordance with ASTM C 478 and DOT Standard Specifications, Section 425.

END OF SECTION

PRECAST CONCRETE SYSTEMS

PART 1. GENERAL

1.1. SCOPE: This section covers the Work necessary for the construction of valve vaults, wet wells, storm drainage structures, inlets, boxes and manholes complete. Details of construction are as indicated on the Drawings and as specified elsewhere in these documents.

1.2. SYSTEM DESCRIPTION:

1.2.1. Manholes: Precast reinforced concrete manholes shall consist of a base unit, riser units of lengths necessary for building the manhole to the required depth and a cone unit.

1.2.2. Valve Vaults and Wet Wells: Precast reinforced concrete wet wells and valve vaults shall consist of a base unit, riser units of lengths necessary for building the wet well to the required depth and a flat top unit.

1.2.3. Storm Drainage Structures, Inlets and Boxes: Stormwater drainage structures, inlets and boxes shall be provided with appropriate openings for pipe, frames and hatches or other covers, etc. as indicated on the design drawings.

PART 2. PRODUCTS

2.1. MANUFACTURED UNITS:

2.1.1. Frames and Covers: Shall be as shown on the Drawings and as specified elsewhere.

2.1.2. Castings: Shall be either traffic or non-traffic load bearing as shown on the drawings and specified elsewhere.

2.1.3. Precast Manhole, Valve Vault, and Wet Well Sections: Shall be of the size, diameter and thickness shown on the Drawings. Top and bottom slabs shall be constructed as shown and conforming to the Specification sections governing reinforced and precast concrete construction.

2.1.4. Precast Base Sections and Bases: Precast base sections shall be used and all details of construction shall be indicated on shop drawings signed and sealed by a Florida registered Professional Engineer and reviewed by the Engineer at the shop drawing stage. Base sections shall have the slab monolithically-poured with the sidewalls and shall conform with the basic dimensions indicated on the Drawings.

2.1.5. Manhole Riser Units: Shall comply with ASTM C478 and be provided with openings for the sewer pipe. Provisions shall be made for a water tight seal by providing a water stop cast in the wall between the manhole and pipe, by a manhole coupling cast directly into the manhole unit (which is compatible with the connecting pipe), or with rubber gasket provided on the connecting pipes. Precast manhole units for 24-inch diameter and smaller sewer lines shall have an inside diameter of 48-inches and a minimum wall thickness of 8-inches. Precast units shall have bell and spigot joints. Cone units shall have a minimum clear opening of 25-1/4 inches and shall have an 8-inch seat for brick adjustments to frame and cover.

2.1.6. Storm Drainage Structures, Inlets and Boxes: Shall be constructed in accordance with ASTM C 478 and with dimensions, reinforcement, etc. conforming to that shown on the design drawings. Inlets

and junction boxes shall be standard DOT Type C and Type E inlets as specified in DOT Standard Specifications, Section 425, unless otherwise shown on the detail sheets of the design drawings. Type C inlets shall be used only on grassed or non-traffic areas. Type E inlets shall be used in all pavement areas. Walls and bottoms of both Type C and E inlets shall be 8-inch thickness minimum.

2.2. MATERIALS:

2.2.1. Base rock shall be granular fill material meeting the requirements of the appropriate earthwork section of these Specifications.

2.2.2. Concrete Work shall conform to the applicable concrete, precast concrete and reinforcing steel sections of these Specifications.

2.2.3. Gaskets: Shall be rubber "O" rings conforming to the requirements of ASTM C442, or in the alternative, a bitumastic plastic compound such as Ramnek may be used.

2.2.4. Piping shall be as required elsewhere in these Specifications.

PART 3. EXECUTION

3.1. PREPARATION: Details and dimensions for construction of valve vaults, wet wells, storm drainage structures, inlets, boxes and manholes are shown on the Drawings.

3.2. INSTALLATION:

3.2.1 Manholes:

3.2.1.1. Joints and annular spaces between pipe and manhole shall be completely filled, both inside and outside and brushed with a non-shrinking grout as specified elsewhere in these Specifications. The top of the cone shall be set sufficiently below the bottom of the manhole frame so that at least one course, but not more than four courses, of clay common brick, are used to bring the manhole frame and cover to final grade. The purpose of the brick is to accommodate future grade changes without disturbing the manhole. Maximum height adjustment with brick is 16-inches. One foot riser units shall be used where the manhole requires adjustment greater than 16-inches. Brick shall be plastered inside and out with $\frac{1}{2}$ inch of Portland cement plaster. All walls, both inside and outside, shall be given two coats of coal tar epoxy or other approved preservative material. Each coat shall be a different color with the final coat black. Exterior coating shall include the outside bottom of the manhole. Each coat shall have a dry film thickness of 8 mils per coat. Prior to applying these two coats the entire internal surface of the manhole shall be coated with a thinned coat of the same preservative in order to fill all voids and surface imperfections. This is done to prevent pin holes which sometimes occur when viscous coatings are applied. Invert channel shall be constructed smooth to conform to the inside of adjacent sewer sections. Bench walls shall be sloped to the channel. Changes in direction of flow shall be made in a smooth curve of as large a radius as possible. Changes in size and grade shall be made gradually and smoothly. All pipe entering the manhole shall be finished off flush with the walls and all exposed sharp edges shall be wiped smooth with mortar.

3.2.1.2. Invert elevations shall be in conformance with those noted on the Drawings and have smooth transitions from point to point to assure free flow through the manhole. All sharp edges shall be removed prior to completion of the Project.

3.2.1.3. Flexible Joints: All sewer pipes entering or leaving a manhole shall be equipped with a flexible joint within 1-1/2 feet of the manhole base.

3.2.1.4. Pipe Stubouts: All future pipe connections shown on the Drawings shall be fitted with watertight gasketed stubouts 1-1/2 feet out from the manhole. Each stubout shall be equipped with a plug suitable for later removal yet capable of withstanding the hydrostatic pressures anticipated for the depth required.

3.2.2. Valve Vaults and Wet Wells:

3.2.2.1. The base section of the wet well and valve vault shall be a monolithically cast section. The wet well (only) floor shall have a fillet poured to provide a 1 to 1 slope to the intake of the pumps. The interior, including the underside of the top slab, and the exterior, including the outside bottom, shall be coated as required for manholes with coal tar epoxy, excluding the above ground exterior portion. Each coat shall be a different color with the final coat black with a dry film thickness of 8 mils per coat. Prior to applying these two coats, the entire internal surface of the valve vault and wet well shall be coated with a thinned coat of the same preservative in order to fill all voids and surface imperfections.

3.2.2.2. Joints and annular spaces between pipes and wall shall be completely filled, both inside and outside, and brushed with a non-shrinking grout as specified elsewhere in these Specifications.

3.2.2.3. The invert elevation of the influent pipe shall be in conformance with the Drawings. All sharp edges shall be removed. The last run of pipe into the wet well shall be ductile iron pipe a minimum of 18-feet long.

3.2.2.5. Top slab: The top slabs shall be as indicated on the Drawings. In the wet well, the access hatch shall be sized and located over the pumps in accordance with the pump manufacturer's instructions.

3.2.3. Guidelines:

3.2.3.1. Valve vaults, Wet Well and Manholes shall be placed on a subbase consisting of dry level compacted granular fill compacted to a density of not less than 95 percent of maximum dry density as determined by ASTM D 1557. Where clay, muck, rock, organics or other unsuitable material is found the Contractor shall overexcavate and replace this with imported granular backfill. Overexcavation and backfilling with less than 10 cubic yards of material shall be considered incidental and be performed at no additional cost to the Owner.

3.2.3.2. The Contractor shall be responsible for removing all water from the excavation and maintaining a dry hole until such time as the construction is complete and secure from flotation.

3.2.3.3. Shoring, sheeting, structural integrity and safety shall be the Contractor's sole responsibility and shall repair, at no cost to the Owner, any damage resulting from failure to provide adequate support.

3.2.3.4. Backfilling and compaction within 5 feet of the structure shall be accomplished with hand tampers or other similar equipment in order to prevent damage to the structure caused by heavy equipment. Lifts shall not exceed 6-inches and shall be compacted to at least 95 percent of maximum dry density as determined by ASTM D 1557. The upper 24-inches of backfilling shall be governed by the type of surface to occupy the surroundings, such as pavement, structures, etc.

3.2.3.5. Concrete Bases shall be constructed in conformance with the details shown on the Drawings.

3.2.3.6. The base and first section of riser shall be plumb prior to placement of subsequent sections.

3.2.3.7. Unsuitable trench bottom materials shall be overexcavated and backfilled with suitable select backfill material.

3.2.3.8. Riser sections shall be clean and free of debris prior to placement. All sections shall be rigid and

watertight.

END OF SECTION

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GROUT

PART 1. GENERAL

- 1.1. SCOPE: The Contractor shall provide manufacturer's literature for grouting materials to the Engineer for review. Literature shall include technical data and recommendations for mixing, surface preparation and installation.

- 1.2. ALTERNATES: Approved equal.

PART 2. PRODUCTS

- 2.1. MIXES: Grout used for patching concrete or precast concrete connections shall be non-shrink, ready-to-use product, attaining a minimum compressive strength of 6000 psi at 28 days, when tested in accordance with ASTM C 109, and shall be MASTERFLOW 713 grout as manufactured by Master Builders, Cleveland, Ohio.

PART 3. EXECUTION

- 3.1. INSTALLATION: Surfaces shall be thoroughly cleaned prior to installation of grout as outlined by the manufacturer. Use, installation and curing shall be performed in accordance with the recommendations of ACI and the manufacturer. A suitable epoxy resin may be substituted upon prior acceptance of the Engineer after submittal of appropriate descriptive material and technical data.

MANHOLE AND WET WELL PROTECTION

PART 1 GENERAL

- 1.1. SCOPE: This section covers the work necessary for the complete protection of new and existing concrete wet wells and manholes indicated in the contract documents. The methods of application, materials utilized, and equipment required shall be as recommended by the manufacturer. Where applicable details of construction are shown elsewhere, and additional requirements specified elsewhere in the contract documents.
- 1.2. SYSTEM DESCRIPTION:
- 1.3.1. Performance requirements: When completed the finished wet well or manholes shall be relatively smooth and uniform with no sharp projections. The completed installation shall be chemically resistant to the environment experienced in the wet well or manhole being protected.
- 1.4. SUBMITTALS:
 - 1.4.1. Shop drawings: Shop drawings shall include descriptive information as required to fully describe the products, materials, installation, overall performance, and to state deviations from specified requirements. Submittals shall include, but shall not be limited to the following:
 - A. Materials to be furnished
 - B. Installation procedures
 - C. Approved Technicians to perform the work
- 1.5. QUALITY ASSURANCE:
 - 1.5.1. Qualifications: Application of all linings shall be performed by factory-approved technicians only.
- 1.6. DELIVERY, STORAGE, HANDLING, & ENVIRONMENTAL REQUIREMENTS: Load, handle, transport, and unload all materials and equipment in such a manner that they are not excessively stressed, deformed, or otherwise damaged. Once delivered, protect all materials, equipment, and packaged materials from damage and deterioration from all sources. Materials and equipment shall be stored in a dry areas not be placed in direct contact with the ground. Materials and/or equipment damaged due to careless delivery, storage, or handling shall be immediately removed and replaced at no additional cost to the Owner.

PART 2 PRODUCTS:

2.1. MATERIALS:

- 2.1.1 Coatings: Per Section 4 and Section 9 of the HCUD Water, Reclaimed Water and Wastewater Construction Specification Manual, latest edition.

PART 3 EXECUTION

3.1. PREPARATION:

- 3.1.1. Adjoining surfaces must be sound, clean, free of loose or damaged substrate, dust, dirt, and other contaminants that will interfere with bond.
- 3.1.2. Abrasive and water blasting is required to provide the most ideal conditions for maximum adhesion.
- 3.1.3. The surface should be saturated surface dry (SSD) with no standing water on the adjoining substrate.
- 3.1.4. Exposed rebar shall be cleaned to "white metal" SSPC-SP-5 finish by appropriate sandblasting. Specific requirements for acid etching pH adjustment, etc., required for the specific lining system being used, shall also be performed prior to installation of the lining system.

3.2. INSTALLATION:

- 3.2.1 The Contractor shall be responsible for following the manufacturer's recommendations.

3.3. TESTING:

- 3.3.2. All defects identified during inspection such as pinholes, low film millage, etc. shall be repaired with same material at the contractor's expense.

END OF SECTION

HYDROSTATIC TESTS - CONCRETE WATER HOLDING STRUCTURES

PART 1. GENERAL

- 1.1. SCOPE: All water holding structures shall be subjected to leakage tests after the concrete has been cured and obtained its design strength. Testing shall take place prior to backfilling, coating application, or other work that will cover exposed faces of the structure.
- 1.1.1. Contractor is to provide all materials, equipment, labor and supervision necessary for the completion of the work specified herein.

1.2. DEFINITIONS:

- 1.2.1. Excessive Leakage: Visible leakage, visible damp spots, and when the drop in water surface, over a 24 hour period represents a volume of water greater than .001 times the normal liquid volume in the tank.

PART 2. PRODUCTS

- 2.1. EQUIPMENT: The Contractor shall furnish, as a minimum, the following for use in performing the Hydrostatic tests:
 - A. Sufficient volumes of clean water for each basin to be tested and each retest required.
 - B. All necessary labor, materials, and equipment needed to fill and drain each basin with water.
- 2.2. QUALITY CONTROL: When leakage exceeds the allowable limit, the basin shall be drained, and all leaks previously identified shall be repaired. The contractor's methods of repair shall be subject to the requirements of these contract documents and review by the owner's representative. After the repair methods have been reviewed and implemented the basin shall then be refilled and the testing procedure repeated. This process shall be continued until the excessive leakage is eliminated. All repairs of faulty workmanship and materials, additional tests, etc. shall be performed by the contractor in an acceptable manner and at no additional cost to the owner. Both measured and visible leakage shall be corrected in order for the basin to pass the leakage test.

PART 3. EXECUTION

- 3.1. PREPARATION: The Contractor shall make all preparations required for the successful execution of required Hydrostatic tests prior to scheduling the owner's representative to observe the test. Preparation shall include making necessary arrangements for a source of water to fill each structure to be tested.
- 3.1.1. All basins to be subjected to leakage tests shall be filled with water to the normal liquid level line. After the basin has been kept full of water for 48 hours, it will be assumed for the

purposes of the test that the absorption of moisture by the concrete in the basin is complete. All valves, gates, and openings to the structure shall then be closed and the change in water surface measured for a 24 hour period.

END OF SECTION

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HYDROSTATIC TESTS – CONCRETE
WATER HOLDING STRUCTURES

ANCHOR BOLTS, EXPANSION BOLTS, AND FASTENERS

PART 1. GENERAL

1.1. SCOPE: All necessary anchor bolts, expansion bolts, washers, sleeves and other fastenings shall be provided and shall be compatible with the materials to be fastened.

PART 2. PRODUCTS

- 2.1. MATERIALS: Where anchor bolts, sleeves or other fasteners require grouting to concrete, the grout shall be EMBECO 153, as manufactured by Master Builders, Cleveland, Ohio, or approved equivalent.
- 2.2. ACCESSORIES: Galvanized steel shall be used in concrete or masonry, unless otherwise indicated on the drawings. 316 stainless steel shall be used with aluminum or stainless steel, unless otherwise indicated. Stainless steel fastenings used with aluminum equipment shall be of the type recommended by the equipment manufacturer. Other anchor bolts and fastenings shall be hot-dipped galvanized steel in accordance with ASTM Designations A123 or A153, as appropriate, unless otherwise indicated. Expansion bolts shall have malleable iron and lead composition elements. Adhesive anchors shall be as manufactured by Hilti or equivalent.
- 2.3. QUALITY CONTROL: Ten (10) percent of the anchor/expansion bolts and adhesive anchors shall be tested by applying the maximum tightening torque shown in the manufacturer's catalogs for each anchor type.

If any of the anchors within a testing group are unacceptable, another ten percent of the remaining anchors shall be tested. This procedure shall be repeated until all of the anchors within any ten percent group are acceptable.

PART 3. EXECUTION

3.1. INSTALLATION: All fasteners shall be anchored to sound concrete. All due care must be exercised when drilling, nailing or shooting fasteners into existing concrete in order to minimize structural damage. Any damage which does occur shall be properly repaired or patched.

END OF SECTION

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CASTINGS

PART 1. GENERAL

1.1. SCOPE: Access frames, manhole rings and covers, grate inlets, and miscellaneous castings shall be furnished and installed as detailed or as required.

1.2. ALTERNATES: Risers shall be as manufactured by NEENAH Foundry Company, National Utility Products Company, Aggregates Equipment, Inc. or approved equal.

1.3. SYSTEM DESCRIPTION: Castings shall be gray iron castings conforming to the dimensions shown or equivalent foundry patterns and shall be free of cracks, blow holes or swells and shall have a smooth and workmanlike finish.

Risers/adjusting rings to bring existing manholes, valve boxes, etc., to new grades shall be furnished with machined bearing surfaces and be of uniform quality and free of defects.

PART 2. PRODUCTS

2.1. MATERIALS: The materials used in the manufacture of castings shall conform to ASTM A48, Class 30, AASHTO M105, Federal Specification QQ-1-652, DOT Standard Specifications, Section 962, as applicable.

2.2. FABRICATION: Frames and covers shall conform to the dimensions and weights shown. Mating surfaces shall be machined to prevent rocking and rattling and any unit found to rock or rattle shall be removed and replaced.

2.3. QUALITY CONTROL: Before leaving the foundry, all castings shall be thoroughly cleaned and subjected to a hammer test.

PART 3. EXECUTION (Not Applicable)

END OF SECTION

SUBMERSIBLE SEWAGE PUMPS - GENERAL

PART 1 GENERAL

1.1. SCOPE:

1.1.1. This section covers the work necessary to furnish and install, complete, the submersible, quick-disconnecting pump systems as specified herein, and as further described in associated portions of the Drawings and specifications.

1.2. DEFINITIONS:

1.3. ALTERNATIVES: The design of this system is specific to the following named materials, equipment, and/or supplier(s). Different materials, equipment, and/or supplier(s) will be considered though there may be significant redesign required to incorporate these into the full design intent. Alternative manufacturers will be evaluated as potential alternates as described elsewhere in the Contract Documents.

1.4. SUBMITTALS:

1.4.1. Shop drawings: Shop drawings shall include descriptive information as required to fully describe the products, materials, installation, overall performance, and to state deviations from specified requirements. Submittals shall include, but shall not be limited to the following:

- A. Performance data curves showing head, capacity, horsepower demand, and pump efficiency over the entire operating range of the pump, from shutoff to maximum capacity. The equipment manufacturer shall indicate separately the head, capacity, horsepower demand, overall efficiency corrected for materials of construction and minimum submergence required at the guarantee point. Performance requirements shall be as defined in the Hydraulic Institute Standards.

1.5. DELIVERY, STORAGE, HANDLING, & ENVIRONMENTAL REQUIREMENTS: Load, handle, transport, and unload all materials and equipment in such a manner that they are not excessively stressed, deformed, or otherwise damaged. Once delivered, protect all materials, equipment, and packaged materials from damage and deterioration from all sources. Materials and equipment shall be stored in a dry area and not be placed in direct contact with the ground. Materials and/or equipment damaged due to careless delivery, storage, or handling shall be immediately removed and replaced at no additional cost to the Owner.

PART 2 PRODUCTS:

2.1. MANUFACTURED UNITS:

2.1.1. The use of a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired only. Products of other manufacturers will be considered in accordance with applicable portions of this document.

2.1.2. Electrical equipment required to complete the work under this section shall conform to the applicable requirements of the electrical and instrumentation divisions of these contract documents.

2.2. EQUIPMENT:

2.2.1. The installed system shall consist of a submersible pump system complete with pumps, motors, 316 stainless steel guide rail system, supports, brackets, level controls, control panel and appurtenances. All pump parts and accessories that come into contact with the guide rail system shall be made of brass, bronze or other non-sparking material.

2.2.2. Motors shall be explosion proof and submersible, 3-phase with horsepower as specified or as required by the specified operating conditions. In any case the motor nameplate horsepower rating shall not be exceeded at any point on the pump curve. Motor, power cables and accessories shall be listed and labeled for installation in a Class 1, Division 1, Group C, and Group D environment.

2.3. COMPONENTS:

2.3.1. Guide Rail Assembly:

2.3.1.1. Each pump shall be equipped with a guide rail assembly designed so that each pump automatically connects to the discharge piping when the pump is lowered into the wet well. The lowering shall be accomplished by two guide rails of 2-inch minimum diameter. Each pump shall utilize a sealing flange to mate the pump with the discharge piping at the base of the guide rail assembly. This connection shall be simple, positive and not require any nuts, bolts, or other fasteners and be easily accomplished from ground level. No rotation of the pump shall be required for consummation of this sealing action.

2.3.1.2. The guide rail assemblies shall be provided with all necessary supports and anchor brackets required by the wet well geometry and dimensions. Guide rail assemblies, brackets, anchors and hardware shall be 316 stainless steel.

2.3.2. Each pump furnished and installed shall be equipped with a lifting cable of adequate length and load carrying capacity. Cable material shall be 316 stainless steel and suitable for use in the application specified and shall be reviewed at the shop drawing stage prior to installation.

2.3.3. All connections between moving parts and connections used during pump removal shall be approved for installation in Class 1, Division 1, Group C, and Group D atmospheres. Ferrous metal to ferrous metal contact shall not occur.

2.4. ACCESSORIES:

2.4.1. All pumps and motors shall be fixed with stamped noncorrosive identification plates securely mounted to each. Each plate shall bear make, model, identification, and rating data sufficient for ready determination of the systems character and capacity.

2.4.2. Equipment weighing 100 pounds or more shall be fitted with lifting lugs sufficient for the purpose.

2.4.3. Access hatches shall be placed in the top slab in the position shown or required to interface with the equipment to be used. The Contractor shall be responsible for the coordination of this installation so that the completed installation is suitable for its intended purpose of access, removal, and replacement of the equipment installed under this contract.

2.7. FABRICATION:

2.7.1. Finishes: All equipment and accessories not constructed of stainless, aluminum, brass, or bronze shall be factory coated and suitable for use in the corrosive environment found in a wastewater wet well. Reference is made to the appropriate painting sections of these specifications and the Drawings for

additional requirements.

PART 3 EXECUTION

3.1. PREPARATION: Shop and field painting shall be in accordance with and as specified elsewhere; however, prior to installation and startup any touch up and repair of damaged coatings shall be completed and fully cured per manufacturer's specifications or those of these contract documents

3.2. INSTALLATION:

3.2.1. Techniques: Pumps shall be installed in accordance with the manufacturer's recommendations, as reviewed and as shown on the Drawings

3.2.3. Guidelines: A supplier's and/or manufacturer's representative for the equipment specified shall be present at the jobsite for installation assistance, inspection and certification of the installation, equipment testing, startup assistance, and training of Owner's personnel

3.3. TESTING:

3.3.1. Prior to plant startup, all equipment described herein and elsewhere in the specifications shall be inspected for proper alignment, quiet operation, proper connection, and satisfactory performance by means of a functional test.

3.3.2. The Contractor, assisted by the pump manufacturer's representative, shall conduct field tests on all pumps to demonstrate conformance to the service conditions specified herein.

3.3.3. The Contractor shall test the operation of all ground fault protective devices by placing a signal into the ground fault sensors and verify the operation and subsequent tripping of all protective devices.

3.3.4. The Contractor shall measure and record each motor phase voltage and current while the motor is actually pumping.

END OF SECTION

SUBMERSIBLE SEWAGE PUMP STATIONS

PART 1. GENERAL

1.1 SCOPE: This section describes the details of the submersible sewage pump system named above. Other general requirements are contained in other sections of these specifications as well as on the Drawings.

1.2. ALTERNATIVES:

1.2.1. The pump manufacturers listed below are believed to meet the specifications, but does not release the manufacturer of equipment from meeting the detailed requirements of the specifications.

Pump Manufacturers:

- A. FLYGT
- B. Or Equivalent

1.3. SYSTEM DESCRIPTION: The system shall consist of a triplex pump system complete with motors, pumps, guide rails, anchors, supports, level switches, power cables, sensor cables, controls and control cabinets. Pumps, motors, and accessories shall be suitable for continuous pumping of raw sewage and its associated environment.

1.3.1. General Design Requirements:

Liquid Pumped:	Raw sewage
Liquid Temperature:	85 degrees F
Minimum Solid Passing:	3 inch diameter
Efficiency:	68.6% percent at Rated Capacity
Speed:	1775 rpm
Horsepower:	105 HP
Impeller Diameter:	350 mm
Discharge Diameter:	6-inch
Frequency:	60 HZ
Voltage:	440 V

1.3.2. Performance Requirements:

Pump Conditions:

1,262 gpm at 131 feet TDH

1.4 SUBMITTALS

- A. The Pump Data Sheet submittal shall be as per HCUD standard specification 4D.20 PUMP DATA SHEET

1.5 ASBUILTS, MANUALS AND WARRANTY DOCUMENTS

Submit as per HCUD standard specification 4D.21

1.6 WARRANTY

Shall be as per HCUD standard specification 4D.24 WARRANTY:

PART 2 PRODUCTS:

2.1 VALVE VAULTS

Shall be as per HCUD standard specification 4D7 PUMP STATION VALVE VAULT

+

2.3 PUMP STATION PUMPS

Shall be as per HCUD standard specification 4D9 PUMP STATION PUMPS

2.4 PUMP STATION MOTORS

Shall be as per HCUD standard specification 4D10 PUMP MOTORS

2.5 LIQUID LEVEL SENSORS

Shall be as per HCUD standard specification 4D11 LIQUID LEVEL SENSORS

2.6 CONDUIT SYSTEMS

Shall be as per HCUD standard specification 4D.12 CONDUIT SYSTEMS

2.7 PIPING

Shall be as per HCUD standard specification 4D.13 PIPING

2.8 VALVES AND FITTINGS

Shall be as per HCUD standard specification 4D.14 VALVES AND FITTINGS

2.9 PRESSURE TAPS AND GAUGE

Shall be as per HCUD standard specification 4D.15 PRESSURE TAPS AND GAUGE

2.10 POTABLE WATER FAUCETS

Shall be as per HCUD standard specification 4D.16 POTABLE WATER FAUCETS

2.11 ACCESSORIES

Shall be as per HCUD standard specification 4D.17 ACCESSORIES

2.12 APPROVED PARTS LIST

Shall be as per HCUD standard specification 4D.18 APPROVED PARTS LIST FOR STANDARD PUMPING STATION DESIGN

2.13 SYSTEM CONTROLS AND TELEMETRY

Shall be as per HCUD standard specification 11 .2 TELEMETRY CONTROL SYSTEM

And

11 .2.2 TELEMETRY CONTROL UNIT

And

11 .2.4 ENCLOSURES

And

11 .3 CONTROLS (STANDARD)

And

11 .4 CIRCUIT BREAKERS

And

11 .5 MOTOR STARTERS

And

1 .6 CONCRETE BASE PAD

PART 3 EXECUTION

3.1 INSTALLATION:

Install all equipment in accordance with manufacturer requirements and compliance with applicable codes.

A manufacturer's representative for the equipment specified herein shall be present at the jobsite for the number of man-hours listed, for each lift station, exclusive of travel time.

- A. 4 hours for installation assistance, inspection, and confirmation of the correctness of the installation.
- B. 4 hours for testing and startup.

3.1.1 EXCAVATION AND BACKFILL

Shall be as per HCUD standard specification 4D.19 EXCAVATION AND BACKFILL

3.1.2 TESTING

Shall be as per HCUD standard specification 4D.23 TESTING: "PUMP STATION START UP"

And

Shall be as per HCUD standard specification 4D.25 PUMP STATION FINAL INSPECTION AND TESTING

END OF SECTION

SECTION 15050

PIPING, FITTINGS, VALVES AND ACCESSORIES

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. The work included in this Section consists of furnishing all labor, equipment and materials and in performing all operations necessary for the construction or installation of all piping, valves, valve boxes and all castings and appurtenances within, adjacent and connecting to the water treatment plant and inside the limits of the work shown therefore, complete and ready for operation as shown on the Drawings and specified herein.

1.02 QUALITY ASSURANCE

- A. Qualifications: Each product specified in this section shall be by a single manufacturer. Products have proven reliable in similar installation over a reasonable number of years.
- B. Standards: All codes, specifications, standards, etc., referenced herein shall be of the issue in effect on the date of Invitation to Bid.
- C. Manufacturers: Where materials and/or equipment are specified by brand name or manufacturer, the intent is to establish a minimum level of performance, a standard of quality, or to identify a preferred system based on previous experience. The Contractor may choose an alternate for substitution provided that the alternate is submitted in writing to the Engineer for approval prior to purchase, installation, or use. The Contractor shall assume full responsibility for replacement of any alternate equipment or materials installed which are not specified, reviewed, or shown on the drawing.

1.03 SUBMITTALS

- A. In general, the following shop or data drawings shall be submitted for review.
 - 1. Test Certificates for pipe (Mill Test Reports)
 - 2. Details of Restrained Joints

3. All Valves and Valve Boxes
4. Detail Piping Layout Drawings

Piping layout drawings shall be fully drawn showing the piping in full detail with exact locations, dimensions and schedules of all pipe, fittings, hangers, supports and appurtenances. They shall be made in accordance with the general information shown on the Contract Drawings and equipment. Where special fittings are required, they shall be shown in large detail. One line drawings are not acceptable for piping four inches in diameter and larger.

5. Temporary Plug and Anchorage System for Pressure Tests of Piping.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. During shipping, delivering and installing pipe and accessories, they shall be handled in such manner as to ensure a sound undamaged condition.
- B. Particular care shall be taken not to injure the pipe coating or lining.
- C. All pipe and related items installed under this Division shall be stored as recommended by the manufacturer. Contractor shall take all actions necessary to protect all items installed under this Division including furnishing all special storage areas required by equipment manufacturers. Pipe shall be stored on suitable timber skids, free from contact with the ground.
- D. Gaskets shall be stored in as clean, cool and shaded an area as is practical.
- E. All special handling equipment and supports required in the handling of materials shall be furnished by the Contractor.

1.06 WARRANTY AND GUARANTEES

- A. The items supplied under this section shall be warranted for a period of one (1) year by the manufacturer and Contractor.

Warranty period shall commence on Owner acceptance as outlined in Division 1.

- B. The items shall be warranted to be free from defects in workmanship, design and materials. If any item should fail during the warranty period, it shall be replaced at no expense to the Owner.
- C. The manufacturer's warranty period shall run concurrently with the Contractor's warranty period. No exception to this provision shall be allowed.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Pipe – Per Section 4 of the HCUD Water, Reclaimed Water and Wastewater Construction Specification Manual, latest edition.
- B. Pipe Fittings – Per Section 4 of the HCUD Water, Reclaimed Water and Wastewater Construction Specification Manual, latest edition.
- C. Joint Material – Per Section 4 of the HCUD Water, Reclaimed Water and Wastewater Construction Specification Manual, latest edition.
- D. Wall Sleeves, Pipes and Castings – Per Section 4 of the HCUD Water, Reclaimed Water and Wastewater Construction Specification Manual, latest edition.
- E. Valves – Per Section 4 of the HCUD Water, Reclaimed Water and Wastewater Construction Specification Manual, latest edition.
- F. Tapping Sleeves and Valves – Per Section 4 of the HCUD Water, Reclaimed Water and Wastewater Construction Specification Manual, latest edition.
- G. Pressure Gauges – Per Section 4 of the HCUD Water, Reclaimed Water and Wastewater Construction Specification Manual, latest edition.
- H. Insulating Flanges, Couplings, and Unions – Per Section 4 of the HCUD Water, Reclaimed Water and Wastewater Construction Specification Manual, latest edition.
- I. Valve Boxes – Per Section 4 of the HCUD Water, Reclaimed Water and Wastewater Construction Specification Manual, latest edition.
- J. Gravity Sewer Main Testing – Per Section 4 of the HCUD Water, Reclaimed Water and Wastewater Construction Specification Manual, latest edition.
- K. Pipeline Locators - Per Section 4 of the HCUD Water, Reclaimed Water and Wastewater Construction Specification Manual, latest edition.
- L. Testing - Per Section 7 of the HCUD Water, Reclaimed Water and Wastewater Construction Specification Manual, latest edition.
- K. Miscellaneous Items
 - 1. Other items necessary for the complete installation and not specified herein shall conform to the details and notes shown on the drawings. All minor items implied, usually included, or required for the construction of a complete operating system shall be installed whether shown on the detail drawings or not.
 - 2. Appropriate signs as detailed on the Drawings shall be provided for any non-potable water system at all hose bibbs and outlets.

3. Metalized warning tapes shall be provided for all non-metallic water mains. Such tape shall be Terra, Type D, 2 inch wide, imprinted with the words "Caution: Water Lines Below", or equal. The tape shall be placed 12 inches below final grade.
4. Valve operators shall be manual, lever or wheel operated unless specified otherwise. Buried valves shall be provided with an operating nut and stem extension, if necessary, to bring the nut to within 6 inches of the valve box cover. Two matched T-wrenches shall be provided which shall allow operation of the buried valves through valve box cover openings.

2.02 PIPING SUPPORT SYSTEMS

- A. Piping shall be supported, in general, as described herein-after and as shown by the pipe support details on the Drawings.
- B. No attempt has been made to show all required supports in all locations. The absence of pipe supports and details on any drawings shall not relieve the Contractor of the responsibility for providing them throughout the plant.
- C. Where piping connects to equipment it shall be supported by a pipe support and not by the equipment.
- D. Pipe support system components shall withstand the dead loads imposed by the weight of the pipes filled with water, plus any insulation. Commercial pipe supports and hangers shall have a minimum safety factor of 5.
- E. Pipe supports and hangers shall conform to Federal Specification WW-H-171, or shall be as specifically shown or indicated on the Drawings.
- F. Pipe hangers shall be complete with rods and clamps or inserts proportioned to the size of the pipe to be supported.
- G. Pedestal pipe supports shall be adjustable, with stanchion, saddle, and anchoring flange. Provide neoprene waffle isolation pad under anchoring flanges, adjacent to equipment or where otherwise required to provide vibration isolation.
- H. All piping shall be supported in a manner which will prevent undue strain on any valve, fitting, or piece of equipment. In addition, pipe supports shall be provided at changes in direction or elevation, adjacent to flexible couplings, and where otherwise shown. Pipe supports and hangers shall not be installed in equipment access areas or bridge crane runs.

PART 3 - EXECUTION

3.01 INSPECTION

- A. All pipe and fittings, valves and other material shall be subject to inspection and approval by the Engineer after delivery, and no broken, cracked, misshapen, imperfectly coated, or otherwise damaged or unsatisfactory material shall be used. When a defect or crack is discovered, the injured portion shall not be installed. Cracked pipe shall have the defect cut off at least 12 inches from the break in the sound section of the barrel.

3.02 INSTALLATION

A. General

1. The Contractor shall be responsible for delivery scheduling, handling, and storage of all materials used in construction, following manufacturer's recommendations and good practice.
2. In the event of a conflict between the installation standards and the manufacturer's recommendations, the Engineer's interpretation and instructions shall prevail.

3.03 FIELD QUALITY CONTROL

- A. Flushing: All piping shall be flushed to remove all sand and other foreign matter with the velocity of the flushing water not less than 2.5 feet per second. Flushing shall be terminated at the direction of the Engineer. The Contractor shall dispose of the flushing water without causing a nuisance or property damage and will repair any damage caused by flushing activities.
- B. Hydrostatic Pressure Testing: All pumps, gauges and measuring devices shall be furnished, installed and operated by the Contractor and all such equipment and devices and their installation shall be approved by the Engineer. All hydro-static testing shall be done in the presence of a representative of the Owner as a condition precedent to the approval and acceptance of the system. All pipes shall be thoroughly flushed immediately prior to testing.
- C. Pressure Tests for Lines
 1. Pressure piping installed under this contract shall be subjected to a hydrostatic pressure test after the pipe has been installed and partially backfilled for underground installations. Each pressure test shall be maintained for at least three hours at 100 psi or 150 psi pressure during which time all joints shall be examined for leaks. The Engineer shall specify the 100 psi or 150 psi as the test pressure for each type of piping to be hydrostatically tested prior to the testing.
 2. Before application of test pressure, all air shall be expelled from the pipe. If permanent air vents are not located at all high points, the Contractor shall install corporation cocks or fittings and valves at such points so the air can be expelled as the pipe system is slowly filled with water. After expulsion of air, the corporate

cocks, or other blowoff devices shall be closed and the test pressure applied.

3. Piping runs with two joints or less need not be pressure tested, but shall be checked for leakage under normal operating pressures.
4. All exposed pipe, fittings, valves and joints shall be carefully examined for leaks. All cracked, broken, or defective pipe, fittings or valves discovered as a consequence of this pressure test shall be removed and replaced with sound material. All leaking, or defective joints shall be repaired, replaced or corrected. After all necessary replacements and corrections, the test shall be repeated until satisfactory to the Owner.
5. Leakage is defined as the quantity of water that must be supplied into the newly laid pipe or any valved section thereof to maintain the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. The allowable limit for leakage of underground piping shall be determined by the following formula.

D. Allowable Limits for Leakage of Pressure Piping

1. The hydrostatic pressure tests shall be performed as herein above specified and no installation, or section thereof, will be acceptable until the leakage is less than the number of gallons per hour as determined by the formula:

$$L = \frac{NxDx(P)^{\frac{1}{2}}}{133,200} \times 2 \text{ Hours}$$

in which,

L = Allowable leakage, in gallons per hour

N = Length of Pipe being tested

D = Nominal pipe diameter; in inches

P = Average test pressure during the test, in psi gauge
(160 PSI minimum)

2. Water shall be supplied to the line during the test period as required to maintain the test pressure as specified. The quantity used, which shall be compared to the above allowable quantity, shall be measured by pumping from a calibrated container. A 5/8 inch meter installed on the discharge side of the pump may be used to measure the leakage for large mains when approved by the Engineer.
3. Where leakage exceeds the allowable limit, as specified hereinbefore, the defective pipe or joints shall be located and repaired. If the defective portions cannot be located, the Contractor shall remove and reconstruct as much of the work as is necessary in order to conform to the specified limits. No additional payment will be made for the correction of defective work, or to damage to other parts of the work resulting from such corrective work.

E. Tests for Drain Lines

1. Drain lines shall be tested for infiltration and exfiltration.
2. The allowable limits of infiltration or exfiltration or leakage for the drain lines, or any portion thereof shall not exceed a rate of 0.1 gallon per foot of pipe per 24 hours for all sizes of pipe throughout the system.
3. All of the system shall be tested for infiltration and exfiltration, as directed by the Engineer. Prior to testing for infiltration, the system shall be pumped out so that normal infiltration conditions exist at the time of testing. The amounts of infiltration or exfiltration shall be determined by pumping into or out of calibrated drums, or by other approved methods.
4. The exfiltration test will be conducted by filling the portion of the system being tested with water to a level which will provide: a minimum head in a lateral connected to the test portion of 2 feet; or, in the event there are no laterals in the test portion, a minimum difference in elevation between the crown of the highest portion of the sewer and the test level of 5 feet.
5. Where infiltration or exfiltration exceeds the allowable limits specified herein, the defective pipe, joints, or other faulty construction shall be located and repaired by the Contractor. If the defective portions cannot be located, the Contractor shall remove and reconstruct as much of the work as is necessary in order to conform to the specified allowable limits.
6. The Contractor shall provide all labor, equipment and materials and shall conduct all testing required, under the direction of the Engineer. No separate payment will be made for this work and the cost for this work shall be included in the prices quoted in the Proposal.

3.04 DISINFECTION

- A. The Contractor shall sterilize all potable water distribution and service lines in accordance with AWWA C601. Chlorinated water shall be fed into the system so as to result in a chlorine residual of not less than 50 parts per million (ppm) at all points in the system. Valves and hydrants shall be manipulated for disinfection of all working parts. The system shall be isolated for 24 hours and tested for chlorine residual. If the residual is greater than 5 ppm, the system shall be flushed at all points until the residual is 0.5 ppm. Water samples for bacteriological examination shall be taken at points selected by the Engineer and submitted to the nearest Department of Health bacteriological laboratory. Disinfection shall not be considered satisfactory until laboratory reports indicate that the water in the system is suitable for drinking.

END OF SECTION

SECTION 15064

STAINLESS STEEL PROCESS PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish, install and test complete stainless steel piping and tubing systems, including stainless steel pipe, tubing, fittings, couplings, supports and appurtenances, as shown on the Drawings and as specified herein, and in accordance with piping manufacturer recommendations.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Pipe and Pipe Fittings - General is specified in Section 15050.

1.3 QUALITY ASSURANCE

- A. General:
 - 1. Manufacturer's Qualifications:
 - a. All shop fabricated stainless steel pipe and fittings shall be furnished by a single manufacturer who is experienced, reputable, qualified and regularly engaged for the last 10 years in the manufacture and fabrication of stainless steel piping systems, and shall show evidence of satisfactory service in at least 5 installations for potable water and/or wastewater treatment or conveyance systems.
 - b. Stainless steel pipe shall be manufactured in the United States.
 - 2. Acceptable Manufacturers:
 - a. Douglas Brothers, Portland, Maine
 - b. Felker Bros. Corp., Marshfield, Wisconsin
 - c. Or approved equal.
- B. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
 - 1. ASTM A 240, Specifications for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels.
 - 2. ASTM A 269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - 3. ASTM A 312, Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes.
 - 4. ASTM A 320, Alloy Steel Bolting Material for Low Temperature Service.
 - 5. ASTM A 530, General Requirements of Specialized Carbon and Alloy Steel Pipe.
 - 6. ASTM A 536, Ductile Iron Castings.
 - 7. ASTM A 774, As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures.

8. ASTM A 778, Welded, Unannealed Austenitic Stainless Steel Tubular Products.
 9. ASTM A 1016 / A1016M-01, Standard Specification for General Requirements for Ferritic Alloy Steel, Austenitic Alloy Steel and Stainless Steel Tubes.
 10. ASTM D 6585-00, Standard Specification for Unsintered Polytetrafluoroethylene (PTFE) Extruded Film or Tape.
 11. ASTM D 3294-97, Standard Specification for PTFE Resin Molded Sheet and Molded Basic Shapes.
 12. ASTM F 36, Standard Test Method for Compressibility and Recovery of Gasket Materials.
 13. ASTM F 38, Standard Test Methods for Creep Relaxation of a Gasket Material.
 14. ANSI B16.1, Cast Iron Pipe Flanges and Flanged Fittings.
 15. ANSI B16.9, Factory Made Wrought Steel Butt Welding Fittings.
 16. ANSI B36.19, Stainless Steel Pipe.
 17. ANSI B31.1/AWWA C206, Standard for Field Welding.
 18. ANSI/ AWWA C-220, Standard for Stainless Steel Pipe, 4 in. and Larger.
 19. AWWA M-11, Steel Pipe – A Guide for Design and Installation.
 20. ANSI/AWS D1.1, Structural Welding Code Steel.
- C. Shop Welding:
1. Shop welding shall be performed by welders certified per ASME Section IX, in accordance with ANSI B31.1.
- D. Field Welding:
1. Field welding shall be done with prior approval of the Engineer and shall be performed by welders certified per ASME Section IX, in accordance with ANSI B31.1. Field welds shall be equal to shop welds in all respects.

1.4 SUBMITTALS

- A. Submit shop drawings, manufacturer's literature, catalog cuts, piping layouts in accordance with Section 01300 and Section 15050. Specific information which shall be submitted is identified below.
1. Name of manufacturer of pipe, fittings and appurtenances and a list of material(s) to be provided by each manufacturer.
 2. Piping layouts and schedules to include: dimensions; location(s) and type(s) of joints, fittings, equipment, valves, supports and appurtenances; coordination with all other work and existing conditions, and all other pertinent technical specifications for the piping systems to be furnished. Piping layouts shall also indicate intended field welding locations.
 3. Shop fabrication drawings showing alloys, diameters, pipe wall thicknesses, flanges and other joint preparation details, dimensions, fittings, and other appurtenances to be supplied.
 4. Proposed cleaning methods, including pre-cleaning, passivation and final cleaning.
 5. Certifications for proposed shop and field welders per ASME Section IX. Certifications shall document conformance with ASME B31.1 - Power Piping.
 6. Shop fabrication inspection report documenting a Certified Welding Inspection (CWI) of shop welds. CWI shall be performed on 20% of the total number of shop welds. Shop fabrication inspection report, including qualifications of shop

- Certified Welding Inspector, shall be submitted prior to shipment of materials. Welds identified as insufficient shall be repaired or replaced prior to shipment.
7. The Contractor shall submit a sample of the tube fittings and the installation manual from the manufacturer.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. Pipe:
 1. Pipe shall be manufactured from ASTM-A240 annealed and pickled sheets and plates in accordance with ASTM A778 in Types 304L and 316L stainless steel as specified herein. Pipe under 3 inches in diameter shall conform to ASTM A-312.
 2. Pipe shall be manufactured to nominal pipe sizes as listed in ANSI B36.19, Table 2.
 3. Wall thickness for 12-gauge pipe shall be 0.109 inches minimum.
- B. Fittings:
 1. Fittings shall be manufactured in accordance with ASTM-A-774 of the same raw material and in the same thicknesses as the pipe.
 2. Long radius elbows up to 24" diameter shall be smooth flow; i.e. centerline to end of elbow equals 1.5 times the nominal pipe size. All short radius, special radius, and reducing elbows and long radius elbows greater than 24" diameter shall be of mitered construction with at least (5) miter sections for 90 degree bends, (3) mitered sections for 45 and 60 degree bends, and (2) mitered sections for 30 degree and smaller bends.
 3. Reducers shall be straight tapered, cone type.
 4. Tees, crosses, laterals and wyes shall be shop fabricated from pipe.
 5. Field fabricated fittings are not acceptable.

2.2 FLANGES

- A. Flanged pipe ends shall be made up of stainless steel slip-on type rolled angle face rings and hot-dipped galvanized ductile iron back-up flanges drilled to ANSI 16.5 class 125 standard. The angle face ring thickness shall be equal to or greater than the wall of the pipe or fitting to sides to the pipe or fitting. The angle leg shall not interfere with the flange bolt holes. The back-up flanges shall be supplied with the following nominal thicknesses.

Nom. Pipe Size (IN.)	Flange Thickness (IN.)
2½ - 3	1/2
4	9/16
6 - 10	5/8
12 - 16	3/4

2.3 COUPLINGS

- A. The piping will be shop prepared for pipe couplings where shown on the Drawings or specified herein.
 1. Arched band type couplings shall be 316/316L stainless steel. Couplings shall be of fixed (FxF), expansion (ExE) or fixed by expansion (FxE) and shall be

Bolted-Sleeve Couplings (Depend-O-Lok type) as manufactured by Victaulic or equivalent. Pipe shall be plain end with external weld beads ground smooth to ensure proper gasket seating. Gasket material shall meet the temperature ratings specified below.

2. Sleeve type couplings shall be of standard steel construction as specified in Section 15088. Pipe shall be plain end with external weld beads ground smooth to insure proper gasket seating. For pressure pipelines, sleeve coupling joints will be restrained by the use of harness rods connecting across the joint to flange lugs on adjacent flange joints. Where no adjacent flange joints exist, stainless steel harness lugs shall be welded to the pipe to receive the harness rods. All sleeve couplings, flange lugs, harness rods and hardware will be provided by the Contractor.

2.4 THREADED CONNECTIONS

- A. Threaded pipe, gauge or instrument connections shall be made using stainless steel 150-pound threaded half couplings conforming to ASTM-A182 or ASTM-A-276, shop welded to the pipe at the locations shown on the Drawings.

2.5 JOINTS

- A. Flanges shall be provided as a minimum at all flanged valves, meters, couplings, and other equipment. Couplings will be provided as shown on the Drawings.
- B. Couplings will be provided as shown on the Drawings.
- C. Expansion joints and couplings shall be spool type, manufactured from heat resistant EPDM and be suitable for 150 psig.
- D. Pipe and fitting spools shall be shop fabricated to the fullest extent possible in 40'0" maximum lengths with 7'-6" maximum widths for efficient commercial transport to the project site. Spools with fittings may exceed 40'-0" so long as length allows commercial transport. Smaller pipe spools shall be provided with joints as shown on the Drawings for special handling, installation, and/or disassembly requirements.
- E. All other joints required for shipping, handling and installation of the piping spools shall be flange joints.

2.6 GASKETS, BOLTS AND NUTS

- A. Flanged Joints
 1. Gaskets shall be full-faced neoprene or rubber ring gaskets with cloth insertion.
 - a. 12-inch diameter or less shall be 1/16-inch thick.
 - b. Larger than 12-inch diameter shall be 3/32-inch thick.
 - c. Gaskets shall be suitable for use at temperatures up to 250°F.
 2. Use bolts, bolt studs with a nut on each end, or studs with nuts where the flange is tapped.
 - a. Number and size shall conform to the same ANSI standard as the flanges.
 - b. Bolts, nuts and washers shall be stainless steel, ASTM F593/F594, Alloy Group 2, AISI 316 stainless steel with minimum yield strength of 65,000 psi. For high temperature service, use A193 Grade B8M Class 1 AISI 316 stainless steel. Bolt grade identification marking "B8M".
 - c. Bolts, nuts and washers shall be carbon steel, ASTM A307 grade B.

PART 3 - EXECUTION

3.1 FABRICATION AND INSTALLATION

- A. All stainless steel pipe and fittings shall be pickled by immersion in an air agitated tank containing an ambient 25% solution of nitric and hydrofluoric acids for 15 to 20 minutes at 125 degrees F. A clean water rinse shall follow the acid pickle.
- B. Spools shall be fabricated to the "Pipe Fabrication Institute" fabricating tolerances ES-3 (1981).
- C. Welding:
 - 1. All shop and field welding shall be performed by certified welders and in full conformance with ANSI B31.1. Field welding shall be done with prior approval of the Engineer including performance of a demonstration weld in the presence of the Engineer at no expense to the Owner. Additional inspections or testing may be performed per Section 01400.
 - 2. Piping with wall thickness up to 11-gauge (0.125") shall be welded with the TIG (GTAW) process. Heavier walls shall be properly beveled and have a root pass with the TIG (GTAW) process followed by subsequent passes with the TIG (GTAW), MIG (GMAW), or metallic Arc (SMAW) process.
 - 3. Filler wire of ELC grades only shall be added to all welds to provide a cross section at the weld equal to or greater than the parent metal. Weld deposit shall be smooth and evenly distributed and have a crown of no more than 1/16 inch on the I.D. and 3/32 inch on the O.D. of the piping. Concavity, undercut, cracks or crevices shall not be allowed.
 - 4. Welds shall have full penetration to the interior surface, and inert gas shielding shall be provided to the interior and exterior of the joint.
 - 5. All welds shall have a surface finish equal to the smoothness of the pipe. Excessive weld deposits, slag, spatter, and projections shall be removed by grinding. Interior bead welds shall be smooth, evenly distributed, with an interior projection not exceeding 1/16-inch beyond the I.D. of the pipe or fitting.
 - 6. Angle face rings shall be continuously welded on both sides to the pipe or fitting. Welds on gasket surfaces shall be ground smooth.
- D. After welding, all welded joints shall be treated with a pickling solution, brushed with stainless wire brushes and rinsed clean.
- E. All fabricated piping shall have openings plugged and flanges secured for storage and/or transport after fabrication. All fabricated piping shall be piece marked with identifying numbers or codes which correspond to the Contractor's layout and installation drawings. The marks will be located on the spools at opposite ends and 180 degrees apart.
- F. Handling and Installation:
 - 1. The piping supplier during manufacturing, fabrication and handling stages, and the Contractor during handling and installation stages, shall use extreme care to avoid the contact of any ferrous materials with the stainless steel piping.
 - 2. All saws, drills, files, wire brushes, etc. shall be used for stainless steel piping only.
 - 3. Pipe storage and fabrication racks shall be non-ferrous or stainless steel or rubber lined.

4. Nylon slings or straps shall be used for handling stainless steel piping. Contact with ferrous items may cause rusting of iron particles embedded in the piping walls.
 5. After installation, the Contractor shall wash and rinse all foreign matter from the piping surface. If rusting of embedded iron occurs, the Contractor shall pickle the affected surface with Oakite Deoxidizer SS or equal, scrub with stainless steel brushes and rinse clean.
- G. Tube Bending:
1. Bending shall result in smooth uniform bends without signs of flattening, kinking or wrinkling.
 2. Hand Bending is not allowed. Bending shall be performed using a bench top tube bender. The bench top tube bender shall consist of a bend shoe, drive shaft, roller bracket assembly, roller adjustment knob and roller bracket lever. The bender shall have manual operation using a hand crank or be electrically driven. The tube bender shall have an indicator to identify the bending angle.
 3. Bends near tube fittings shall maintain a minimum straight tube length from the bend to the fitting as required by the manufacturer of the fitting.
 4. Bending shall be performed in accordance with the minimum tube bend radius identified by the manufacturer of the tubing.
- H. Maintenance:
1. The Contractor shall be responsible for supplying and installing the stainless steel piping with a consistently clean surface. Identifying spool piece marks shall be removed with paint thinner or solvents and the entire stainless steel surface shall be washed with detergent and hot water and rinsed clean.
 2. Final marking of the pipeline will be in accordance with the Hernando County Utilities Department Water, Reclaimed Water and Wastewater Construction Specifications Manual, Latest Edition.
- I. After installation, the piping system shall be tested by the Contractor according to Section 15050.

END OF SECTION

120 EARTHWORK AND RELATED OPERATIONS FOR LAP (CLASS - D).
(REV 3-2-22) (FA 7-13-21) (FY 2023-24)

SECTION 120 is deleted and the following substituted:

SECTION 120
EARTHWORK AND RELATED OPERATIONS FOR LAP (CLASS - D)

120-1 Description.

120-1.1 General: Perform earthwork and related operations based on the type of work specified in the Contract and the Earthwork Categories as defined below. Meet the applicable requirements for materials, equipment and construction as specified.

Earthwork and related operations consist of excavation for the construction of the roadway, excavation for structures and pipe, constructing backfill around structures and pipe, and constructing embankments as required for the roadway, ditches, and channel changes.

120-1.2 Earthwork Categories: Performance of Earthwork Operations will fall into one of the following Earthwork Categories:

120-1.2.1 Earthwork Category 1: Includes the earthwork and related operations associated with the construction of sidewalks and bike paths along with any drainage structures associated with these facilities.

120-1.2.2 Earthwork Category 2: Includes the earthwork and related operations associated with the construction of turn lanes and other non-mainline traffic lanes, widening, roadway shoulders, concrete box culverts, retaining walls, and other drainage structures on the non-mainline pavement.

120-1.2.3 Earthwork Category 3: Includes the earthwork and related operations associated with the construction of new mainline pavement, along with concrete box culverts, retaining walls, and other drainage structures on the mainline pavement.

120-1.3 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 Department of a contamination assessment/remediation process plan to 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.

120-2 Classifications of Excavation.

120-2.1 General: The Engineer may classify excavation specified under this Section for payment as any of the following: regular excavation, subsoil excavation, lateral ditch excavation, and channel excavation.

The definition of existing surface is 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 definition of finished graded surface includes the completed grades of side slopes, unpaved shoulders, and the bottom of the base for flexible or rigid pavement.

120-2.2 Regular Excavation: Regular excavation includes roadway excavation and borrow excavation, as defined below for each.

: 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 as may be specifically shown to be paid for separately and that portion of the lateral ditches within the limits of the roadway right-of-way as shown in the Plans.

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 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 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, 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 of channels of streams and satisfactory disposal of all materials from the limits of the channel as shown in the Plans.

120-2.6 Excavation for Structures and Pipe: Excavation for structures consists of the excavation for bridge foundations, box culverts, pipe culverts, storm sewers and all other pipelines, retaining walls, headwalls for pipe culverts and drains, catch basins, drop inlets, manholes, and similar structures.

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 Excavation Requirements.

120-4.1 Removal of Unsuitable Materials and Existing Roads

120-4.1.1 Subsoil Excavation: Where rock, muck, clay, or other material within the limits of the roadway is unsuitable in its original position, excavate such material to the depth 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 ± 0.2 foot in depth and ± 6 inches (each side) in width.

120-4.1.2 Construction over Existing Old Road: Where a new roadway is to be constructed over an old one, completely remove the existing pavement for the entire limits of the width and depth. If the Plans provide that paving materials may be incorporated into the fill, distribute such material in a manner so as not to create voids. Recompact the old road meeting the requirements of 120-10.2.

120-4.2 Lateral Ditch Excavation: Excavate inlet and outlet ditches to structures and roadway, changes in channels of streams and ditches parallel to the roadway. Dress lateral ditches to the grade and finished graded surface shown in the Plans.

120-4.3 Channel Excavation: Excavate and dispose of all materials from the limits of the channel as shown in the Plans. Excavate for bridge foundations, box culverts, pipe culverts, storm sewers and all other pipelines, retaining walls, headwalls for pipe culverts and drains, catch basins, drop inlets, manholes, and similar structures.

120-4.4 Excavation for Structures and Pipe.

120-4.4.1 Requirements for all Excavation: Perform all excavation to foundation materials, satisfactory to the Engineer, regardless of the elevation shown in the Plans. Remove rock, boulders or other hard lumpy or unyielding material to a depth of 12 inches below the bottom of pipes and box culverts elevations. Remove muck or other soft material to the depth indicated in the Plans or as directed by the Engineer.

120-4.4.2 Earth Excavation:

120-4.4.2.1 Foundation Material other than the Rock: When masonry is to rest on an excavated surface other than rock, take special care to avoid disturbing the bottom of the excavation, and do not remove the final foundation material to grade until just before placing the masonry. In case the foundation material is soft or mucky, the Engineer may require excavation to a greater depth and to backfill to grade with approved material.

120-4.4.2.2 Foundation Piles: Where foundation piles are used, complete the excavation of each pit before driving the piles. After the driving is completed, remove all loose and displaced material, leaving a smooth, solid, and level bed to receive the masonry.

120-4.4.2.3 Removal of Obstructions: Remove boulders, logs, or any unforeseen obstacles encountered in excavating.

120-4.4.3 Rock Excavation: Clean all rock and other hard foundation material, remove all loose material, and cut all rock to a firm surface. Either level, step vertically and horizontally, or serrate the rock, as may be directed by the Engineer. Clean out all seams and fill them with concrete or mortar.

120-4.4.4 Pipe Trench Excavation: Excavate trenches for pipes to the elevation of the bottom of the pipe and to a width sufficient to provide adequate working room. Remove soil not meeting the classification specified as suitable backfill material in 120-8.3.2.2 to a depth of 4 inches below the bottom of the pipe elevation. Remove rock, boulders or other hard lumpy or unyielding material to a depth of 12 inches below the bottom of the pipe elevation. Remove

muck or other soft material to a depth necessary to establish a firm foundation. Where the soils permit, ensure that the trench sides are vertical up to at least the mid-point of the pipe.

For pipelines placed above the natural ground line, place and compact the embankment, prior to excavation of the trench, to an elevation at least 2 feet above the top of the pipe and to a width equal to four pipe diameters, and then excavate the trench to the required grade.

For pipe trenches utilizing trench boxes, ensure that the trench box used is of sufficient width to permit thorough tamping of bedding material under and around the pipes as specified in 125-8.1.6.

Do not disturb the installed pipe and its embedment when moving trench boxes. Move the trench box carefully to avoid excavated wall displacement or damage. As the trench box is moved, fill any voids left by the trench box and continuously place and compact the backfill material adjacent to and all along the side of the trench box walls to fill any voids created by the trench box.

120-5 Disposal of Surplus and Unsuitable Material.

120-5.1 Ownership of Excavated Materials: Take ownership of the materials and dispose them outside the right-of-way.

120-5.2 Placement of Muck on Side Slopes: As an exception to the provisions of 120-5.1, the Contractor may store muck (A-8 material) alongside the roadway, provided there is a clear distance of at least 6 feet between the roadway grading limits and the muck. Do not store such material in a manner which will impede the inflow or outfall of any channel or side ditches. All stored materials that is not used for the final surface material must be disposed of outside the right-of-way.

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. Existing limerock base that is removed may be incorporated in the stabilized portion of the subgrade. If the construction sequence will allow, incorporate all existing limerock base 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 road. If the materials are buried, disregard the 300-foot limitation.

120-6 Materials for Embankment.

120-6.1 General Requirements for Embankment Materials: Construct embankments using suitable materials excavated from the roadway or delivered to the jobsite from authorized borrow pits. Embankment material shall not contain muck, stumps, roots, brush, vegetable matter, rubbish, reinforcement bar or other material that does not compact into a suitable and enduring roadbed.

Remove all waste material designated as undesirable. Use material in embankment construction in accordance with Plan details or as the Engineer directs.

Construct the embankment using maximum particle sizes 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, larger rocks (not to exceed 18 inches in any dimension) may be placed 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. Where constructing embankments adjacent to bridge end bents or abutments, do not place rock larger than 3-½ inches in diameter within 3 feet of the location of any end-bent piling.

120-6.2 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.

120-6.3 Authorization for Use of Borrow: Use borrow pit 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 and pipe. Do not use borrow material until so ordered by the Engineer, and then only use material from approved borrow pits.

120-6.3.1 Haul Routes for Borrow Pits: Provide and maintain, at no expense to the Agency, 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.

120-6.3.2 Borrow Material for Shoulder Build-up: When so 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 Materials Used at Pipes, Culverts, etc.: Construct embankments over and around pipes, culverts, and bridge foundations with selected materials.

120-7 Embankment Construction.

120-7.1 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.

120-7.2 Dry Fill Method:

120-7.2.1 General: Construct embankments to meet compaction requirements in 120-7 and in accordance with the acceptance program requirements in 120-10.

Construct embankment in the dry whenever normal dewatering equipment and methods can accomplish the needed dewatering.

120-7.2.1.1 Maximum Compacted Lift Thickness Requirements:

Construct the embankment in successive layers with lifts up to a maximum listed in the table 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 120-7.2.1.2
	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)		

120-7.2.1.2 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. Demonstrate the possession and control of compacting equipment sufficient to achieve density required by 120-10.5 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 tests at random locations within the test section.
 - a. All five tests must meet the density required by 120-10.5.
 - b. Identify the test section with the compaction effort and soil classification in the project's records.
4. Obtain Engineer's approval for the compaction effort after completing a successful test section.

In case of a change in compaction effort or soil classification, failing density test, 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.

120-7.2.1.3 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 in low swampy ground in accordance with 120-9.2.4.

120-7.2.2 Placing in Unstable Areas: When depositing the material in water, or in 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 120-9.2.3 and 120-9.2.6.

120-7.2.3 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 into steps the surface of the original ground on which the embankment is to be placed.

120-7.2.4 Placing Outside 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.

120-7.3 Hydraulic Method:

120-7.3.1 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.

120-7.3.2 Excess Material: Do not use excess material placed outside the prescribed slopes, below the normal high-water level, to raise the fill. Remove only the portion of this material required for dressing the slopes.

120-7.3.3 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 depth of channel as existed 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 Backfilling Around Structures and Pipe.

120-8.1 Requirements for Structures and Pipes:

120-8-1.1 General: Backfill around structures and pipe in the dry whenever normal dewatering equipment and methods can accomplish the needed dewatering. A LOT is defined as one lift of backfill material placement, not to exceed 500 feet in length or a single run of pipe connecting two successive structures, whichever is less. Backfill for structures and pipe compacted in one operation will be considered as one LOT within the cover zone. Backfill around structures compacted separately from the pipe will be considered as separate LOTs. Backfill on each side of the pipe for the first lift will be considered a separate LOT. Backfill on opposite sides of the pipe for the remaining lifts will be considered separate LOTs, unless the same compaction effort is applied. Same compaction effort is defined as the same type of equipment (make and model) making the same number of passes on both sides of the pipe. For multiple phases of backfill, a LOT shall not extend beyond the limits of the phase.

When placing backfill within a trench box, each lift of backfill is considered a LOT. Placement of backfill within a trench box limits will be considered a complete operation before trench box is moved for next backfill operation. When the trench box is moved for next backfill operation this will start new LOTs for each lift. Follow the density testing frequency in 125-9.3.1.

129-8.1.2 Equipment and Methods: Provide normal dewatering equipment including, but not limited to, surface pumps, sump pumps, wellpoints and header pipe and trenching/digging machinery. Provide normal dewatering methods including, but not limited to, constructing shallow surface drainage trenches/ditches, using sand blankets, perforated pipe drains, sumps, and siphons.

120-8.1.3 Backfill Materials: Backfill to the original ground surface or subgrade surface of openings made for structures, with a sufficient allowance for settlement. The Engineer may require that the material used for this backfill be obtained from a source entirely apart from the structure.

Do not allow heavy construction equipment to cross over culvert or storm sewer pipes until placing and compacting backfill material to the finished earthwork grade or to an elevation at least 4 feet above the crown of the pipe.

120-8.1.4 Use of A-7 Material: In the backfilling of trenches, A-7 material may be used from a point 12 inches above the top of the pipe up to the elevation shown in the Standard Plans as the elevation for undercutting of A-7 material.

120-8.1.5 Time of Placing Backfill: Do not place backfill against any masonry or concrete abutment, wingwall, or culvert until the Engineer has given permission to do so, and in no case until the masonry or concrete has been in place seven days or until the specified 28-day compressive strength occurs.

120-8.1.6 Placement and Compaction: Place the material in horizontal layers not exceeding 6 inches compacted thickness in depth above water level, behind abutments, wingwalls and end bents or end rest piers, under the haunches of the pipes, around box culverts, and all structures including pipe culverts. When the backfill material is deposited in water, compact as specified in 125-8.2.5 and 125-8.3.4.

120-8.1.6.1 Thick Lift Requirements: The Contractor may elect to place material in thicker lifts of no more than 12 inches compacted thickness above the Soil Envelope if the embankment material is classified as Group 1 in the table below. If the embankment material is classified as Group 2 in the table below and the Contractor chooses to place material in thicker lifts of no more than 12 inches compacted thickness above the soil envelope, then the Contractor must demonstrate with a successful test section that density can be achieved. Thick

lift around structures is only allowed above the soil envelope of the connecting pipe. Notify the Engineer in writing prior to beginning construction of a test section. Construct a test section of the length of one LOT. Perform five quality control tests at random locations within the test section. All five tests must meet the density required by 120-9.2. Identify the test section with the compaction effort and soil classification in the project's records. In case of a change in compaction effort or soil classification, construct a new test section. When a test fails the requirements of 120-9.2, construct a new test section. The Contractor may elect to place material in 6 inches compacted thickness at any time.

Table 120-2					
Group	AASHTO Soil Class	Maximum Lift Thickness		Thick Lift Control Test Section Requirements	
		Within Cover Zone	Above Soil Envelope	Within Cover Zone	Above Soil Envelope
1	A-3	6 inches	12 inches	N/A	Not Needed
	A-2-4 (No. 200 Sieve ≤ 15%)				
2	A-1	6 inches without control test section		N/A	Maximum of 12 inches per 120-7.2.1.2
	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 Additional Requirements for Structures Other than Pipe:

120-8.2.1 Density: Where the backfill material is deposited in water, obtain a 12 inch layer of comparatively dry material, thoroughly compacted by tamping, before the Engineer verifies layer and density requirements. Meet the requirements of the density Acceptance Criteria.

120-8.2.2 Box Culverts: For box culverts over which pavement is to be constructed, compact around the structure to an elevation not less than 12 inches above the top of the structure, using rapid-striking mechanical tampers.

120-8.2.3 Other Limited Areas: Compact in other limited areas using mechanical tampers or approved hand tampers, until the cover over the structure is at least 12 inches thick. When hand tampers are used, deposit the materials in layers not more than 4 inches thick using hand tampers suitable for this purpose with a face area of not more than 100 in². Take special precautions to prevent any wedging action against the masonry, and step or terrace the slope bounding the excavation for abutments and wingwalls if required by the Engineer.

120-8.2.4 Culverts and Piers: Backfill around culverts and piers on both sides simultaneously to approximately the same elevation.

120-8.2.5 Compaction Under Wet Conditions: Where wet conditions do not permit the use of mechanical tampers, compact using hand tampers. Use only A-3 material for the hand tamped portions of the backfill. When the backfill has reached an elevation and condition such as to make the use of the mechanical tampers practical, perform mechanical

tamping in such manner and to such extent as to transfer the compaction force into the sections previously tamped by hand.

120-8.3 Additional Requirements for Pipe Greater than 12 Inches Inside Diameter:

120-8.3.1 General: Trenches for pipe may have up to four zones that must be backfilled.

Lowest Zone: The lowest zone is backfilled for deep undercuts up to within 4 inches of the bottom of the pipe.

Bedding Zone: The zone above the Lowest Zone is the Bedding Zone. Usually, it will be the backfill which is the 4 inches of soil below the bottom of the pipe. When rock or other hard material has been removed to place the pipe, the Bedding Zone will be the 12 inches of soil below the bottom of the pipe.

Cover Zone: The next zone is the backfill that is placed after the pipe has been laid and will be called the Cover Zone. This zone extends to 12 inches above the top of the pipe. The Cover Zone and the Bedding Zone are considered the Soil Envelope for the pipe.

Top Zone: The Top Zone extends from 12 inches above the top of the pipe to the base or final grade.

120-8.3.2 Material:

120-8.3.2.1 Lowest Zone: Backfill areas undercut below the Bedding Zone of a pipe with coarse sand, or other suitable granular material, obtained from the grading operations on the project, or a commercial material if no suitable material is available.

120-8.3.2.2 Soil Envelope: In both the Bedding Zone and the Cover Zone of the pipe, backfill with materials classified as A-1, A-2, or A-3. Material classified as A-4 may be used if the pipe is concrete pipe.

120-8.3.2.3 Top Zone: Backfill the area of the trench above the soil envelope of the pipe with materials allowed on Standard Plans, Index 120-001.

120-8.3.3 Compaction:

120-8.3.3.1 Lowest Zone: Compact the soil in the Lowest Zone to approximately match the density of the soil in which the trench was cut.

120-8.3.3.2 Bedding Zone: If the trench was not undercut below the bottom of the pipe, loosen the soil in the bottom of the trench immediately below the approximate middle third of the outside diameter of the pipe.

If the trench was undercut, place the bedding material and leave it in a loose condition below the middle third of the outside diameter of the pipe. Compact the outer portions to meet the density requirements of the Acceptance Criteria. Place the material in lifts no greater than 6 inches (compacted thickness).

120-8.3.3.3 Cover Zone: Place the material in 6 inches layers (compacted thickness), evenly deposited on both sides of the pipe, and compact with mechanical tampers suitable for this purpose. Hand tamp material below the pipe haunch that cannot be reached by mechanical tampers. Meet the requirements of the density Acceptance Criteria.

120-8.3.3.4 Top Zone: Place the material in layers not to exceed 12 inches in compacted thickness. Meet the requirements of the density acceptance criteria.

120-8.3.4 Backfill Under Wet Conditions: Where wet conditions are such that dewatering by normal pumping methods would not be effective, the procedure outlined below may be used when specifically authorized by the Engineer in writing.

Granular material may be used below the elevation at which mechanical tampers would be effective, but only material classified as A-3. Place and compact the material

using timbers or hand tampers until the backfill reaches an elevation such that its moisture content will permit the use of mechanical tampers. When the backfill has reached such elevation, use normally acceptable backfill material. Compact the material using mechanical tampers in such manner and to such extent as to transfer the compacting force into the material previously tamped by hand.

The Engineer may permit the use of coarse aggregate below the elevation at which mechanical tampers would be effective. Use coarse aggregate from approved sources for Aggregate Size Number 89, 8, 78, 7, 68, 6, or 57. Place the coarse aggregate such that it will be stable and firm. Fully wrap the aggregate with an appropriate geosynthetic filter fabric, as specified by the Engineer. Do not place coarse aggregate within 4 feet of the ends of the trench or ditch. Use normally accepted backfill material at the ends.

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, add water to the material, or lower the moisture content by manipulating the material or allowing it to dry, as is appropriate, to attain the specified density.

120-9.2 Compaction of Embankments:

120-9.2.1 Earthwork Category 1 and 2 Density Requirements: The Engineer will accept a minimum density of 95% of the maximum density as determined by FM 1-T099 for all earthwork items requiring densities.

120-9.2.2 Earthwork Category 3 Density Requirements: The Engineer will accept a minimum of 100% of the maximum density as determined by FM 1-T099 for all densities required under category 3. Except for embankments constructed by the hydraulic method as specified in 120-7.3, and for the material placed outside the standard minimum slope as specified in 120-7.2.4, and for other areas specifically excluded herein, compact each layer of the material used in the formation of embankments to the required density stated above. 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.

120-9.2.3 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 120-7.2.2), compact the top 6 inches (compacted thickness) of such layer to the density as specified in 120-10.5.

120-9.2.4 Compaction Where Plastic Material Has Been Removed: Where unsuitable material is removed and the remaining surface is of soil classifications A-4, A-5, A-6, or A-7 per AASHTO M145, as determined by the Engineer, compact the surface of the excavated area by rolling with a sheepsfoot 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.

120-9.2.5 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 this section.

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 this section.

120-9.2.6 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.

120-9.2.7 Compaction of Grassed Embankment Areas: For the outer layer of all embankments where plant growth will be established, do not compact. Leave this layer in a loose condition to a minimum depth of 6 inches for the subsequent seeding or planting operations.

120-9.3 Compaction of Subgrade: If the plans do not provide for stabilizing, compact the subgrade in both cuts and fills to the density specified in 120-10.5. 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 is 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 Density over 105%: When a computed dry density results in a value greater than 105% of the applicable Proctor maximum dry density, the Engineer will perform a second density test within 5 feet. If the second density results in a value greater than 105%, investigate the compaction methods, examine the applicable Maximum Density and material description. If necessary, the Engineer will test an additional sample for acceptance in accordance with FM 1-T099.

120-10.2 Maximum Density Determination: The Engineer will determine the maximum density and optimum moisture content by sampling and testing the material in accordance with the specified test method listed in 120-10.3.

120-10.3 Density Testing Requirements: Compliance with the requirements of 120-10.5 will be determined in accordance FM 1-T 238. The in-place moisture content will be determined for each density in accordance with 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).

120-10.4 Soil Classification and Organic Content: The Engineer will perform soil classification tests in accordance with AASHTO T88, T89, T90, and FM 1-T267. The Engineer will classify soils in accordance with AASHTO M-145 in order to determine compliance with embankment utilization requirements. The Engineer will verify the organic content test with the criteria specified in Standard Plans, Index 120-001.

120-10.5 Acceptance Criteria: The Engineer will accept a minimum density in accordance with 120-9.2 with the following exceptions:

- 1) embankment constructed by the hydraulic method as specified in 120-7.3;
- 2) material placed outside the standard minimum slope as specified in 120-7.2.4;
- 3) other areas specifically excluded herein.

120-10.6 Frequency: The Engineer will conduct sampling and testing at a minimum frequency listed in the table below.

Test Name	Frequency
Proctor Maximum Density	One per soil type
Density	1 per LOT (Alternate Lift)
Soil Classification and Organic Content	One per Maximum Density

120-11 Maintenance and Protection of Work.

While construction is in progress, always maintain adequate drainage for the roadbed. Maintain a shoulder at least 3 feet wide adjacent to all pavement or base construction to provide support for the edges.

Maintain and protect 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 any slides, washouts, settlement, subsidence, or other mishap which may occur prior to final acceptance of the work. 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 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.
2. Shape the earthwork to match adjacent pavement, curb, sidewalk, structures, etc.
3. Shape the bottom of 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.

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 Excavation: Excavation will be paid for by volume, in cubic yards, calculated by the method of average end areas, unless the Engineer determines that another method of calculation will provide a more accurate result. The material will be measured in its original position by field survey or by photogrammetric means as designated by the Engineer. Measurement for payment will include the excavation of unsuitable material, lateral ditch excavation, channel excavation, and excavation for structures and pipe. Payment will not be

made for excavation or embankment beyond the limits shown in the plans or authorized by the Engineer.

120-13.2 Embankment: Measurement will be made on a loose volume basis, as measured in trucks or other hauling equipment at the point of dumping on the road. Payment will not be made for embankment beyond the limits shown in the plans or authorized by the Engineer.

120-14 Basis of Payment.

120-14.1 General: Prices and payments for the 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; and maintaining and protecting the complete earthwork.

120-14.2 Excavation: The total quantity of all excavation specified under this Section will be paid for at the Contract unit price for Excavation. No payment will be made for the excavation of any materials which are 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.

120-14.3 Embankment: The total quantity of embankment specified in this Section will be paid for at the Contract unit price for embankment. No payment will be made for materials which are used for purposes other than those shown in the plans or designated by the Engineer. No payment will be made for materials placed outside the lines and grades given by the Engineer.

334 ASPHALT CONCRETE FOR LAP (CLASS - D).
(REV 3-2-22) (FA 7-2-21) (FY 2023-24)

SECTION 334 is deleted and the following substituted:

SECTION 334
ASPHALT CONCRETE FOR LAP (OFF-SYSTEM)

334-1 Description.

334-1.1 General: Construct an Asphalt Concrete pavement based on the type of work specified in the Contract and the Asphalt Work Categories as defined below. Meet the applicable requirements for plants, equipment, and construction requirements as defined below. Use an asphalt concrete mix that meets the requirements of this specification.

334-1.2 Asphalt Work Mix Categories: Construction of Asphalt Concrete Pavement will fall into one of the following work categories:

334-1.2.1 Asphalt Work Category 1: Includes the construction of bike paths and miscellaneous asphalt.

334-1.2.2 Asphalt Work Category 2: Includes the construction of new turn lanes, paved shoulders and other non-mainline pavement locations.

334-1.2.3 Asphalt Work Category 3: Includes the construction of new mainline pavement lanes, milling and resurfacing.

334-1.3 Mix Types: Use the appropriate mix type as shown in Table 334-1.

Table 334-1 Mix Types			
Asphalt Work Category	Mix Types	Traffic Level	ESALs (millions)
1	Type SP-9.5 ⁽¹⁾	A	<0.3
2	Structural Mixes: Types SP-9.5 or SP-12.5 ⁽¹⁾ Friction Mixes: Types FC-9.5 or FC-12.5 ⁽¹⁾	B	0.3 to <3
3	Structural Mixes: Types SP-9.5 or SP-12.5 Friction Mixes: Types FC-9.5 or FC-12.5	C	≥3

(1) Equivalent mixes may be approved as determined by the Engineer. For example, Marshall S-III mixture type is equivalent to Superpave SP-9.5, Marshall S-I is equivalent to Superpave SP-12.5, and Marshall FC-3 is equivalent to Superpave FC-9.5.

For a Traffic Level A mixture, meet the mix design criteria for a Traffic Level B mixture and for a Traffic Level D mixture meet the mix design criteria for a Traffic Level E mixture.

At no additional cost to the Department, for a Type SP mix the following Traffic Level substitutions are allowed:

- Traffic Level E can be substituted for Traffic Level D.
- Traffic Level D or E can be substituted for Traffic Level C.
- Traffic Level C can be substituted for Traffic Level B.
- Traffic Level B or C can be substituted for Traffic Level A.

334-1.4 Gradation Classification: Asphalt concrete mixtures are classified as fine and are defined in Standard Specification 334-3.2.2.

The equivalent AASHTO nominal maximum aggregate size Superpave mixes are as follows:

Type SP-9.5, FC-9.5	9.5 mm
Type SP-12.5, FC-12.5	12.5 mm

334-1.5 Thickness: The total pavement thickness of the asphalt concrete pavement layers will be the plan thickness as shown in the Contract Documents. Before paving, propose a thickness for each individual layer meeting the requirements of this specification, which when combined with other layers (as applicable) will equal the plan thickness. For construction purposes, the plan thickness and individual layer thickness will be converted to spread rate using the following equation:

$$\text{Spread rate (lbs/yd}^2\text{)} = t \times G_{\text{mm}} \times 43.3$$

where: t = Thickness (in.) (Plan thickness or individual layer thickness)
 G_{mm} = Maximum specific gravity from the mix design

For target purposes only, spread rate calculations shall be rounded to the nearest whole number.

334-1.5.1 Layer Thicknesses: Unless otherwise called for in the Contract Documents, the allowable layer thicknesses for asphalt concrete mixtures are as follows:

Type SP-9.5, FC-9.5.....	1 to 1-1/2 inches
Type SP-12.5.....	1-1/2 to 3 inches
Type FC-12.5.....	1-1/2 to 2-1/2 inches

334-1.5.2 Additional Requirements: The following requirements also apply to asphalt Concrete mixtures:

1. When construction includes the paving of adjacent shoulders (less than or equal to 5 feet wide), the layer thickness for the upper pavement layer and shoulder shall be the same and paved in a single pass, unless otherwise called for in the Contract Documents.

2. For overbuild layers, use the minimum and maximum layer thicknesses as specified above unless called for differently in the Contract Documents. On variable thickness overbuild layers, the minimum and maximum allowable thicknesses will be as specified below, unless called for differently in the Contract Documents.

Type SP-9.5.....	3/8 to 2 inches
Type SP-12.5.....	1/2 to 3 inches
Type SP-19.0.....	1-1/2 to 4 inches

3. Variable thickness overbuild layers constructed using a Type SP-9.5 or SP-12.5 mixtures may be tapered to zero thickness provided the contract documents require a minimum of 1-1/2 inches of dense-graded mix placed over the variable thickness overbuild layer.

334-1.6 Weight of Mixture: The weight of the mixture shall be determined as provided in 320-3.2 of the Florida Department of Transportation (FDOT) specifications.

334-2 Materials.

334-2.1 Superpave Asphalt Binder: Unless specified elsewhere in the Contract Documents, use an asphalt binder grade as determined from Table 334-2. If the Contract calls for an alternative binder, meet the requirements of FDOT Specification 916.

334-2.2 Aggregate: Use aggregate capable of producing a quality pavement. Size, grade and combine the aggregate fractions to meet the grading and physical properties of the mix design. Aggregates from various sources may be combined.

For Type FC mixes, use an aggregate blend that consists of approved friction course aggregates that consists of crushed granite, crushed granitic gneiss, crushed limestone, crushed shell rock, or a combination of the above. As an exception, mixes that contain a minimum of 60% of approved friction course aggregates of crushed granite and/or crushed gneiss may either contain: up to 40% fine aggregate from other sources of aggregate not approved for friction courses or a combination of up to 20% RAP and the remaining fine aggregate from other sources of aggregate not approved for friction courses. Mixtures utilizing High Polymer (HP) binder are not allowed to contain RAP.

A list of aggregates approved for use in friction courses may be available on the FDOT's State Materials Office website. The URL for obtaining this information, if available, is: <https://mac.fdot.gov/>.

334-2.3 Reclaimed Asphalt Pavement (RAP) Material:

334-2.3.1 General requirements: RAP may be used as a component of the asphalt mixture subject to the following requirements:

1. Limit the amount of RAP material used in the mix to a maximum of 50% by weight of total aggregate.
2. Assume full responsibility for the design, production and construction of asphalt mixes which incorporate RAP as a component material.
3. Provide stockpiled RAP material that is reasonably consistent in characteristics and contains no aggregate particles which are soft or conglomerates of fines.
4. Provide RAP material having a minimum average asphalt content of 4.0% by weight of total mix. As an exception, when using fractionated RAP, the minimum average asphalt binder content for the coarse portion of the RAP shall be 2.5% by weight of the coarse portion of the RAP. The coarse portion of the RAP shall be the portion of the RAP retained on the No. 4 sieve. The Engineer may sample the stockpile to verify that this requirement is met.
4. When using RAP as a component material, prevent any oversized RAP from being incorporated into the completed mixture by the use of a grizzly or grid over the RAP bin; in-line roller or impact crusher; screen; or other suitable means. If oversized RAP material appears in the completed recycled mix, take the appropriate corrective action immediately. If the appropriate corrective actions are not immediately taken, stop plant operations.

334-2.3.2 Material Characterization: Assume responsibility for establishing the asphalt binder content, gradation, viscosity and bulk specific gravity (G_{sb}) of the RAP material based on a representative sampling of the material.

334-2.3.3 Asphalt Binder for Mixes with RAP: Select the appropriate asphalt binder grade based on Table 334-2

Table 334-2 Asphalt Binder Grade for Mixes Containing RAP	
Percent RAP	Asphalt Binder Grade
0 - 15	PG 67-22
16 - 30	PG 58-22
≥ 30	PG 52-28

334-3 Composition of Mixture.

334-3.1 General: Compose the asphalt mixture using a combination of aggregate (coarse, fine or mixtures thereof), mineral filler, if required, and asphalt binder material. Size, grade and combine the aggregate fractions to meet the grading and physical properties of the mix design. Aggregates from various sources may be combined.

334-3.2 Mix Design:

334-3.2.1 General: Design the asphalt mixture in accordance with AASHTO R 35, except as noted herein. Submit the proposed mix design with supporting test data indicating compliance with all mix design criteria to the Engineer. Prior to the production of any asphalt mixture, obtain the Engineer's conditional approval of the mix design. If required by the Engineer, send representative samples of all component materials, including asphalt binder to a laboratory designated by the Engineer for verification. As an exception to these requirements, use a currently approved FDOT Mix Design.

The Engineer will consider any marked variations from original test data for a mix design or any evidence of inadequate field performance of a mix design as sufficient evidence that the properties of the mix design have changed, and at his/her discretion, the Engineer may no longer allow the use of the mix design.

334-3.2.2 Mixture Gradation Requirements: Combine the coarse and fine aggregate in proportions that will produce an asphalt mixture meeting all of the requirements defined in this specification and conform to the gradation requirements at design as defined in AASHTO M 323. Aggregates from various sources may be combined.

334-3.2.2.1 Mixture Gradation Classification: Plot the combined mixture gradation on an FHWA 0.45 Power Gradation Chart. Include the Control Points from AASHTO M, as well as the Primary Control Sieve (PCS) Control Point from AASHTO M. Fine mixes are defined as having a gradation that passes above the primary control sieve control point and above the maximum density line for all sieve sizes smaller than the primary control sieve and larger than the No. 30 sieve. Use only fine mixes.

334-3.2.3 Gyratory Compaction: Compact the design mixture in accordance with AASHTO T 312, with the following exception: use the number of gyrations at N_{design} as defined in Standard Specification Table 334-4. Measure the inside diameter of gyratory molds in accordance with AASHTO T 312.

334-3.2.4 Design Criteria: Meet the requirements for nominal maximum aggregate size as defined in AASHTO M, as well as for relative density, VMA, VFA, and dust-to-binder ratio as specified in AASHTO M 323. N_{initial} and N_{maximum} requirements are not applicable.

334-3.2.5 Moisture Susceptibility:

1. For all traffic levels, use a liquid anti-strip agent listed on the APL at the specified dosage rate. Hydrated lime may be used instead of the liquid anti-strip agent.
2. Provide a mixture having a retained tensile strength ratio of at least 0.80 and a minimum tensile strength (unconditioned) of 100 psi in accordance with FM 1-T 283.

334-3.2.6 Additional Information: In addition to the requirements listed above, provide the following information on each mix design:

1. The design traffic level and the design number of gyrations (N_{design}).
2. The source and description of the materials to be used.
3. The Department source number and the FDOT product code of the aggregate components furnished from an FDOT approved source (if required).

4. The gradation and proportions of the raw materials as intended to be combined in the paving mixture. The gradation of the component materials shall be representative of the material at the time of use. Compensate for any change in aggregate gradation caused by handling and processing as necessary.

5. A single percentage of the combined mineral aggregate passing each specified sieve. Degradation of the aggregate due to processing (particularly material passing the No. 200 sieve) should be accounted for and identified.

6. The bulk specific gravity (G_{sb}) value for each individual aggregate and RAP component, as identified in the Department's aggregate control program.

7. A single percentage of asphalt binder by weight of total mix intended to be incorporated in the completed mixture, shown to the nearest 0.1%.

8. A target temperature for the mixture at the plant (mixing temperature) and a target temperature for the mixture at the roadway (compaction temperature). Do not exceed a target temperature of 340°F for High Polymer asphalt binders, 330°F for PG 76-22 asphalt binders, and 315°F for unmodified asphalt binders.

9. Provide the physical properties at the optimum asphalt content, which must conform to all specified requirements.

10. The name of the Construction Training Qualification Program (CTQP) mix designer.

11. The ignition oven and maximum specific gravity (G_{mm}) calibration factors.

12. The warm mix technology, if used.

334-4 Producer Process Control (PC).

Assume full responsibility for controlling all operations and processes such that the requirements of these Specifications are met at all times. Perform any tests necessary at the plant and roadway for process control purposes.

334-5 General Construction Requirements.

334-5.1 Weather Limitations: Do not transport asphalt mix from the plant to the roadway unless all weather conditions are suitable for the laying operations.

334-5.2 Limitations of Paving Operations:

334-5.2.1 General: Place the mixture only when the surface upon which it is to be placed has been previously prepared, is intact, firm, dry, clean, and the tack or prime coat, with acceptable spread rate, is properly broken or cured. Do not place friction course until the adjacent shoulder area has been dressed and grassed.

334-5.2.2 Ambient Air Temperature: Place the mixture only when the air temperature in the shade and away from artificial heat meets the requirements of Table 334-3. The minimum ambient temperature requirement may be reduced by 5°F when using warm mix technology, if mutually agreed to by both the Engineer and the Contractor.

Table 334-3 Ambient Air Temperature Requirements for Paving	
Layer Thickness or Asphalt Binder Type	Minimum Temperature (°F)
≤ 1 inch	50
Any mixture > 1 inch containing a PG asphalt binder with a high temperature designation ≥ 76°C	45
Any mixture > 1 inch containing a PG asphalt binder with a high temperature designation < 76°C	40
FC-5 ⁽¹⁾	65
⁽¹⁾ As an exception, place the mixture at temperatures no lower than 60°F, only when approved by the Engineer based on the Contractor's demonstrated ability to achieve a satisfactory surface texture and appearance of the finished surface. For mixtures containing PG 76-22 binder, the minimum ambient temperature may be further reduced to 55°F when using warm mix technology, if agreed to by both the Engineer and the Contractor.	

334-5.3 Mix Temperature: Heat and combine the ingredients of the mix in such a manner as to produce a mixture with a temperature at the plant and at the roadway, within a range of plus or minus 30°F from the target temperature as shown on the mix design. Reject all loads outside of this range. Reject any load or portion of a load of asphalt mix at the plant or at the roadway with a temperature outside of its respective master range shown in Table 334-4. Notify the Engineer of the rejection immediately.

Table 334-4 Mix Temperature Master Range Tolerance	
Location	Acceptable Temperature Tolerance
Plant	Mixing Temperature ±30 F
Roadway (mix in truck)	Compaction Temperature ±30°F

334-5.4 Transportation of the Mixture: Transport the mixture in trucks of tight construction, which prevents the loss of material and the excessive loss of heat and previously cleaned of all foreign material. After cleaning, thinly coat the inside surface of the truck bodies with soapy water or an asphalt release agent as needed to prevent the mixture from adhering to the beds. Do not allow excess liquid to pond in the truck body. Do not use a release agent that will contaminate, degrade, or alter the characteristics of the asphalt mix or is hazardous or detrimental to the environment. Petroleum derivatives (such as diesel fuel), solvents, and any product that dissolves asphalt are prohibited. Provide each truck with a tarpaulin or other waterproof cover mounted in such a manner that it can cover the entire load when required. When in place, overlap the waterproof cover on all sides so that it can be tied down. Cover each load during cool and cloudy weather and at any time it appears rain is likely during transit with a tarpaulin or waterproof cover. Cover and tie down all loads of friction course mixtures.

334-5.5 Surface Preparation:

334-5.5.1 Cleaning: Before placing the mixture, clean the surface of the base or underlying pavement of all loose and deleterious material by the use of power brooms or blowers, supplemented by hand brooming where necessary.

334-5.5.2 Patching and Leveling Courses: As shown in the plans, bring the existing surface to proper grade and cross-section by the application of patching or leveling courses.

334-5.5.3 Application over Surface Treatment: Where an asphalt mix is to be placed over a surface treatment, sweep and dispose of all loose material from the paving area.

334-5.5.4 Tack Coat: Use a rate of application as defined in Table 334-5. Control application rate within plus or minus 0.01 gallon per square yard of the target application rate. The target application rate may be adjusted by the Engineer to meet specific field conditions. Determine the rate of application as needed to control the operation. When using PG 52-28, multiply the target rate of application by 0.6.

Table 300-2 Tack Coat Application Rates		
Asphalt Mixture Type	Underlying Pavement Surface	Target Tack Rate (gal/yd ²) ¹
Base Course, Structural Course, Dense-Graded Friction Course, Open-Graded Friction Course	Newly Constructed Asphalt Layers	0.06
	Milled Asphalt Pavement Surface, Oxidized and Cracked Asphalt Pavement, Concrete Pavement	0.09
Note 1: Target tack application rates greater than those specified may be used upon approval of the Engineer.		

When using a meter to control the tack or prime application rate, manually measure the volume in the tank at the beginning and end of the application area for a specific target application rate. Perform this operation at a minimum frequency of once per production shift. Resolve any differences between the manually measured method and the meter to ensure the target application rate is met in accordance with this Section. Adjust the application rate if the manually measured application rate is greater than plus or minus 0.01 gallons per square yard when compared to the target application rate.

334-5.5.5 Curing and Time of Application: Apply tack coat sufficiently in advance of placing bituminous mix to permit drying, but do not apply tack coat so far in advance that it might lose its adhesiveness as a result of being covered with dust or other foreign material.

334-5.5.6 Protection: Keep the tack coat surface free from traffic until the subsequent layer of bituminous hot mix has been laid.

334-6 Placing Mixture:

334-6.1 Alignment of Edges: Place all asphalt mixtures by the stringline method to obtain an accurate, uniform alignment of the pavement edge. As an exception, pavement edges adjacent to curb and gutter or other true edges do not require a stringline. Control the unsupported pavement edge to ensure that it will not deviate from the stringline more than plus or minus 1.5 inches.

334-6.2 Rain and Surface Conditions: Immediately cease transportation of asphalt mixtures from the plant when rain begins at the roadway. Do not place asphalt mixtures while rain is falling, or when there is water on the surface to be covered. Once the rain has stopped, standing water has been removed from the tacked surface to the satisfaction of the Engineer, and

the temperature of the mixture caught in transit still meets the requirements as specified in 334-5.3, the Contractor may then place the mixture caught in transit.

334-6.3 Checking Depth of Layer: Check the depth of each layer at frequent intervals to ensure a uniform spread rate that will meet the requirements of the Contract.

334-6.4 Hand Work: In limited areas where the use of the paver is impossible or impracticable, the Contractor may place the mixture by hand.

334-6.5 Spreading and Finishing: Upon arrival, dump the mixture in the approved paver, and immediately spread and strike-off the mixture to the full width required, and to such loose depth for each course that, when the work is completed, the required weight of mixture per square yard, or the specified thickness, is secured. Carry a uniform amount of mixture ahead of the screed at all times.

334-6.6 Thickness Control: Ensure the spread rate is within 5% of the target spread rate, as indicated in the Contract. When determining the spread rate, use, at a minimum, an average of five truckloads of mix and at a maximum, an average of 10 truckloads of mix. When the average spread rate is beyond plus or minus 5% of the target spread rate, monitor the thickness of the pavement layer closely and adjust the construction operations.

When the average spread rate for two consecutive days is beyond plus or minus 5% of the target spread, stop the construction operation at any time until the issue is resolved.

The Engineer will allow a maximum deficiency from the specified spread rate for the total thickness as follows:

1. For pavement of a specified thickness of 2-1/2 inches or more: 50 pounds per square yard.
2. For pavement of a specified thickness of less than 2-1/2 inches: 25 pounds per square yard.

Address the unacceptable pavement in accordance with 334-5.10.4, unless an alternative approach is agreed upon by the Engineer.

334-6.7 Leveling Courses:

334-6.7.1 Patching Depressions: Before spreading any leveling course, fill all depressions in the existing surface as shown in the plans.

334-6.7.2 Spreading Leveling Courses: Place all courses of leveling with an asphalt paver or by the use of two motor graders, one being equipped with a spreader box. Other types of leveling devices may be used upon approval by the Engineer.

334-6.7.3 Rate of Application: When using Type SP-9.5 (fine graded) for leveling, do not allow the average spread of a layer to be less than 50 pounds per square yard or more than 75 pounds per square yard. The quantity of mix for leveling shown in the plans represents the average for the entire project; however, the Contractor may vary the rate of application throughout the project as directed by the Engineer. When leveling in connection with base widening, the Engineer may require placing all the leveling mix prior to the widening operation.

334-6.8 Compaction: For each paving or leveling train in operation, furnish a separate set of rollers, with their operators.

When density testing for acceptance is required, select equipment, sequence, and coverages of rolling to meet the specified density requirement. Regardless of the rolling procedure used, complete the final rolling before the surface temperature of the pavement drops

to the extent that effective compaction may not be achieved or the rollers begin to damage the pavement.

No vibratory compaction in the vertical direction will be allowed for layers one inch or less in thickness or, if the Engineer or Contract Documents limit compaction to the static mode only. Compact these layers in the static mode only. Other non-vertical vibratory modes of compaction will be allowed, if approved by the Engineer; however, no additional compensation, cost or time, will be made.

When density testing for acceptance is not required, use a rolling pattern approved by the Engineer.

Use hand tamps or other satisfactory means to compact areas which are inaccessible to a roller, such as areas adjacent to curbs, headers, gutters, bridges, manholes, etc.

334-6.9 Joints.

334-6.9.1 Transverse Joints: Construct smooth transverse joints, which are within 3/16 inch of a true longitudinal profile when measured with a 15 foot manual straightedge. The Engineer may waive straightedge requirements for transverse joints at the beginning and end of the project, at the beginning and end of bridge structures, at manholes, and at utility structures if the deficiencies are caused by factors beyond the control of the Contractor such as no milling requirement, as determined by the Engineer. When smoothness requirements are waived, construct a reasonably smooth transitional joint.

334-6.9.2 Longitudinal Joints: Place each layer of pavement so all longitudinal construction joints are offset 6 to 12 inches laterally between successive layers. Plan offsets in advance so the longitudinal joints of the friction course are not in wheel path areas. The longitudinal joints for friction course layers should be within 6 inches of the lane edge or at the center of the lane. The Engineer may waive these requirements where offsetting is not feasible due to the sequence of construction.

334-6.10 Surface Requirements: Construct a smooth pavement with good surface texture and the proper cross-slope.

334-6.10.1 Texture of the Finished Surface of Paving Layers: Produce a finished surface of uniform texture and compaction with no pulled, torn, raveled, crushed or loosened portions and free of segregation, bleeding, flushing, sand streaks, sand spots, or ripples. Correct any area of the surface that does not meet the foregoing requirements in accordance with 334-6.10.4.

334-6.10.2 Cross Slope: Construct a pavement surface with cross slopes in compliance with the requirements of the Contract Documents. Furnish a four-foot-long electronic level accurate to 0.1 degree, approved by the Engineer for the control of cross slope. Make this electronic level available at the jobsite at all times during paving operations.

334-6.10.3 Pavement Smoothness: Construct a smooth pavement meeting the requirements of this Specification. Furnish a 15 foot manual and a 15 foot rolling straightedge meeting the requirements of FM 5-509. Obtain a smooth surface on all pavement courses placed, and then straightedge all layers as required by this Specification.

334-6.10.3.1 Straightedge Testing:

334-6.10.3.1.1 Acceptance Testing: Using a rolling straightedge, test the final (top) layer of the pavement. Test all pavement lanes where the width is constant using a rolling straightedge and document all deficiencies on a form approved by the Engineer. Notify the Engineer of the location and time of all straightedge testing a minimum of 48 hours before beginning testing.

334-6.10.3.1.2 Final (Top) Pavement Layer: At the completion of all paving operations, straightedge the final (top) layer either behind the final roller of the paving train or as a separate operation. Address all deficiencies in excess of 3/16 inch in accordance with 334-5.10.4, unless waived by the Engineer. Retest all corrected areas.

334-6.10.3.1.3 Straightedge Exceptions: Straightedge testing will not be required in the following areas: shoulders, intersections, tapers, crossovers, sidewalks, bicycle/shared use paths, parking lots and similar areas, or in the following areas when they are less than 250 feet in length: turn lanes, acceleration/deceleration lanes and side streets. The limits of the intersection will be from stop bar to stop bar for both the mainline and side streets.

As an exception, in the event the Engineer identifies an objectional surface irregularity in the above areas, straightedge and address all deficiencies in excess of 3/8 inch in accordance with 334-5.10.4.

334-6.10.4 Correcting Unacceptable Pavement: Correct deficiencies in the pavement layer by removing and replacing the full depth of the layer, extending a minimum of 50 feet on both sides (where possible) of the defective area for the full width of the paving lane, at no additional cost.

334-7 Acceptance of the Mixture.

334-7.1 General: The asphalt mixture will be accepted based on the Asphalt Work Category as defined below:

1. Asphalt Work Category 1 – Certification by the Contractor as defined in 334-7.2.

2. Asphalt Work Category 2 – Certification and process control testing by the Contractor as defined in 334-7.3

3. Asphalt Work Category 3 – Process control testing by the Contractor and acceptance testing by the Engineer as defined in 334-7.4.

334-7.2 Certification by the Contractor: On Asphalt Work Category 1 construction, the Engineer will accept the mix on the basis of visual inspection. Submit a Notarized Certification of Specification Compliance letter on company letterhead to the Engineer stating that all material produced and placed on the project meets the requirements of the Specifications. The Engineer may run independent tests to determine the acceptability of the material.

334-7.3 Certification and Process Control Testing by the Contractor: On Asphalt Work Category 2 construction, submit a Notarized Certification of Specification Compliance letter on company letterhead to the Engineer stating that all material produced and placed on the project meets the requirements of the Specifications, along with supporting test data documenting all process control testing as described in 334-6.3.1. If required by the Contract, utilize an Independent Laboratory as approved by the Engineer for the process control testing. The mix will also require visual acceptance by the Engineer. In addition, the Engineer may run independent tests to determine the acceptability of the material. Material failing to meet these acceptance criteria will be addressed as directed by the Engineer such as but not limited to acceptance at reduced pay, delineation testing to determine the limits of the questionable material, removal and replacement at no cost to the agency, or performing an Engineering analysis to determine the final disposition of the material.

334-7.3.1 Process Control Sampling and Testing Requirements: Perform process control testing at a frequency of once per day. Obtain the samples in accordance with FDOT Method FM 1-T 168. Test the mixture at the plant for gradation (P_{.8} and P_{.200}) and asphalt

binder content (P_b). Measure the roadway density with 6 inch diameter roadway cores at a minimum frequency of once per 1,500 feet of pavement with a minimum of three cores per day.

Determine the asphalt binder content of the mixture in accordance with FM 5-563. Determine the gradation of the recovered aggregate in accordance with FM 1-T 030. Determine the roadway density in accordance with FM 1-T 166. The minimum roadway density will be based on the percent of the maximum specific gravity (Gmm) from the approved mix design. If the Contractor or Engineer suspects that the mix design Gmm is no longer representative of the asphalt mixture being produced, then a new Gmm value will be determined from plant-produced mix with the approval of the Engineer. Roadway density testing will not be required in certain situations as described in 334-7.4.1. Assure that the asphalt binder content, gradation and density test results meet the criteria in Table 334-6.

Table 334-6 Process Control and Acceptance Values	
Characteristic	Tolerance
Asphalt Binder Content (percent)	Target ± 0.55
Passing No. 8 Sieve (percent)	Target ± 6.00
Passing No. 200 Sieve (percent)	Target ± 1.50
Roadway Density (daily average)	Minimum 91.5% of Gmm
Roadway Density (any single core)	Minimum 88.0 % of Gmm

334-7.4 Process Control Testing by the Contractor and Acceptance Testing by the Engineer: On Asphalt Work Category 3, perform process control testing as described in 334-6.3.1. In addition, the Engineer will accept the mixture at the plant with respect to gradation ($P_{.8}$ and P_{200}) and asphalt binder content (P_b). The mixture will be accepted on the roadway with respect to density. The Engineer will sample and test the material as described in 334-7.3.1. The Engineer will randomly obtain at least one set of samples per day. Assure that the asphalt content, gradation and density test results meet the criteria in Table 334-6. Material failing to meet these acceptance criteria will be addressed as directed by the Engineer such as but not limited to acceptance at reduced pay, delineation testing to determine the limits of the questionable material, removal and replacement at no cost to the agency, or performing an Engineering analysis to determine the final disposition of the material.

334-7.4.1 Acceptance Testing Exceptions: When the total quantity of any mix type in the project is less than 500 tons, the Engineer will accept the mix on the basis of visual inspection. The Engineer may run independent tests to determine the acceptability of the material.

Density testing for acceptance will not be performed on widening strips or shoulders with a width of 5 feet or less, open-graded friction courses, variable thickness overbuild courses, leveling courses, any asphalt layer placed on subgrade (regardless of type), miscellaneous asphalt pavement, bike/shared use paths, crossovers, gore areas, or any course with a specified thickness less than 1 inch or a specified spread rate less than 100 lb per square yard. Density testing for acceptance will not be performed on asphalt courses placed on bridge decks or approach slabs; compact these courses in static mode only. In addition, density testing for acceptance will not be performed on the following areas when they are less than 500 feet (continuous) in length: turning lanes, acceleration lanes, deceleration lanes, shoulders, parallel parking lanes, or ramps. Do not perform density testing for acceptance in situations where the

area requiring density testing is less than 50 tons. Density testing for acceptance will not be performed in intersections. The limits of the intersection will be from stop bar to stop bar for both the mainline and side streets. A random core location that occurs within the intersection shall be moved forward or backward from the intersection at the direction of the Engineer. Compact these courses in accordance with a standard rolling procedure approved by the Engineer. In the event that the rolling procedure deviates from the approved procedure, placement of the mix will be stopped.

334-8 Method of Measurement.

For the work specified under this Section, the quantity to be paid for will be the weight of the mixture, in tons.

The bid price for the asphalt mix will include the cost of the liquid asphalt and the tack coat application as specified in 334-5.5.4. There will be no separate payment or unit price adjustment for the asphalt binder material in the asphalt mix.

334-9 Basis of Payment.

334-.1 General: Price and payment will be full compensation for all the work specified under this Section.

**344 CONCRETE FOR LOCAL AGENCY PROGRAM (LAP) (CLASS - D).
(REV 6-9-2021) (FA 7-2-21) (FY 2023-24)**

SECTION 344 is deleted and the following substituted:

**SECTION 344
CONCRETE FOR LAP (OFF-SYSTEM)**

344-1 Description.

344-1 General: Construct concrete structures and other concrete members, based on the type of work as described in the Contract Documents and the concrete work categories as defined below.

344-1.2 Work Categories: Construction will fall into one of the following concrete work categories:

344-1.2.1 Concrete Work Category 1: Includes the construction of cast-in-place nonstructural concrete; including sidewalks, curb and gutter, ditch and slope pavement, or other non-reinforced cast-in-place elements.

344-1.2.2 Concrete Work Category 2: Includes the construction of precast and prestressed concrete products.

344-1.2.2.1 Precast Concrete Drainage Structures: Includes but are not limited to reinforced and non-reinforced concrete pipes, french drains, underdrains, inlets, manholes, junction boxes, endwalls, pipe culverts, storm sewers, and box culverts.

344-1.2.2.1 Incidental Precast/Prestressed Concrete Structures: Includes the fabrication, storage, transportation, and erection of prestressed concrete poles, concrete bases for light poles, highway sign foundations, retaining wall systems, traffic separators, sound barriers or other structural precast elements.

344-1.2.3 Concrete Work Category 3: Includes the work associated with the placement and/or construction of structural cast-in-place concrete meeting the requirements of this section.

344-2 Materials.

344-2.1 General: Use concrete composed of a mixture of portland cement, aggregates, and water, with or without chemical or mineral admixtures and supplementary cementitious materials that meet the following requirements:

344-2.1.1 Portland Cement: Portland cements meeting the requirements of AASHTO M 85 or ASTM C150 is required. Different brands of cement, cement of the same brand from different facilities or different types of cement shall be stored separately and shall not be mixed.

344-2.1.2 Coarse and Fine Aggregates: Aggregates shall meet ASTM C33.

344-2.1.3 Water: Water shall meet the requirements of ASTM C 1602.

344-2.1.4 Chemical Admixtures: Use chemical admixtures shall be listed on the FDOT Approved Products List (APL). Admixtures may be added at the dosage rates recommended by the manufacturer.

344-2.1.5 Types of Cement: Unless a specific type of cement is designated in the Contract Documents, use Type I, Type IL, Type IP, Type IS, Type II, Type II (MH) or Type III cement in all classes of concrete. Use Type IL or Type II (MH) for all mass concrete elements.

344-2.1.6 Supplementary Cementitious Materials: Supplementary Cementitious Materials shall meet the requirements of ASTM C618 and ASTM C 989, respectively. Fly ash shall not include the residue resulting from the burning of municipal garbage or any other refuse with coal, or the burning of industrial or municipal garbage in incinerators.

344-3 Production, Mixing and Delivery of Concrete.

344-3.1 Concrete Production Requirements:

344-3.1.1 Category 1: Use a concrete production facility that is certified by the National Ready Mixed Concrete Association (NRMCA) or listed on the FDOT list of non-structural concrete producers. Concrete production facilities listed on the FDOT Producers with Accepted QC Programs list for structural concrete may also be used for Category 1.

344-3.1.2 Category 2: Obtain precast concrete products from plants that are currently on the FDOT's Production Facility Listing for the types of products that they are producing.

344-3.1.3 Category 3: Obtain structural concrete from a plant that is currently on the FDOT's Production Facility Listing for structural concrete.

344-3.2 Classes of Concrete: Meet the requirements of Table 344-1.

Table 344-1 Master Proportion Table ⁽⁷⁾				
Class of Concrete	28-day Specified Minimum Compressive Strength (f_c') (psi)	Maximum Water to Cementitious Materials Ratio (pounds per pounds)	Minimum Total Cementitious Materials Content (lb/yd ³)	Target Slump Value (inches) ⁽³⁾
Category 1				
Class NS	2,500	N/A	N/A	N/A
Category 3				
I ⁽¹⁾	3,000	0.53	470	3 ⁽²⁾
I (Pavement)	3,000	0.50	470	1.5 or 3 ⁽⁵⁾
II ⁽¹⁾	3,400	0.53	470	3 ⁽²⁾
II (Bridge Deck)	4,500	0.44	600 ⁽⁸⁾	3 ⁽²⁾
III ⁽⁴⁾	5,000	0.44	600 ⁽⁸⁾	3 ⁽²⁾
III (Seal)	3,000	0.53	600 ⁽⁸⁾	8
IV	5,500	0.41 ⁽⁶⁾	600 ⁽⁸⁾	3 ⁽²⁾
IV (Drilled Shaft)	4,000	0.41	600 ⁽⁸⁾	8.5
V (Special)	6,000	0.37 ⁽⁶⁾	600 ⁽⁸⁾	3 ⁽²⁾
V	6,500	0.37 ⁽⁶⁾	600 ⁽⁸⁾	3 ⁽²⁾
VI	8,500	0.37 ⁽⁶⁾	600 ⁽⁸⁾	3 ⁽²⁾
VII	10,000	0.37 ⁽⁶⁾	600 ⁽⁸⁾	3 ⁽²⁾

Notes:

- (1) For precast three-sided culverts, box culverts, endwalls, inlets, manholes and junction boxes, the target slump value and air content will not apply. The maximum allowable slump is 6 inches, except as noted in (2). The Contractor is permitted to use concrete meeting the requirements of ASTM C478 (4,000 psi) in lieu of the specified Class I or Class II concrete for precast endwalls, inlets, manholes and junction boxes.
- (2) The Engineer may allow a maximum target slump of 7 inches when a Type F, G, I or II admixture is used. When flowing concrete is used, meet the requirements of Section 8.6 of the FDOT Materials Manual.
- (3) For a reduction in the target slump for slip-form operations, submit a revision to the mix design to the Engineer. The target slump for slip-form mix is 1.50 inches.
- (4) When precast three-sided culverts, box culverts, endwalls, inlets, manholes or junction boxes require a Class III concrete, the minimum cementitious materials content is 470 pounds per cubic yard. Do not apply the air content range and the maximum target slump shall be 6 inches, except as allowed in (2).
- (5) Meet the requirements of Section 350 of FDOT Specifications.
- (6) When silica fume or metakaolin is required, the maximum water to cementitious material ratio will be 0.35. When ultrafine fly ash is used, the maximum water to cementitious material ratio will be 0.30.
- (7) Tolerance for slump is ± 1.5 inches and Air Content range is 0.0% to 6.0%.
- (8) The minimum total amount of cementitious materials content of 600 pounds per cubic yard is required for extremely aggressive environment. For moderately and slightly aggressive environments, the required amounts are 550 lb/yd³ and 510 lb/yd³, respectively.

344-3.3 Contractors Quality Control: For Categories 1 and 2, assume full responsibility for controlling all operations and processes such that the requirements of these Specifications are always met.

For Category 3, furnish a Quality Control (QC) plan to identify to the Engineer how quality will be ensured at the project site. During random inspections, the Engineer will use this document to verify that the construction of the project agrees with the QC plan.

344-3.4 Concrete Mix Design: Before producing any Category 1 or Category 2 concrete, submit the proposed mix designs to the Engineer. For Category 3, submit to the Engineer for approval, FDOT approved mix designs. Do not use concrete mix designs without prior approval of the Engineer.

Materials may be adjusted provided that the theoretical yield requirement of the approved mix design is met. Show all required original approved design mix data and batch adjustments on an Engineer approved concrete delivery ticket.

344-3.5 Delivery: For Category 3, the maximum allowable transit time of concrete is 90 minutes. For critical placements, with the Engineer's approval, the transit time may be extended to the allowable mixing time shown in the mix design.

Furnish a delivery ticket on a form approved by the Engineer with each batch of concrete before unloading at the placement site. Record material quantities incorporated into the mix on the delivery ticket. Ensure that the Batcher responsible for producing the concrete signs the delivery ticket certifying that the batch was produced and delivered in accordance with these requirements. Sign the delivery ticket certifying that the concrete was placed in accordance with these requirements.

344-3.6 Placing Concrete:

344-3.6.1 Concreting in Cold Weather: Do not mix or place concrete when the air temperature at placement is below 40°F.

During the curing period, if the National Oceanic and Atmospheric Administration (NOAA) predicts the ambient temperature to fall below 35°F for 12 hours or more or to fall below 30°F for more than 4 hours, enclose the structure in such a way that the air temperature within the enclosure can be kept above 50°F for a period of 3 days after placing the concrete or until the concrete reaches a minimum compressive strength of 1,500 psi.

Assume all risks connected with the placing and curing of concrete.

Although the Engineer may give permission to place concrete, the Contractor is responsible for satisfactory results. If the placed concrete is determined to be unsatisfactory, remove, dispose of, and replace the concrete at no expense to the Agency.

344-3.6.2 Concreting in Hot Weather: For Category 3, hot weather concreting is defined as the production, placing and curing of concrete when the concrete temperature at placing exceeds 86°F but is less than 100°F.

Spray reinforcing bars and metal forms with cool fresh water just prior to placing the concrete in a method approved by the Engineer.

Assume all risks associated with the placing and curing of concrete.

Although the Engineer may give permission to place concrete, the Contractor is responsible for satisfactory results. If the placed concrete is determined to be unsatisfactory, remove, dispose of, and replace the concrete at no expense to the Agency.

Unless the specified hot weather concreting measures are in effect, reject concrete exceeding 85°F at the time of placement. Regardless of special measures taken, reject concrete exceeding 100°F. Predict the concrete temperatures at placement time and implement hot weather measures to avoid production shutdown.

344-3.7 Mixers: For Category 3 concrete, do not place concrete from a truck mixer that does not have a current FDOT mixer identification card.

344-3.8 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. The Engineer may verify that the pre-bagged mixture is prepared in accordance with the manufacturer's recommendations and will meet the requirements of this Specification.

344-3.9 Sampling and Testing:

344-3.9.1 Category 1: The Engineer may sample and test the concrete to verify its quality. The minimum 28 day compressive strength requirement for this concrete is 2,500 psi.

344-3.9.2: Category 2: No sampling and testing is required by the Engineer for category 2.

344-3.9.3 Category 3: The Engineer will randomly select a sample from each LOT to determine its plastic properties and to make three 4 x 8 inch cylinders for testing by the Engineer at 28 days to ensure that the design compressive strength has been met for the class of concrete as specified in Table 344-1. A LOT is defined as the concrete placement of 200 cubic yards or one day's production, whichever is less.

344-3.10 Records: Ensure the following records are available for review for at least 3 years after final acceptance of the project:

1. Accepted concrete Plant QC Plan.
2. Approved concrete mix designs.
3. Materials source (delivery tickets, certifications, certified mill test reports).

4. A copy of the scale company or testing agency report showing the signature of the scale company representative, date of inspection, observed deviations from quantities checked during calibration of the scales and meters.

5. A copy of the documentation certifying the admixture weighing/measuring devices.

6. Aggregate moisture control records including date and time of test.

7. Manufacturer's mixer information.

8. Certification documents for admixture weighing and measuring dispensers.

9. A daily record of all concrete batched for delivery to the projects, including respective mix design numbers and quantities of batched concrete.

344-4 Acceptance of the Work.

344-4.1 Category 1 Work: Category 1 work will be accepted based on certification by the batcher and contractor on the delivery ticket.

344-4.2 Category 2 Work: Certify that the precast elements were produced by production facilities that are currently on the FDOT's Production Facility Listing for the types of products that they are producing. In addition, the producer's logo shall be stamped on the element. The producer shall not use the Florida Department of Transportation QC stamp on elements used on this project. Provide a statement of certification from the manufacturer of the precast element that the element meets the requirements of this Specification.

344-4.3 Category 3 Work: Category 3 concrete will be accepted based on the Engineer's test results for plastic properties and compressive strength requirements for the class of concrete as defined in Table 344-2. In addition, a Delivery Ticket as described in 344-3.5 will be required for acceptance of the material at the project site.

344-4.4 Small Quantities of Concrete: Category 3 concrete meeting the definition of 344-3.8 will be accepted in accordance with 344-4.3 based on test results for plastic properties and compressive strength.

344-5 Method of Measurement.

The quantities to be paid for will be the items shown in the plans, completed and accepted.

344-6 Basis of Payment.

Prices and payments will be full compensation for all work and materials specified in this Section.

Z:\2024 Projects\2404E SR50 Pump Station\Drawings\Electrical\Sheet Set\2404E_E-01 Electrical Legend and Specifications.dwg Jul 2, 2024 4:18 pm

DRAWING SPECIFICATIONS

GENERAL:	
A.	REFER TO THE LATEST HERNANDO COUNTY UTILITIES DEPARTMENT (HCUD) WATER, RECLAIMED WATER, AND WASTEWATER CONSTRUCTION SPECIFICATIONS MANUAL FOR ADDITIONAL INFORMATION AND REQUIREMENTS. THE HCUD SPECIFICATIONS SHALL SUPERCEDE THESE DRAWING SPECIFICATIONS UNLESS APPROVED BY HCUD.
B.	PROVIDE SHALL MEAN FURNISH AND INSTALL.
C.	THE COMPLETE ELECTRICAL SYSTEM WHICH SHALL BE PROVIDED BY THE CONTRACTOR SHALL INCLUDE ALL WORK, MATERIALS AND APPARATUS SPECIFIED HEREINAFTER AND INDICATED ON THE DRAWINGS. ALL WORKMANSHIP SHALL BE OF THE HIGHEST QUALITY AND NO SUBSTANDARD WORK WILL BE ACCEPTED.
D.	PROVIDE ALL WORK AND ELECTRICAL SYSTEMS COMPONENTS REQUIRED TO SERVE LOADS AS SPECIFIED HEREINAFTER AND INDICATED ON THE DRAWINGS. THE WORK SHALL INCLUDE COMPLETE TESTING OF ALL ELECTRICAL SYSTEMS AT THE COMPLETION OF THE WORK AND MAKING ANY CHANGES AND ADJUSTMENTS NECESSARY FOR THE PROPER FUNCTIONING OF THE SYSTEMS.
E.	MAKE A THOROUGH EXAMINATION OF THE SITE AND THE CONTRACT DOCUMENTS PRIOR TO EXECUTING THE CONTRACT. NO CLAIM FOR ADDITIONAL COMPENSATION WILL BE RECOGNIZED FOR DIFFICULTIES ENCOUNTERED WHICH AN EXAMINATION OF SITE CONDITIONS AND CONTRACT DOCUMENTS WOULD HAVE REVEALED.
F.	ALL ELECTRICAL EQUIPMENT SHALL BE INSTALLED ABOVE THE FLOODPLAIN ELEVATION. CONTRACTOR SHALL COORDINATE FLOODPLAIN ELEVATION AND EQUIPMENT REQUIREMENTS WITH OWNER PRIOR TO ROUGH-IN.
G.	THE PLANS ARE GENERALLY DIAGRAMMATIC. COORDINATE ALL WORK WITH OTHER TRADES AS REQUIRED TO AVOID INTERFERENCES BETWEEN TRADES (I.E. PIPING, CONDUITS, EQUIPMENT, ETC).
H.	REMOVE ALL EXISTING LIGHTING FIXTURES, EQUIPMENT, DEVICES, CONDUCTORS, RACEWAYS, ETC. MADE UNNECESSARY BY THE NEW INSTALLATION. PRIOR TO REMOVAL FROM SITE, COORDINATE WITH OWNER TO DETERMINE IF OWNER WISHES TO RETAIN ANY REMOVED EQUIPMENT.
WORK PERFORMANCE:	
A.	JOB SITE SAFETY AND WORKER SAFETY IS THE RESPONSIBILITY OF THE CONTRACTOR.
B.	ARRANGE, PHASE AND PERFORM ALL WORK DURING TIME PERIODS SCHEDULED WITH AND ACCEPTABLE TO THE OWNER BEFORE PROCEEDING. NO ADDITIONAL COMPENSATION WILL BE AUTHORIZED FOR WORK NECESSITATED BY ILL-TIMED, DEFECTIVE, OR NON-CONFORMING WORK.
C.	THE CONTRACTOR SHALL ENSURE THAT ALL SYSTEMS OPERATE AS DESIGNED AND/OR REQUIRED AND SHALL REVIEW THEIR OPERATION WITH THE OWNER UPON COMPLETION OF CONSTRUCTION AND TESTING. COMPILE COMPLETE AND UPDATED AS-BUILT DRAWINGS/DOCUMENTS AND ISSUE ONE (1) SET TO THE OWNER.
D.	ELECTRICAL WORK SHALL BE ACCOMPLISHED WITH ALL AFFECTED CIRCUITS OR EQUIPMENT DE-ENERGIZED, WHEN AN ELECTRICAL OUTAGE CANNOT BE ACCOMPLISHED IN THIS MANNER FOR THE REQUIRED WORK, THE FOLLOWING REQUIREMENTS ARE MANDATORY:
1.	ELECTRICIANS MUST USE AND WEAR FULL PROTECTIVE EQUIPMENT (PPE) (I.E. CERTIFIED AND TESTED INSULATING MATERIAL TO COVER EXPOSED ENERGIZED ELECTRICAL COMPONENTS, CERTIFIED AND TESTED INSULATED TOOLS, ETC.) WHILE WORKING ON ENERGIZED SYSTEMS IN ACCORDANCE WITH NFPA 70E. THE LEVEL OF PPE SHALL BE DETERMINED BY A COMPUTER GENERATED ARC FLASH CALCULATION PROVIDED AND PAID FOR BY THE CONTRACTOR. THE ARC FLASH DATA SHALL BE PRESENTED WITH THE SUBMITTAL BELOW.
2.	WORK ON ENERGIZED CIRCUITS OR EQUIPMENT CANNOT BEGIN UNTIL PRIOR WRITTEN APPROVAL IS OBTAINED FROM THE OWNER.
E.	NEW WORK SHALL BE INSTALLED AND CONNECTED TO EXISTING WORK NEATLY AND CAREFULLY. PROVIDE PROTECTIVE MATS, COVERS, ETC. AS REQUIRED FOR ALL EXISTING WORK SUSCEPTIBLE TO DAMAGE. VERIFY SPECIFIC LOCATIONS AND REQUIREMENTS WITH THE OWNER. DISTURBED OR DAMAGED WORK AS A RESULT OF ELECTRICAL WORK SHALL BE REPLACED OR REPAIRED TO ITS PRIOR CONDITIONS.
F.	EXISTING SERVICE SHALL NOT BE INTERRUPTED WITHOUT PRIOR CONSENT OF THE OWNER AND MAY BE INTERRUPTED ONLY AT AND FOR THE SPECIFIED TIME DESIGNATED BY THE OWNER. THE CONTRACTOR SHALL BE GUIDED BY THE OWNER AT ALL TIMES IN MATTERS AFFECTING THE EXISTING FACILITIES.
G.	ELECTRICAL EQUIPMENT SHALL NOT BE STORED OUTDOORS. EQUIPMENT SHALL BE STORED IN AN OWNER/ENGINEER APPROVED MEDIUM AND LOCATION.
CODES & STANDARDS:	
A.	PERFORM WORK IN COMPLIANCE WITH THE LATEST EDITION OF ALL APPLICABLE, FEDERAL, STATE AND LOCAL CODES, REGULATIONS AND STANDARDS, TO INCLUDE THOSE LISTED BELOW, ADOPTED BY THE AUTHORITY HAVING JURISDICTION, WHERE DIFFERENCES MAY OCCUR THE MORE STRINGENT REQUIREMENTS SHALL GOVERN. IN CASE OF CONFLICT PROVIDE WRITTEN NOTIFICATION AND OBTAIN A DECISION FROM THE ARCHITECT.
1.	NFPA 70: NATIONAL ELECTRICAL CODE (2020)
2.	NFPA 70E: STANDARD FOR ELECTRICAL SAFETY IN THE WORKPLACE (2024)
3.	NFPA 101: LIFE SAFETY CODE (2021)
4.	NFPA 110: STANDARD FOR EMERGENCY AND STANDBY POWER SYSTEMS (2019)
5.	NFPA 241: STANDARD FOR SAFEGUARDING CONSTRUCTION, ALTERATION AND DEMOLITION OPERATIONS (2022)
6.	FBC: FLORIDA BUILDING CODE (2023)
7.	OSHA PART 1910: OCCUPATIONAL SAFETY AND HEALTH STANDARDS
8.	OSHA PART 1926: SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION
WARRANTY:	
A.	CONTRACTOR SHALL WARRANTY ALL WORK FOR A PERIOD OF ONE (1) YEAR FROM DATE OF SUBSTANTIAL COMPLETION. CONTRACTOR SHALL RECTIFY ANY DEFECTS DUE TO FAULTY MATERIALS OR WORKMANSHIP AND PAY FOR ANY DAMAGE TO OTHER WORK RESULTING THEREFROM WITHIN SAID PERIOD. THE OWNER WILL GIVE NOTICE OF DEFECTS WITH REASONABLE PROMPTNESS.
B.	PROVIDE COMPLETE WARRANTY INFORMATION FOR EACH ITEM TO INCLUDE PRODUCT OR EQUIPMENT; DATE OR BEGINNING OF WARRANTY OR BOND; DURATION OF WARRANTY OR BOND; AND NAMES, ADDRESSES, AND TELEPHONE NUMBERS AND PROCEDURES FOR FILING A CLAIM AND OBTAINING WARRANTY SERVICES.

SUBMITTALS:	
A.	SUBMIT ONE (1) ELECTRONIC PDF COPY. THE ENGINEER WILL RETURN SUBMITTAL REVIEW COMMENTS NO LATER THAN 10 CALENDAR DAYS OF RECEIPT.
B.	APPROVAL SHALL BE OBTAINED FOR ALL EQUIPMENT AND MATERIAL BEFORE DELIVERY TO THE JOB SITE. DELIVERY, STORAGE OR INSTALLATION OF EQUIPMENT OR MATERIAL WHICH HAS NOT HAD PRIOR APPROVAL, WILL NOT BE PERMITTED AT THE JOB SITE.
C.	ALL SUBMITTALS SHALL INCLUDE ADEQUATE DESCRIPTIVE LITERATURE, CATALOG CUTS, SHOP DRAWINGS AND OTHER DATA NECESSARY FOR THE ARCHITECT/ENGINEER TO ASCERTAIN THAT THE PROPOSED EQUIPMENT AND MATERIALS COMPLY WITH SPECIFICATION REQUIREMENTS. CATALOG CUTS SUBMITTED FOR APPROVAL SHALL BE LEGIBLE AND CLEARLY IDENTIFY EQUIPMENT BEING SUBMITTED.
D.	SUBMITTALS FOR INDIVIDUAL SYSTEMS AND EQUIPMENT ASSEMBLIES WHICH CONSIST OF MORE THAN ONE ITEM OR COMPONENT SHALL BE MADE FOR THE SYSTEM OR ASSEMBLY AS A WHOLE. PARTIAL SUBMITTALS WILL NOT BE CONSIDERED FOR APPROVAL.
E.	SUBMITTAL OF SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES WILL BE ACCEPTED ONLY WHEN SUBMITTED BY THE CONTRACTOR. DATA SUBMITTED FROM SUBCONTRACTORS AND MATERIAL SUPPLIERS DIRECTLY TO THE ENGINEER WILL NOT BE PROCESSED.
F.	SUBMITTALS SHALL BE MARKED TO SHOW SPECIFICATION REFERENCE INCLUDING THE SECTION AND PARAGRAPH NUMBERS. SUBMIT EACH SECTION SEPARATELY AND INCLUDE THE FOLLOWING:
1.	INFORMATION THAT CONFIRMS COMPLIANCE WITH CONTRACT REQUIREMENTS. INCLUDE THE MANUFACTURER'S NAME, MODEL OR CATALOG NUMBERS, CATALOG INFORMATION, TECHNICAL DATA SHEETS, SHOP DRAWINGS, PICTURES, NAMEPLATE DATA AND TEST REPORTS AS REQUIRED.
2.	PARTS LIST WHICH SHALL INCLUDE THOSE REPLACEMENT PARTS RECOMMENDED BY THE EQUIPMENT MANUFACTURER, QUANTITY OF PARTS, CURRENT PRICE AND AVAILABILITY OF EACH PART.
MATERIALS AND METHODS:	
A.	MATERIALS AND APPARATUS SHALL COMPLY WITH ALL APPLICABLE TESTS, RATINGS, SPECIFICATIONS, AND REQUIREMENTS OF THE IEEE, NEMA, NFPA AND UL, SHALL BEAR THE UL LABEL OF APPROVAL AND BE LISTED FOR THE PROPOSED APPLICATION.
B.	FINISHED PRODUCTS SHALL BE FACTORY PRIMED AND FINISH COATED WITH THE MANUFACTURER'S PRIME COAT AND STANDARD FINISH UNLESS OTHERWISE SPECIFIED.
C.	INSTALLATIONS SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES, AS RECOMMENDED BY THE MANUFACTURER AND AS CLOSE AS PRACTICABLE TO LOCATIONS INDICATED ON DRAWINGS.
D.	INSTALLATIONS SHALL FACILITATE MAINTENANCE AND REPAIR OR REPLACEMENT OF EQUIPMENT COMPONENTS. ACCESS, WORKING SPACES AND CLEARANCES SHALL NOT BE LESS THAN SPECIFIED BY THE NEC FOR ALL VOLTAGES SPECIFIED.
IDENTIFICATION:	
A.	INSTALL LABEL TAGS ON ALL WIRE AND CABLE IN JUNCTION BOXES, WIREWAYS AND WIRING GUTTERS OF PANELS. TAGS SHALL IDENTIFY WIRE OR CABLE CIRCUIT NUMBER AND/OR EQUIPMENT SERVED AS INDICATED ON DRAWINGS.
B.	JUNCTION BOXES SHALL BE LABELED IN A PERMANENT MANNER REFLECTING PANELBOARD/CIRCUIT NUMBER OF BRANCH CIRCUIT WIRING CONTAINED WITHIN.
C.	PANELBOARD DIRECTORIES SHALL BE TYPEWRITTEN, REFLECTING RECORD CONDITIONS TO INCLUDE CIRCUIT NUMBER, TYPE AND LOCATION OF LOAD.
D.	INSTALL PLASTIC PLACARDS ON EQUIPMENT REFLECTING, EQUIPMENT NAME, NUMBER AND RATING.
RACEWAYS:	
A.	RACEWAYS:
1.	EXTERIOR EXPOSED: SCHEDULE 40 POLYVINYL CHLORIDE CONDUIT (PVC), UON.
2.	EXTERIOR CONNECTIONS TO MOTORS, TRANSFORMERS AND VIBRATING EQUIPMENT: LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC).
3.	UNDERGROUND: SCHEDULE 40 PVC.
4.	PENETRATIONS THROUGH CONCRETE SLABS SHALL BE MADE WITH PVC COATED RIGID GALVANIZED STEEL CONDUIT.
B.	ALL BENDS IN PVC LARGER THAN 1" NOMINAL TRADE SIZE SHALL BE MADE WITH PVC COATED RIGID METAL CONDUIT.
C.	ALL CONDUIT SHALL BE PROPERLY ALIGNED, GROUPED AND SUPPORTED. INSTALL EXPOSED CONDUIT PERPENDICULAR AND PARALLEL TO PRINCIPAL STRUCTURAL MEMBERS. PROVIDE SUPPORT A MINIMUM OF 18" FROM BENDS AND OUTLET BOXES AND ON INTERVALS NOT TO EXCEED 6'-0". CONDUIT IS NOT TO SPAN ANY SPACE UNSUPPORTED.
D.	UNDERGROUND CONDUITS SHALL BE INSTALLED WITH MINIMUM 30" COVER.
E.	PROVIDE NYLON PULL CORD AND LEAVE IN PLACE IN EACH EMPTY CONDUIT.
BOXES:	
A.	ALL BOXES SHALL BE RIGIDLY MOUNTED AND SHALL BE EQUIPPED WITH SUITABLE SCREW FASTENED COVERS. OPEN KNOCK-OUTS OR HOLES IN BOXES SHALL BE PLUGGED WITH A SUITABLE BLANKING DEVICE.
B.	EXTERIOR BRANCH BOXES SHALL BE WEATHERPROOF CAST "FS" BOXES.
CONDUCTORS:	
A.	UNLESS OTHERWISE INDICATED, ALL BRANCH CIRCUIT CONDUCTORS SHALL BE NO. 12 AWG. BRANCH CIRCUITS RUN OVER 75 FEET IN LENGTH, MEASURING ONE WAY FROM THE FIRST OUTLET OF THE CIRCUIT TO THE PANEL, SHALL BE NO. 10 AWG FOR THE ENTIRE CIRCUIT.
B.	CONDUCTORS SHALL BE COPPER WITH THHN/THWN-2 90°C INSULATION. THE FOLLOWING SYSTEMS OF COLOR CODING SHALL BE STRICTLY ADHERED TO AND SHALL BE CONSISTENTLY FOLLOWED THROUGHOUT:
1.	GROUND WIRES: GREEN
2.	GROUND NEUTRAL WIRES: WHITE
3.	208/120 VOLT, UNGROUNDED PHASE WIRES: BLACK, RED AND BLUE
4.	480/277 VOLT, UNGROUNDED PHASE WIRES: BROWN, ORANGE AND YELLOW

C.	NO UNDERGROUND SPLICES ALLOWED.
D.	MULTIPLE CIRCUITS IN SAME CONDUIT SHALL NOT SHARE NEUTRAL CONDUCTORS. FOR EXISTING CIRCUITS.
E.	INSTALL INSUL-TAP CONNECTORS FOR COPPER CONDUCTOR SPLICES AND TAPS, 6 AWG AND LARGER.
F.	INSTALL SOLDERLESS PRESSURE CONNECTORS WITH INSULATING COVERS FOR COPPER CONDUCTOR SPLICES AND TAPS, 8 AWG AND SMALLER.
G.	INSTALL INSULATED SPRING WIRE CONNECTORS WITH PLASTIC CAPS FOR COPPER CONDUCTOR SPLICES AND TAPS, 10 AWG AND SMALLER.
H.	"PUSH-IN" OR "STAB" TYPE CONNECTORS ARE NOT ACCEPTABLE.
GROUNDING:	
A.	THE ELECTRICAL SYSTEMS SHALL BE COMPLETELY AND EFFECTIVELY GROUNDED AS REQUIRED BY THE NEC AND AS SPECIFIED HEREINAFTER.
B.	ALL METALLIC RACEWAYS SHALL BE MECHANICALLY AND ELECTRICALLY SECURE AT ALL JOINTS AND AT ALL BOXES, CABINETS, FITTINGS, AND EQUIPMENT. METALLIC RACEWAYS SHALL BE CONNECTED TO A DIRECT GROUND AT THE POINT OF ELECTRICAL SERVICE ENTRANCE AND SHALL BE ELECTRICALLY CONTINUOUS THROUGHOUT THE ENTIRE SYSTEM.
C.	METALLIC LIGHT POLES SHALL BE BONDED TO THE LUMINAIRE EQUIPMENT GROUNDING CONDUCTOR PER NEC 410.30(B)(5).
D.	ALL GROUND CONDUCTORS SHALL BE INSULATED COPPER UON.
E.	ALL RACEWAYS WITH NO. 10 OR 12 AWG PHASE CONDUCTORS FOR BRANCH CIRCUITS SHALL BE PROVIDED WITH A PARITY SIZED GREEN EQUIPMENT GROUND CONDUCTOR. GROUND CONDUCTOR SHALL BE INSTALLED IN ENTIRE RACEWAY SYSTEM. EQUIPMENT GROUND CONDUCTOR SIZES FOR CIRCUITS WITH PHASE CONDUCTORS LARGER THAN NO. 12 AWG ARE INDICATED ON DRAWINGS. GROUND CONDUCTORS SHALL BE CONNECTED TO GROUND BUS.
F.	TERMINATE FEEDER AND BRANCH CIRCUIT INSULATED EQUIPMENT GROUNDING CONDUCTORS WITH GROUNDING LUG, BUS, OR BUSHING. CONDUCTORS LOOPED UNDER SCREW OR BOLT HEADS WILL NOT BE PERMITTED.
G.	INSTALL CLAMP-ON CONNECTORS ON CLEAN METAL CONTACT SURFACES TO ENSURE ELECTRICAL CONDUCTIVITY AND CIRCUIT INTEGRITY.
H.	TEST THE GROUNDING SYSTEM TO ASSURE CONTINUITY AND THAT RESISTANCE TO GROUND DOES NOT EXCEED 5 OHMS UNLESS OTHERWISE NOTED. TEST EACH GROUND ROD FOR RESISTANCE TO GROUND BEFORE MAKING ANY CONNECTIONS TO THE ROD; THEN TIE ENTIRE GROUNDING SYSTEM TOGETHER AND TEST FOR RESISTANCE TO GROUND. MAKE RESISTANCE MEASUREMENTS IN NORMALLY DRY WEATHER, NOT LESS THAN 48 HOURS AFTER RAINFALL. MAKE GROUND RESISTANCE MEASUREMENTS WITH A GROUND RESISTANCE TEST METER CALIBRATED WITHIN THE LAST TWELVE MONTHS.
RECEPTACLES:	
A.	RECEPTACLES SHALL BE THE GROUNDING TYPE WITH GROUND CONNECTION MADE THROUGH AN EXTRA POLE WHICH SHALL BE PERMANENTLY CONNECTED TO GROUND CONDUCTOR.
B.	CONNECT WIRING DEVICES BY WRAPPING SOLID CONDUCTOR AROUND SCREW TERMINAL. WHEN STRANDED CONDUCTORS ARE USED IN LIEU OF SOLID, USE CRIMP ON FORK TERMINALS FOR DEVICE TERMINATIONS. DO NOT PLACE BARE STRANDED CONDUCTORS DIRECTLY UNDER DEVICE SCREWS.
C.	GFCI RECEPTACLES SHALL MEET CURRENT UL 943 REQUIREMENTS WITH AUTO-MONITORING OR SELF-TEST FUNCTIONALITY; IF THE SELF-TEST FUNCTION DETECTS A PROBLEM, THE UNIT MUST DENY POWER OR PROVIDE VISUAL AND/OR AUDIBLE INDICATION.
D.	GFCI RECEPTACLES LOCATED IN DAMP, WET OR EXTERIOR LOCATIONS SHALL BE WEATHER-RESISTANT TYPE TO COMPLY WITH NEC 406.9.
E.	RECEPTACLES FOR 20 AMPERE, 120 VOLT APPLICATION SHALL BE SPECIFICATION GRADE THREE-WIRE, TWO POLE, RATED 20 AMPERES AT 125 VOLTS, PASS & SEYMOUR OR APPROVED EQUAL.
F.	WEATHERPROOF COVER PLATES SHALL BE NEMA 250 COMPLYING WITH TYPE 3R, WEATHER RESISTANT, DIE-CAST ALUMINUM, WHILE IN USE COVER. COVER SHALL HAVE NOTCH FOR CORD.
LIGHTING FIXTURES:	
A.	THE CONTRACTOR SHALL FURNISH AND INSTALL COMPLETE IN ALL RESPECTS ALL LIGHTING FIXTURES AND APPURTENANCES AS INDICATED ON THE PLANS.
B.	THE MANUFACTURER SHALL PROVIDE A WARRANTY AGAINST LOSS OF PERFORMANCE AND DEFECTS IN MATERIAL AND WORKMANSHIP FOR THE LUMINAIRE FOR A PERIOD OF 5 YEARS FROM THE DATE OF SHIPMENT.
C.	PROPERLY AND CAREFULLY ALIGN FIXTURES. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL NECESSARY HARDWARE, ETC. FOR A COMPLETE FIXTURE INSTALLATION.
D.	POLES: DO NOT STORE POLES ON GROUND. STORE POLES SO THEY ARE AT LEAST ONE FOOT ABOVE GROUND LEVEL AND GROWING VEGETATION. DO NOT REMOVE FACTORY-APPLIED POLE WRAPPINGS UNTIL JUST BEFORE INSTALLING POLE.
E.	FIXTURES SHALL BE CLEAN AND LENSES SHALL BE CLEAR OF FINGERPRINTS.
EQUIPMENT:	
A.	APPROVED MANUFACTURERS SHALL BE AS PER HCUD WATER, RECLAIMED WATER, AND WASTEWATER CONSTRUCTION SPECIFICATIONS MANUAL.
B.	EQUIPMENT BUSES SHALL BE COPPER.
C.	OUTDOOR EQUIPMENT SHALL BE NEMA 3R OR NEMA 4X AS REQUIRED.
D.	PROVIDE DISCONNECTING MEANS OR SAFETY SWITCH NEAR AND WITHIN SIGHT OF EACH MOTOR.
E.	SAFETY SWITCHES SHALL BE HEAVY DUTY TYPE UON.
F.	FUSES SHALL BE CLASS RK1 UON.
G.	SURGE PROTECTIVE DEVICE MANUFACTURERS SHALL BE SQUARE D; REFER TO HCUD SPECIFICATIONS.
SYSTEMS:	
A.	COMMUNICATIONS WIRING INSTALLED UNDERGROUND OR IN CONCRETE SLABS OR MASONRY IN DIRECT CONTACT WITH EARTH SHALL BE UL LISTED AS SUITABLE FOR WET LOCATIONS (I.E. OSP RATED CABLE).

LEGEND					
SYMBOL	DESCRIPTION	MOUNTING/REMARKS			
	SITE LIGHTING FIXTURE	POLE OR WALL SURFACE			
	SITE LIGHTING POLE OR POST	GRADE DIRECT BURIAL OR BASE			
	DISCONNECT SWITCH	TOP 78" AFF			
	ELECTRICAL EQUIPMENT	AS NOTED			
	EQUIPMENT RACK	AS NOTED			
	GROUNDING ROD	BELOW GRADE			
	ELECTRIC UTILITY METER/CABINET	AS REQUIRED BY UTILITY COMPANY			
	SECURITY LIGHTING FIXTURE	WALL SURFACE			
	SCONCE LIGHTING FIXTURE	WALL SURFACE			
	STRIP LIGHTING FIXTURE	CEILING SURFACE OR SUSPENDED			
	JUNCTION/OUTLET BOX: DENOTED BY ANNOTATION	WALL SURFACE			
	DUPLEX RECEPTACLE: 20 A, 125 VAC	TOP 20" AFF			
	DEVICE AS NOTED	AS NOTED			
	CIRCUIT/CONDUIT SPLICE OR CABLE BONDING	WIRES INDICATED AS FOLLOWS:			
	CIRCUIT/CONDUIT OR CABLE TURNING DOWN/DROP	TWO WIRES: * NEUTRAL WIRE (TYP) PHASE WIRE (TYP) THREE WIRES, ETC. EQUIPMENT GROUND WIRE *MIN 2 #12 + #12 EG - 1/2" C FOR ALL POWER AND LIGHTING RACEWAYS UON OR SPECIFIED			
	CIRCUIT HOME RUN TO PANELBOARD INDICATED				
	CIRCUIT/CONDUIT OR CABLE UNDERGROUND OR UNDER FLOOR				
	KEYED NOTES	REFER TO LIKE-NUMBERED NOTES			
ABBREVIATIONS:					
A	AMPS OR AMPERE	FC	FOOTCANDLE	NEC	NATIONAL ELECTRICAL CODE
A/E	ARCHITECT/ENGINEER	FLA	FULL LOAD AMPS	NEMA	NATIONAL ELECTRICAL
AF	AMPERE FRAME	FO	FIBER OPTIC		MANUFACTURERS
AFCI	ARC-FAULT CIRCUIT INTERRUPTER	FT	FOOT (FEET)		ASSOCIATION
AFF	ABOVE FINISHED FLOOR	GC	GENERAL CONTRACTOR	NFPA	NATIONAL FIRE PROTECTION
AFG	ABOVE FINISHED GRADE	GEN	GENERATOR		ASSOCIATION
AHJ	AUTHORITY HAVING JURISDICTION	GFCI	GROUND-FAULT CIRCUIT INTERRUPTER	NO	NORMALLY OPEN
AIC	AMPERE INTERRUPTING CAPACITY		GROUND	NTS	NOT TO SCALE
AL	ALUMINUM	GND	GROUND	OB	OUTLET BOX
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	HOA	HAND-OFF-AUTO	P	POLE
ASD	ADJUSTABLE SPEED DRIVE	HP	HORSEPOWER	PA	PUBLIC ADDRESS
AT	AMPERE TRIP	HPS	HIGH PRESSURE SODIUM	PB	PULL BOX
ATS	AUTOMATIC TRANSFER SWITCH	HV	HIGH VOLTAGE	PH/φ	PHASE
AUTO	AUTOMATIC	HZ	HERTZ	PNL	PANELBOARD (PANEL)
AWG	AMERICAN WIRE GAUGE	IG	ISOLATED GROUND	RECPT	RECEPTACLE
BLDG	BUILDING	IB	INCH (INCHES)	SECC	SHORT CIRCUIT CAPACITY
BFG	BELOW FINISHED GRADE	JB	JUNCTION BOX	SI	SQUARE FOOT (FEET)
BRKR	BREAKER	kcmil	THOUSAND CIRCULAR MIL	SPEC	SPECIFICATION
C	CONDUIT	kV	KILOVOLT	SPD	SURGE PROTECTIVE DEVICE
CB	CIRCUIT BREAKER	kVA	KILOVOLT AMPERE	SS	STAINLESS STEEL
CKT	CIRCUIT	kw	KILOWATT	SWBD	SWITCHBOARD
COMM	COMMUNICATIONS	kWh	KILOWATT HOUR	SWGR	SWITCHGEAR
CT	CURRENT TRANSFORMER	LED	LIGHT EMITTING DIODE	TR	TAMPER RESISTANT
CU	COPPER	LPS	LIGHTNING PROTECTION SYSTEM	TYP	TYPICAL
°C	DEGREES CELSIUS	LTG	LIGHTING	U	UNKNOWN CIRCUIT
°F	DEGREES FAHRENHEIT	LTNG	LIGHTNING	UL	UNDERWRITERS
DISC	DISCONNECT	LV	LOW VOLTAGE	UN	UNLESS OTHERWISE NOTED
DP	DISTRIBUTION PANELBOARD	MAX	MAXIMUM	UON	UNINTERRUPTIBLE POWER SUPPLY
DS	DISCONNECT SWITCH	MCA	MINIMUM CIRCUIT AMPACITY	UTIL	UTILITY
DWG	DRAWING	MCB	MAIN CIRCUIT BREAKER	V	VOLT OR VOLTAGE
EC	ELECTRICAL CONTRACTOR	MCC	MOTOR CONTROL CENTER	VA	VOLT AMPERE
ELEC	ELECTRIC OR ELECTRICAL	MDP	MAIN DISTRIBUTION PANELBOARD	VD	VOLTAGE DROP
ELEV	ELEVATOR	MH	METAL HALIDE	VFD	VARIABLE FREQUENCY DRIVE
EMER	EMERGENCY	MHz	MEGAHERTZ	W	WATT OR WIRE
EPO	EMERGENCY POWER OFF	MIN	MINIMUM	WP	WEATHERPROOF
EPS	EMERGENCY POWER SUPPLY	MLO	MAIN LUGS ONLY	WR	WEATHER RESISTANT
EXIST	EXISTING	MOCP	MAXIMUM OVERCURRENT PROTECTION	WT	WATERTIGHT
FA	FIRE ALARM	MTS	MANUAL TRANSFER SWITCH	XFER	TRANSFER
		N	NEUTRAL	XFMR	TRANSFORMER
		NA	NOT APPLICABLE	XP	EXPLOSION RATED
		NC	NORMALLY CLOSED		

A. MOUNTING HEIGHTS INDICATE NOMINAL MOUNTING HEIGHTS UON.	
OBJECT STATE LINETYPES:	
EXISTING OBJECT OR CONSTRUCTION:	_____
EXISTING OBJECT OR CONSTRUCTION TO BE DEMOLISHED:	-----
NEW OBJECT OR CONSTRUCTION TO BE PROVIDED:	_____
OBJECT STATE SUBSCRIPTS:	
D EXISTING OBJECT TO BE DEMOLISHED	M EXISTING OBJECT TO BE REMOVED & RELOCATED
E EXISTING OBJECT TO REMAIN	R RELOCATED EXISTING OBJECT

ELECTRICAL LEGEND AND SPECIFICATIONS

CORTEZ BOULEVARD PUMP STATION REPLACEMENT PROJECT

ADAM V. EACHES, P.E.
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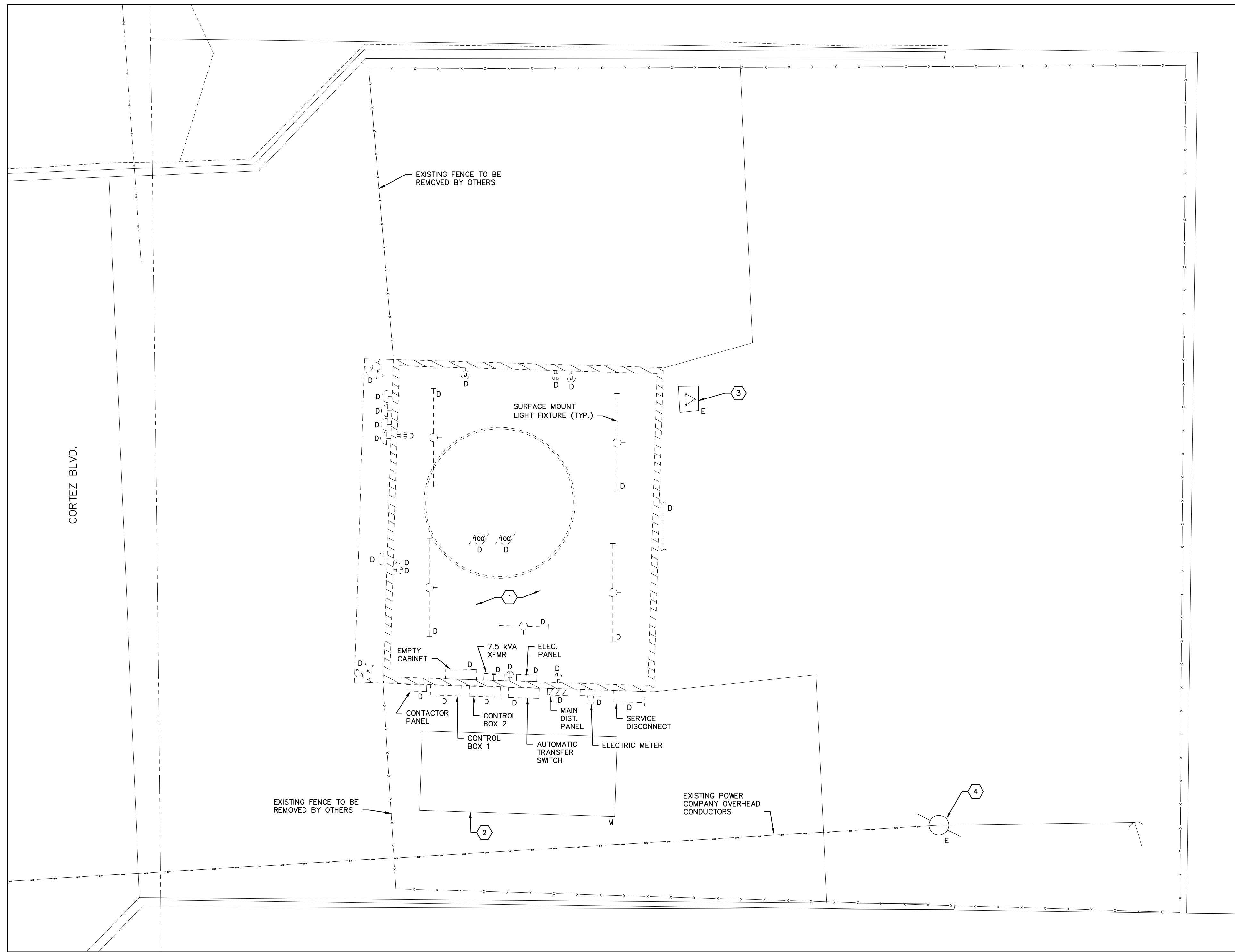
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 **01 PUMP STATION ELECTRICAL DEMOLITION PLAN**
SCALE: 1" = 5'-0" 

ELECTRICAL GENERAL DEMOLITION NOTES

- A. EXISTING PUMP BUILDING TO BE COMPLETELY DEMOLISHED. ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE ALL EXISTING ELECTRICAL EQUIPMENT IN THE BUILDING.
- B. NOT ALL THE ELECTRICAL EQUIPMENT SCHEDULED TO BE DEMOLISHED IS SHOWN ON THE ELECTRICAL DEMOLITION PLAN. EC SHALL VISIT THE EXISTING BUILDING PRIOR TO BID. NO CHANGE ORDERS WILL BE ACCEPTED DUE TO DEMOLITION SCOPE OF WORK.
- C. COORDINATE WITH GENERAL CONTRACTOR FOR ANY ADDITIONAL DEMOLITION ELECTRICAL WORK AND PROVIDE ACCORDINGLY.
- D. COORDINATE WITH POWER UTILITY COMPANY FOR SPECIFIC REQUIREMENTS PRIOR TO START DEMOLITION WORK.

DRAWING NOTES

1. EXISTING PUMP BUILDING TO BE DEMOLISHED. REMOVE ALL EXISTING LIGHTING FIXTURES, EQUIPMENT, DEVICES, CONDUCTORS, RACEWAYS, ETC. COORDINATE WITH POWER COMPANY AND GENERAL CONTRACTOR PRIOR TO COMMENCING WORK. COORDINATE WITH OWNER TO DETERMINE IF OWNER WISHES TO RETAIN ANY REMOVED EQUIPMENT.
2. EXISTING TRAILER MOUNTED GENERATOR TO REMAIN. GC SHALL DE-ENERGIZE AND REMOVE ALL ELECTRICAL CONNECTIONS FROM EXISTING GENERATOR. PREPARE EQUIPMENT FOR RELOCATION AS INDICATED ON CIVIL PLANS. COORDINATE WITH GENERAL CONTRACTOR FOR SPECIFIC REQUIREMENTS.
3. APPROXIMATE LOCATION OF EXISTING TELEMETRY ANTENNA TOWER TO REMAIN. COORDINATE WITH GC FOR DISCONNECTION AND REMOVE EXISTING CONDUCTORS BACK TO SOURCE. PREPARE EQUIPMENT TO RECEIVE NEW CONDUCTORS FROM PROPOSED CONTROL PANEL. COORDINATE WITH OWNER ON SITE FOR ADDITIONAL REQUIREMENTS AND PROVIDE ACCORDINGLY.
4. EXISTING LOCATION OF POLE MOUNTED UTILITY TRANSFORMERS. COORDINATE WITH DUKE ENERGY FIELD ENGINEER FOR SHUTDOWN SERVICE SCHEDULE.

ELECTRICAL DEMOLITION PLAN

CORTÈZ BOULEVARD PUMP
STATION REPLACEMENT PROJECT

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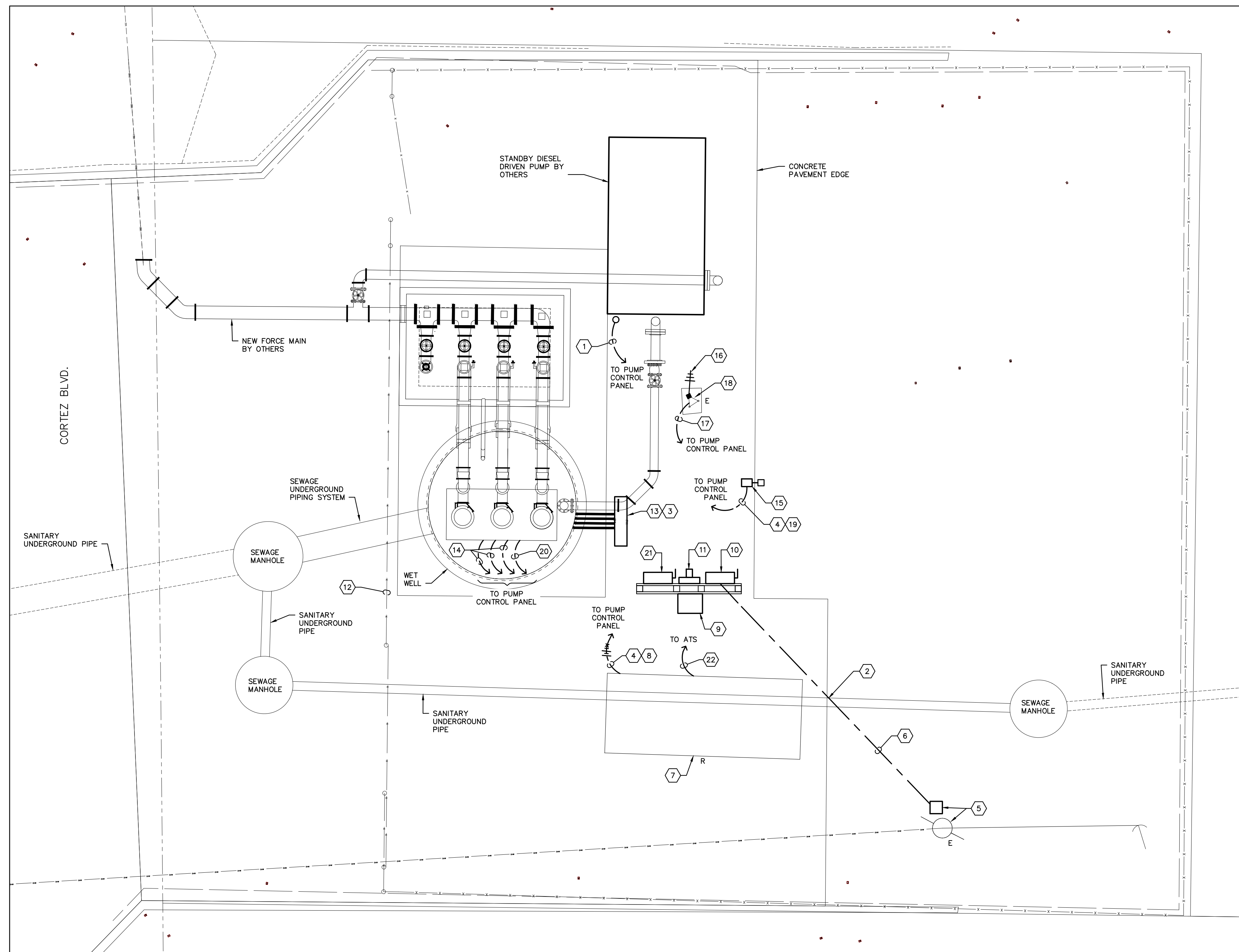
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 **01 PUMP STATION ELECTRICAL SITE PLAN**
SCALE: 1" = 5'-0" 

DRAWING GENERAL NOTES

- A. REFER TO HERNANDO COUNTY UTILITIES DEPARTMENT (HCUD) WATER, RECLAIMED WATER, AND WASTEWATER CONSTRUCTION SPECIFICATIONS MANUAL FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
- B. COORDINATE WITH DUKE ENERGY FIELD ENGINEER (DANIEL LEWIS, PH: (352) 610-2900, EMAIL: DANIEL.LEWIS2@DUKE-ENERGY.COM) FOR ELECTRICAL SERVICE REQUIREMENTS.
- C. REFER ALSO TO CIVIL DRAWINGS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
- D. CONTRACTOR SHALL FIELD COORDINATE WITH DUKE ENERGY AND OTHER TRADES TO AVOID OTHER INFRASTRUCTURES AND MEET ALL CLEARANCE REQUIREMENTS.
- E. MAINTAIN MINIMUM 12" SEPARATION BETWEEN ELECTRICAL AND OTHER INFRASTRUCTURE.
- F. REFER TO POWER ONE-LINE DIAGRAM FOR ADDITIONAL INFORMATION.
- G. GROUNDING OF WET WELL AND VALVE VAULT PER MANUFACTURER'S RECOMMENDATIONS, HCUD STANDARDS AND NFPA.

DRAWING NOTES

1. PROVIDE TWO (2) 2" EMPTY CONDUITS FOR LOW VOLTAGE COMMUNICATIONS. COORDINATE EXACT REQUIREMENTS AND STUB-UP LOCATION OF UNDERGROUND CONDUITS WITH THE EQUIPMENT SUPPLIER/INSTALLER AND THE LOW VOLTAGE CONTRACTOR. CONTROL CABLING SHALL BE PROVIDED BY OTHERS.
2. COORDINATE ROUTING OF SERVICE FEEDER WITH EXISTING GRAVITY LINE. MAINTAIN MINIMUM 12" SEPARATION.
3. TELEMETRY CONTROL UNIT (TCU) MOUNTED IN CONTROL PANEL (BY OTHERS).
4. CIRCUIT(S) SHALL BE FED FROM 120 V SECONDARY OF POWER TRANSFORMER INTEGRAL TO PUMP CONTROL PANEL. REFER TO HCD SPECIFICATIONS.
5. EXISTING POWER COMPANY POLE-MOUNTED TRANSFORMERS AND NEW PEDESTAL INSTALLED AT BASE OF THE POLE PER POWER COMPANY SPECIFICATIONS.
6. PROPOSED ROUTING OF NEW UNDERGROUND SERVICE FEEDER.
7. EXISTING TRAILER MOUNT GENERATOR SET TO REMAIN AND BE RECONNECTED TO NEW ELECTRICAL SERVICE. REFER TO ONE-LINE RISER DIAGRAM, SHEET E-04.
8. REFER TO POWER ONE-LINE DIAGRAM ON SHEET E-04 FOR GENERATOR BLOCK HEATER AND BATTERY CHARGER DETAILS.
9. AUTOMATIC TRANSFER SWITCH TO BE FURNISHED AND INSTALLED BY CONTRACTOR PER COUNTY REQUIREMENTS.
10. UTILITY METER DISCONNECT SWITCH.
11. UTILITY METER.
12. GROUND FENCE AND BOND TO GROUNDING ELECTRODE SYSTEM. REFER TO SECURITY FENCE GROUNDING DETAIL, SHEET E-05, AND POWER ONE-LINE DIAGRAM, SHEET E-04; FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
13. PUMP CONTROL PANEL TO BE FURNISHED AND INSTALLED BY CONTRACTOR PER COUNTY REQUIREMENTS.
14. PROVIDE MINIMUM 2" C WITH MANUFACTURER RECOMMENDED CABLING FOR PUMP MOTOR TO PUMP CONTROL PANEL. PROVIDE 600 V, 250/3 CIRCUIT BREAKER; REFER TO CONTROL PANEL DETAIL ON SHEET E-04 FOR ADDITIONAL INFORMATION.
15. POLE MOUNTED LED LIGHT FIXTURE WITH INTEGRAL PHOTOCELL; TECHLIGHT, MODEL #SBT1CB3P1WH-PC7; 4" STEEL, 15' POLE; TECHLIGHT, MODEL #SS15411WH7230-PT144WH-KAB41860UR. PROVIDE FOR REVIEW AND COMMENT PRODUCT DATA WITH SIGNED AND SEALED, BY FLORIDA PROFESSIONAL STRUCTURAL ENGINEER (PE), DESIGN AND CALCULATIONS FOR SITE LIGHTING FIXTURE AND POLE ASSEMBLY INCLUDING MOUNTING HARDWARE, ANCHOR BOLTS, AND FOUNDATION TO MEET PROJECT WIND LOADING REQUIREMENTS PER FBC. COORDINATE EXACT LOCATION WITH OWNER PRIOR TO COMMENCING WORK. REFER ALSO TO POLE MOUNTED FIXTURE DETAIL, SHEET E-05.
16. COPPER CLAD STEEL GROUND ROD. REFER TO ANTENNA TOWER GROUNDING DETAIL, SHEET E-05. BOND TO GROUND TO GROUNDING ELECTRODE SYSTEM AND EQUIPMENT RACK. REFER TO POWER ONE-LINE DIAGRAM, SHEET E-04.
17. PROVIDE 1" C + (1) SPARE 1" C FOR ANTENNA COAX CABLE AS REQUIRED. COORDINATE CONDUIT ROUTING WITH GENERAL CONTRACTOR PRIOR TO COMMENCING WORK.
18. APPROXIMATE LOCATION OF EXISTING TELEMETRY ANTENNA TOWER TO REMAIN.
19. 2 #12 + #12 EG - 3/4" C. PROVIDE 600 V, 20/1 CIRCUIT BREAKER WITH MINIMUM 18,000 AMPERES INTERRUPTING RATING AT 600 V IN PUMP CONTROL PANEL.
20. PROVIDE MINIMUM 2" C WITH MANUFACTURER RECOMMENDED CABLING FOR FLOAT SENSORS TO PUMP CONTROL PANEL; REFER ALSO TO HCD SPECIFICATIONS.
21. SERVICE ENTRANCE DISCONNECT SWITCH. REFER TO POWER ONE-LINE DIAGRAM ON SHEET E-04 FOR ADDITIONAL INFORMATION.
22. AUTO START CIRCUIT TO ATS. REFER TO POWER ONE-LINE FOR DETAILS.

ELECTRICAL SITE PLAN

**CORTEZ BOULEVARD PUMP
STATION REPLACEMENT PROJECT**

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- B. COORDINATE WITH DUKE ENERGY FOR ELECTRICAL SERVICE REQUIREMENTS.
- C. CONTRACTOR SHALL FIELD COORDINATE WITH DUKE ENERGY AND OTHER TRADES TO AVOID OTHER INFRASTRUCTURE AND MEET ALL CLEARANCE REQUIREMENTS.
- D. MAINTAIN MINIMUM 12" SEPARATION BETWEEN ELECTRICAL AND OTHER INFRASTRUCTURE.
- E. REFER TO CIVIL DRAWINGS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
- F. ALL ELECTRICAL EQUIPMENT SHALL BE MOUNTED ABOVE FLOOD ELEVATION.
- G. CONTACT KOHLER REPRESENTATIVE FOR GENERATOR DETAILS: DAVID ADAMS AT (813) 394-1141; DAVID.ADAMS@PS.US

1. EXISTING UTILITY POWER COMPANY, POLE-MOUNTED, 480/277 V, 3 ϕ , TRANSFORMERS.
2. SECONDARY CONDUITS AND CONDUCTORS. 4 #600 KCMIL - 4" C.
3. METER SOCKET PER DUKE ENERGY REQUIREMENTS.
4. 400 A, 600 V, 3-POLE, 4-W, NEMA 4X, SS TYPE 304, SERVICE ENTRANCE RATED FUSIBLE DISCONNECT SWITCH, FUSE AT 400 A WITH CLASS RK1 FUSES. BOND NEUTRAL-GROUND.
5. COORDINATE WITH DUKE ENERGY FOR LENGTH OF SERVICE LOOP. CONNECTIONS WILL BE MADE BY POWER COMPANY.
6. 3/4" X 10' COPPER CLAD GROUND ROD.
7. 4 #600 KCMIL + #3 EG - 4" C.
8. SPD PER HCUD SPECIFICATIONS. LEADS SHALL BE AS SHORT AND STRAIGHT AS PRACTICABLE.
9. BOND TO WELL, PIPING, ETC. AS RECOMMENDED BY PUMP AND CONTROL PANEL MANUFACTURER.
10. CHANNEL--STRUT EQUIPMENT RACK FOR ILLUSTRATION PURPOSES ONLY. REFER TO HCUD SPECIFICATIONS FOR REQUIREMENTS.
11. 400 A, 480 V, 3 ϕ , 3-POLE, SOLID NEUTRAL, NEMA 4X, SS TYPE 304 AUTOMATIC TRANSFER SWITCH (ATS). REFER TO HCUD SPECIFICATIONS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
12. AUTOMATIC TRANSFER SWITCH LOAD SIDE. CONNECT TO PUMP CONTROL PANEL; NOT SHOWN FOR CLARITY.
13. 4 #600 KCMIL - 4" C.
14. EXISTING GENERATOR TO BE CONNECTED TO NEW ATS. REFER TO LOAD SUMMARY SCHEDULE FOR PUMP INFORMATION ABOUT QUANTITY AND HORSE POWER RATING. PUMPS SHALL START SEQUENTIALLY WITH A MINIMUM 3 SECOND DELAY.
15. PROVIDE NEW PEDESTAL PER POWER COMPANY SPECIFICATIONS. COORDINATE WITH POWER COMPANY FOR EXACT LOCATION AND REQUIREMENTS PRIOR TO COMMENCING WORK.
16. EXOTHERMIC WELD.
17. CALCULATED FAULT CURRENT.
18. BOND TO ANTENNA TOWER GROUND ROD.
19. EXISTING TRAILER MOUNTED, 250 kW, 60 HZ, 480/277 V, 3 ϕ , 4-W GENERATOR SET TO BE RELOCATED AND RECONNECTED TO NEW ELECTRICAL SERVICE. COORDINATE WITH CITY OF BROOKSVILLE TO SECURE AND ANCHOR GENERATOR.
20. BOND TO FENCE.
21. NO NEUTRAL-GROUND BOUND AT THIS LOCATION.
22. RESISTANCE TO GROUND SHALL NOT EXCEED 5 OHMS. PROVIDE ADDITIONAL GROUND RODS AS REQUIRED.
23. FIELD VERIFY EXISTING 100K RATED GENERATOR OUTPUT CIRCUIT BREAKER; 400 AF WITH 400 A TRIP PLUG. CONTACT ENGINEER OF RECORD IN CASE OF DISCREPANCIES.
24. SUPPLEMENTAL GROUNDING ELECTRODE SYSTEM.
25. 3000 PSI MIN. CONCRETE FOOTING. DIMENSIONS SHALL BE PROVIDED BY REGISTERED FL STRUCTURAL ENGINEER.
26. 400 A, 600 V, 3-POLE, 4-W, NEMA 4X, SS TYPE 304 UTILITY METER DISCONNECT SWITCH INSTALLED BY UTILITY COMPANY. COORDINATE PER UTILITY COMPANY'S SPECIFICATIONS. DISCONNECT SWITCH SHALL HAVE PROVISION FOR UTILITY COMPANY PADLOCK ON OPERATING HANDLE. PROVIDE PLASTIC PLACARD THAT READS: "METER DISCONNECT NOT SERVICE EQUIPMENT". COORDINATE WITH DUKE ENERGY PRIOR TO COMMENCING WORK.
27. BOND TO FRAME WITH #2/0 AWG.
28. 2 #10 + #10 EG IN 3/4" PVC C FOR BLOCK HEATER. COORDINATE DETAILS WITH KOHLER GENERATOR REPRESENTATIVE PRIOR TO COMMENCING WORK.
29. 2 #12 + #12 GND IN 3/4" PVC C FOR AUTO START. COORDINATE DETAILS WITH KOHLER GENERATOR REPRESENTATIVE PRIOR TO COMMENCING WORK.
30. 2 #10 + #10 EG IN 3/4" PVC C FOR BATTERY CHARGER. COORDINATE DETAILS WITH KOHLER GENERATOR REPRESENTATIVE PRIOR TO COMMENCING WORK.

LOAD DESCRIPTION	LOAD
EXISTING GENERATOR:	
250 kW KOHLER (@ 80% PF) MAXIMUM OUTPUT:	312.50 kVA
PROPOSED LOADS:	
LIGHTING	0.09 kVA
PUMP #1 (105 HP)	108.08 kVA
PUMP #2 (105 HP)	108.08 kVA
PUMP #3 (105 HP) (*)	
CONTROLS AND OTHER MISC LOADS	2.80 kVA
RECEPTACLES	0.18 kVA
TOTAL PROPOSED LOAD	219.2 kVA
TOTAL AMPERES (@ 480 V, 3Ø)	263.7 AMPS

1. THE EXISTING GENERATOR WILL BE ABLE TO ACCOMMODATE TWO (2) 105 HP PUMPS WITH VFD START AS LONG AS THE VFD IS 12-PULSE MINIMUM WITH HARMONIC FILTERING ON THE DRIVES.
2. EXISTING GENERATOR WITH VFD START WILL NOT BE ABLE TO HANDLE ALL THREE PUMPS RUNNING (SIMULTANEOUSLY).

JULY 02, 2024: NOT FOR CONSTRUCTION

DAM V. EACHES, P.E.
FL. REG. #: 76151

TO THE BEST OF THE ENGINEER'S KNOWLEDGE THE PLANS AND SPECIFICATIONS COMPLY WITH THE MINIMUM BUILDING CODES.
THIS DOCUMENT IS VALID FOR 12 MONTHS FROM DATE OF ENGINEER'S SIGNATURE AND SEAL.
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WHEN PRINTED TO SCALE, DRAWING SIZE SHALL BE 22" X 34"

E-04

JOB No.: 20073





XYLEM WATER SOLUTIONS USA, INC. – FLYGT PRODUCTS
455 Harvest Time Drive. Sanford Florida 32771
Phone: 407-880-2900 • Fax: 407-880-2962

December 09, 2024

City of Brooksville, Florida
Attn: David Kingsbury

Subject: FLYGT PRODUCTS – SALES & SERVICE

Please be advised that Xylem Water Solutions USA, Inc. is the only authorized vendor for Flygt Products and is the only authorized service repair and warranty organization in the State of Florida; (East of the Apalachicola River). Our staff is properly trained to provide you the best service available.

Thank you for your interest in Flygt Products. Do not hesitate to call me if you have any questions regarding distribution or any other matter.

Sincerely,

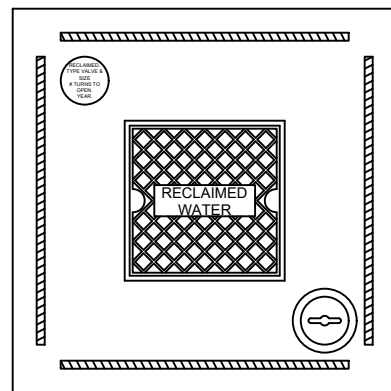
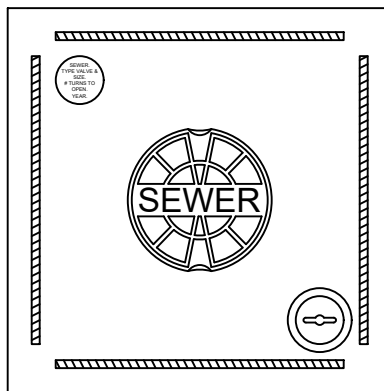
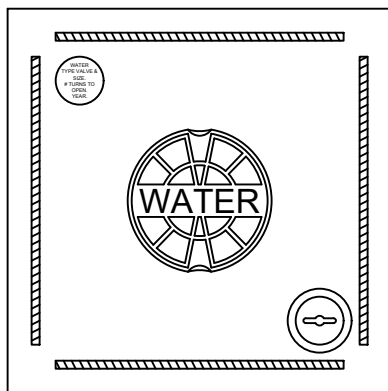
A handwritten signature in black ink, appearing to read "TJ Brown", is written over a light blue horizontal line.

TJ Brown
Sales Representative

ARTICLE IV

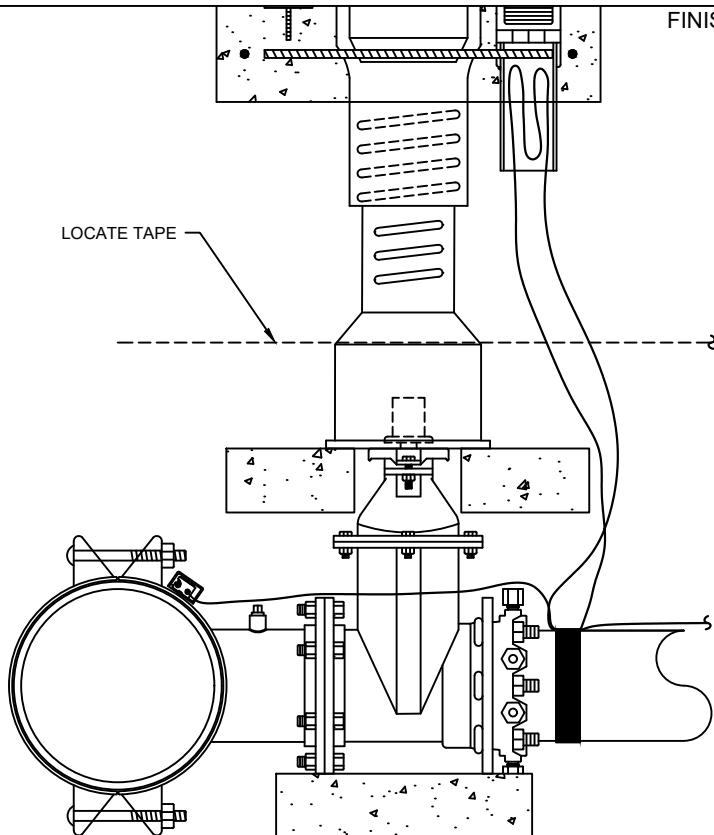
HCUD Construction Details - Updated June 2023

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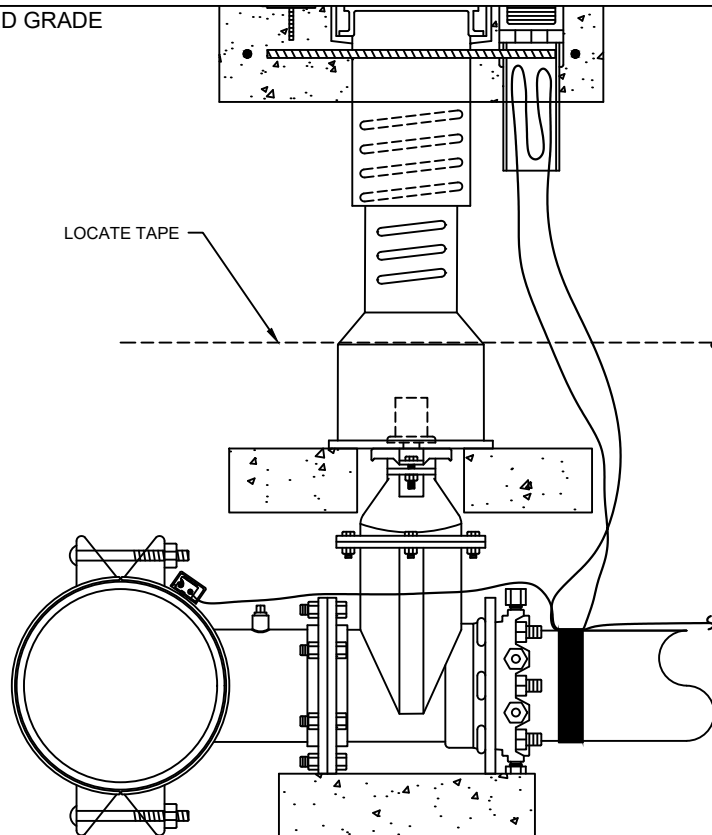


FINISHED GRADE

LOCATE TAPE



LOCATE TAPE



NOTES:

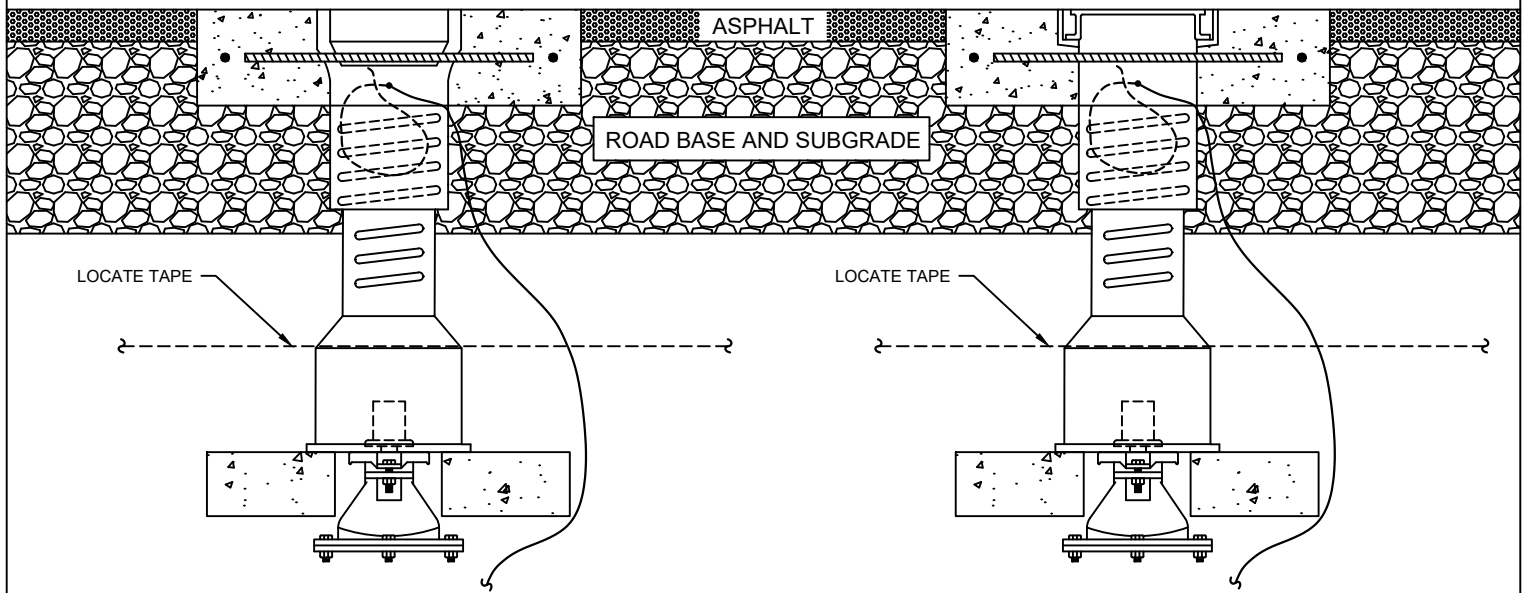
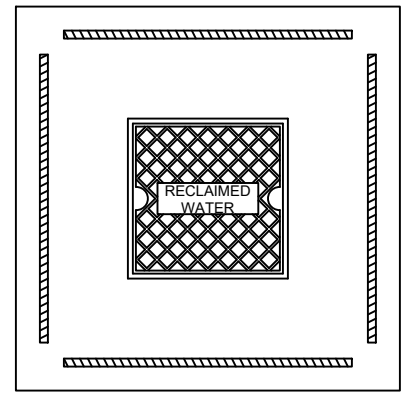
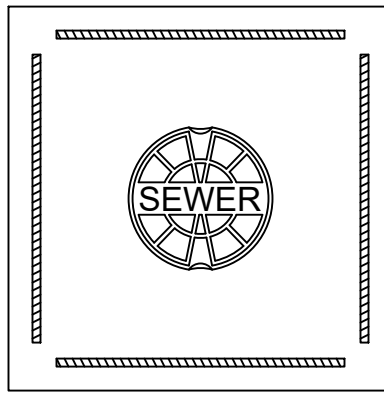
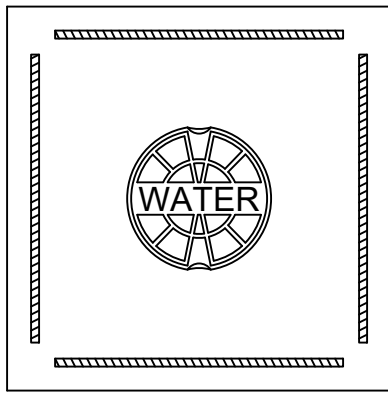
1. 24"x24"x6" POURED IN PLACE 4000 PSI CONCRETE VALVE PAD. INSTALLATION INCLUDES MINIMUM FOUR #4 REBAR AROUND THE PERIMETER OF PAD, ONE 3" SCHEDULE 40 PVC FEMALE ADAPTOR WITH PVC FLUSH MOUNT THREADED CAP AND MINIMUM 8" LENGTH OF PVC PIPE FOR LOCATE WIRE ACCESS PORT, ONE 3" ROUND SOLID CAST BRASS VALVE IDENTIFICATION TAG WITH 2"x 1/4" THEFT PROOF ANCHOR PIN AND ONE 5 1/4" 2 PIECE HEAVY DUTY ADJUSTABLE LENGTH SCREW TYPE CAST IRON VALVE BOX, AS SHOWN. NOTE: SEE VALVE PAD IN DRIVEWAY AND ROADWAY DETAIL FOR VALVES UNDER ASPHALT ROADWAYS OR OTHER TYPE DRIVEWAYS.
2. 3" ROUND SOLID CAST BRASS VALVE IDENTIFICATION TAG SHALL HAVE THE FOLLOWING INFORMATION ENGRAVED IN FOUR ROWS WITH 3/8" LETTER HEIGHT ON THE ROUND DISK: ROW 1 - TYPE OF MAIN "WATER", "SEWER" OR "RECLAIM", ROW 2 - TYPE OF VALVE AND SIZE, ROW 3 - THE AMOUNT OF TURNS TO OPEN OR CLOSE VALVE. ROW 4 - THE YEAR OF INSTALLATION.
3. CAST IRON VALVE BOX ACCESS LIDS SHALL HAVE THE TYPE OF INFRASTRUCTURE IT IS CAST INTO THE LID, "WATER", "SEWER", OR "RECLAIM" AND PAINTED BLUE FOR WATER, GREEN FOR SEWER AND PURPLE FOR RECLAIM.
4. LOCATE WIRE SHALL BE #10 AWG SOLID COPPER OR COPPER CLAD. INSULATION COLOR SHALL BE BLUE FOR WATER, GREEN FOR SEWER AND PURPLE FOR RECLAIMED WATER. LOCATE WIRE SHALL BE CONNECTED TO THE EXISTING LOCATE WIRE ON THE MAIN THAT IS BEING TAPPED WITH AN HCUD APPROVED LOCATE WIRE CONNECTOR. LOCATE WIRE SHALL EXTEND 18" ABOVE PAD. COAT THREADS ON PVC CAP WITH GREASE OR ANTI-SEIZE LUBRICANT AND THREAD CAP ALL THE WAY DOWN FLUSH INTO FEMALE ADAPTOR.
5. TAPPING SADDLE (SLEEVE) SHALL BE FULL WRAP STAINLESS STEEL REGARDLESS OF SIZE WITH STAINLESS STEEL HARDWARE.
6. A PRE-CAST CONCRETE SUPPORT BLOCK FOR THE VALVE SHALL BE INSTALLED AS SHOWN. THE MINIMUM SIZE REQUIRED SHALL BE 16"x8"x4" SOLID CONCRETE BLOCK.
7. A MINIMUM OF TWO 16"x8"x4" CONCRETE SUPPORT BLOCKS SHALL BE INSTALLED UNDER THE BOTTOM OF THE VALVE BOX FOR SUPPORT AS SHOWN.

HERNANDO COUNTY
UTILITIES DEPARTMENT
15365 CORTEZ BOULEVARD
BROOKSVILLE, FLORIDA 34613
OFFICE: (352) 754-4037 FAX: (352) 754-4485

WET TAP

DATE:
JUNE 2023

DETAIL: G-01



NOTES:

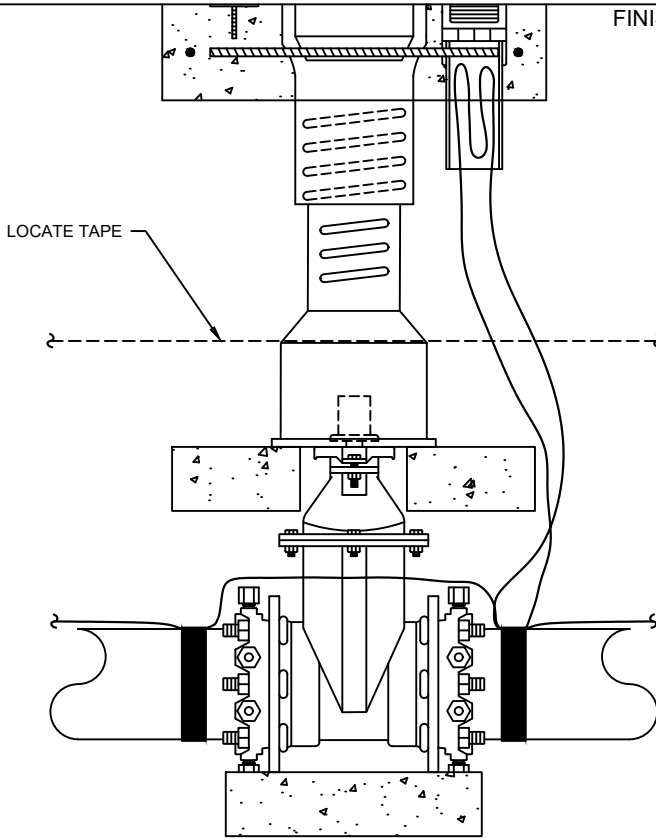
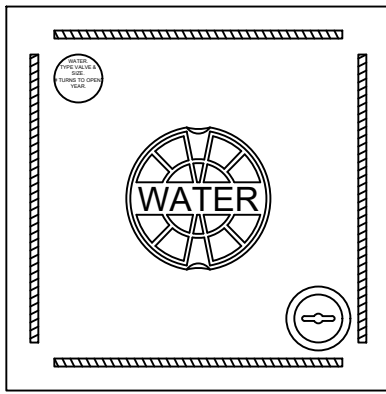
1. HCUD REQUIRES THAT NO VALVES SHALL BE INSTALLED UNDER PAVEMENT OR DRIVEWAYS. HOWEVER, IF RETROFITTING AN EXISTING SYSTEM AND THE NEW VALVE PLACEMENT IS UNDER PAVEMENT OR A DRIVEWAY AND CAN NOT BE AVOIDED, THESE VALVE PADS ARE TO BE USED.
2. 24"x24"x6" POURED IN PLACE 4000 PSI CONCRETE VALVE PAD. INSTALLATION INCLUDES MINIMUM FOUR #4 REBAR AROUND THE PERIMETER OF PAD AS SHOWN. NO LOCATE WIRE ACCESS PORT OR BRASS VALVE IDENTIFICATION TAG IS REQUIRED.
3. CAST IRON VALVE BOX ACCESS LIDS SHALL HAVE THE TYPE OF INFRASTRUCTURE IT IS CAST INTO THE LID, "WATER", "SEWER", OR "RECLAIM" AND PAINTED BLUE FOR WATER, GREEN FOR SEWER OR PURPLE FOR RECLAIM.
4. LOCATE WIRE SHALL BE #10 AWG SOLID COPPER OR COPPER CLAD. INSULATION COLOR SHALL BE BLUE FOR WATER, GREEN FOR SEWER OR PURPLE FOR RECLAIMED WATER. LOCATE WIRE SHALL BE INSTALLED ON THE EXTERIOR OF THE VALVE BOX THEN THROUGH A HOLE DRILLED IN THE THE TOP OF THE VALVE BOX BELOW THE LID. THE DRILLED HOLE SHALL HAVE A GROMMET INSTALLED IN THE HOLE OR THE LOCATE WIRE GENEROUSLY TAPED WHERE THE WIRE MAKES CONTACT WITH THE VALVE BOX TO PREVENT THE CAST IRON VALVE BOX CUTTING THE WIRE INSULATION. THE LOCATE WIRE SHALL BE LONG ENOUGH TO EXTEND 18" ABOVE THE CONCRETE VALVE PAD.
5. A MINIMUM OF TWO 16"x8"x4" CONCRETE SUPPORT BLOCKS SHALL BE INSTALLED UNDER THE BOTTOM OF THE VALVE BOX FOR SUPPORT AS SHOWN.

HERNANDO COUNTY
UTILITIES DEPARTMENT
15365 CORTEZ BOULEVARD
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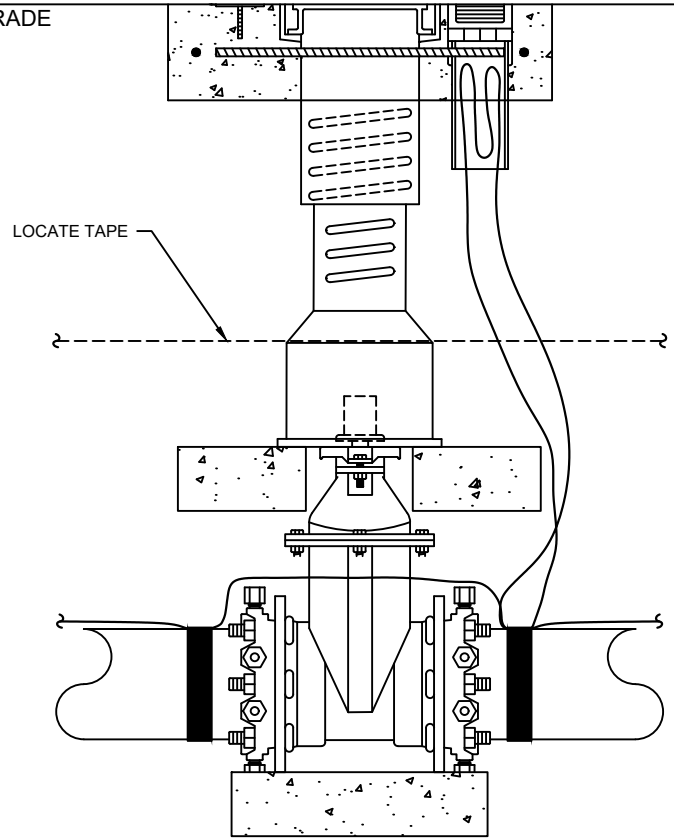
VALVE PADS IN DRIVEWAY OR ROADWAY

DATE:
JUNE 2023

DETAIL: G-02



FINISHED GRADE



NOTES:

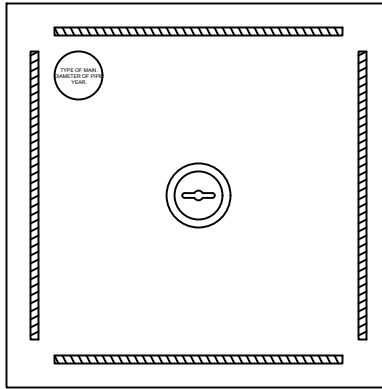
1. 24"x24"x6" POURED IN PLACE 4000 PSI CONCRETE VALVE PAD. INSTALLATION INCLUDES MINIMUM FOUR #4 REBAR AROUND THE PERIMETER OF PAD, ONE 3" SCHEDULE 40 PVC FEMALE ADAPTOR WITH PVC FLUSH MOUNT THREADED CAP AND MINIMUM 8" LENGTH OF PVC PIPE FOR LOCATE WIRE ACCESS PORT, ONE 3" ROUND SOLID CAST BRASS VALVE IDENTIFICATION TAG WITH 2"x 1/4" THEFT PROOF ANCHOR PIN AND ONE 5 1/4" 2 PIECE HEAVY DUTY ADJUSTABLE LENGTH SCREW TYPE CAST IRON VALVE BOX, AS SHOWN. NOTE: SEE VALVE PAD IN DRIVEWAY OR ROADWAY DETAIL FOR VALVES UNDER ASPHALT ROADWAYS OR OTHER TYPE DRIVEWAYS.
2. 3" ROUND SOLID CAST BRASS VALVE IDENTIFICATION TAG SHALL HAVE THE FOLLOWING INFORMATION ENGRAVED IN FOUR ROWS WITH 3/8" LETTER HEIGHT ON THE ROUND DISK: ROW 1 - TYPE OF MAIN "WATER", "SEWER" OR "RECLAIM", ROW 2 - TYPE OF VALVE AND SIZE, ROW 3 - THE AMOUNT OF TURNS TO OPEN OR CLOSE VALVE. ROW 4 - THE YEAR OF INSTALLATION.
3. CAST IRON VALVE BOX ACCESS LIDS SHALL HAVE THE TYPE OF INFRASTRUCTURE IT IS CAST INTO THE LID, "WATER", "SEWER", OR "RECLAIM" AND PAINTED BLUE FOR WATER, GREEN FOR SEWER AND PURPLE FOR RECLAIM.
4. LOCATE WIRE SHALL BE #10 AWG SOLID COPPER OR COPPER CLAD. INSULATION COLOR SHALL BE BLUE FOR WATER, GREEN FOR SEWER AND PURPLE FOR RECLAIMED WATER. LOCATE WIRE SHALL BE PULLED UP IN A CONTINUOUS LOOP INTO THE 3" PVC PIPE. LOCATE WIRE SHALL EXTEND 18" ABOVE PAD. COAT THREADS ON PVC CAP WITH GREASE OR ANTI-SEIZE LUBRICANT AND THREAD CAP ALL THE WAY DOWN FLUSH INTO THE FEMALE ADAPTOR.
5. A PRE-CAST CONCRETE SUPPORT BLOCK FOR THE VALVE SHALL BE INSTALLED AS SHOWN. THE MINIMUM SIZE REQUIRED SHALL BE 16"x8"x4" SOLID CONCRETE BLOCK.
6. A MINIMUM OF TWO 16"x8"x4" CONCRETE SUPPORT BLOCKS SHALL BE INSTALLED UNDER THE BOTTOM OF THE VALVEBOX FOR SUPPORT AS SHOWN.

HERNANDO COUNTY
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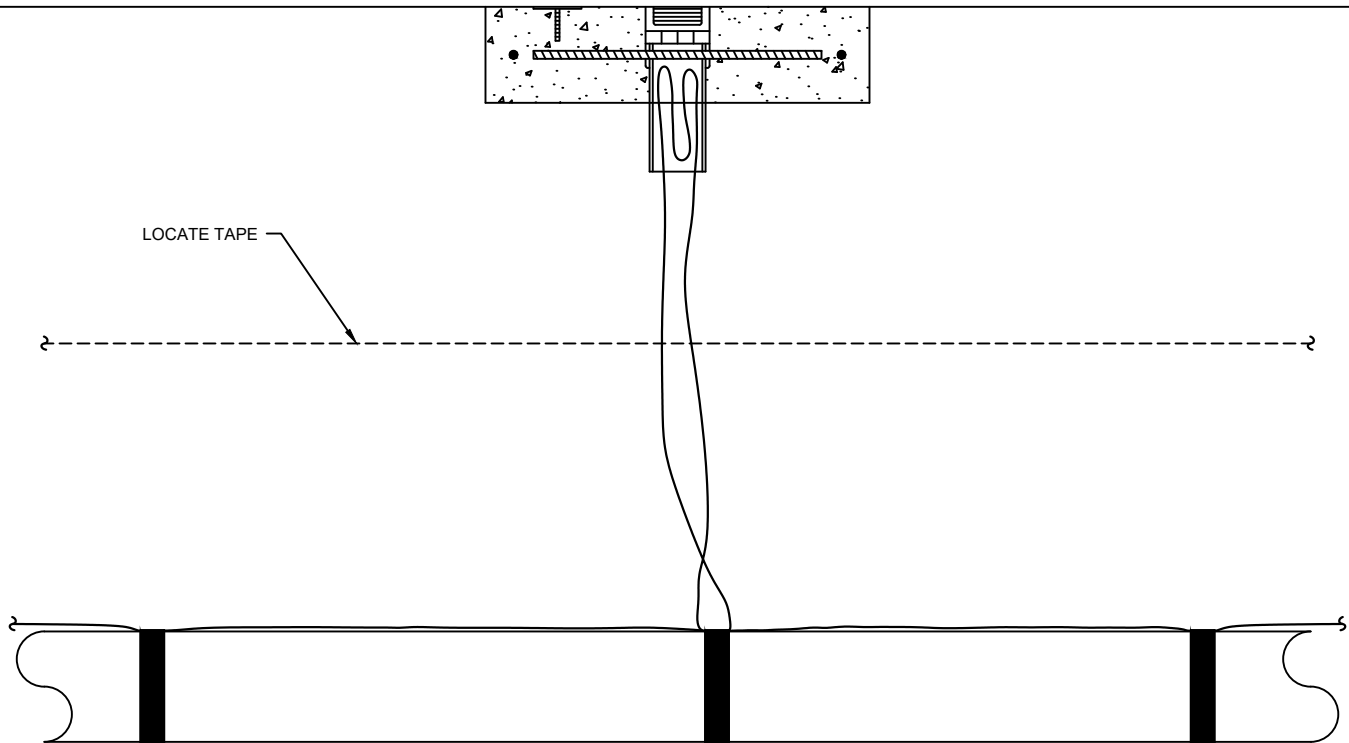
GATE VALVE

DATE:
JUNE 2023

DETAIL: G-03



FINISHED GRADE



NOTES:

1. 24"x24"x6" POURED IN PLACE 4000 PSI CONCRETE LOCATE WIRE RISER PAD. INSTALLATION INCLUDES MINIMUM FOUR #4 REBAR AROUND THE PERIMETER OF PAD, ONE 3" SCHEDULE 40 PVC FEMALE ADAPTOR WITH PVC FLUSH MOUNT THREADED CAP AND MINIMUM 8" LENGTH OF PVC PIPE FOR LOCATE WIRE ACCESS PORT AND ONE 3" ROUND SOLID CAST BRASS PIPE LINE IDENTIFICATION TAG WITH 2"x 1/4" THEFT PROOF ANCHOR PIN, AS SHOWN. COAT THREADS ON PVC CAP WITH GREASE OR ANTI-SEIZE LUBRICANT AND THREAD CAP ALL THE WAY DOWN FLUSH INTO THE FEMALE ADAPTOR.
2. 3" ROUND SOLID CAST BRASS PIPE LINE IDENTIFICATION TAG SHALL HAVE THE FOLLOWING INFORMATION ENGRAVED IN THREE ROWS WITH 3/8" LETTER HEIGHT ON THE ROUND DISK: ROW 1 -TYPE OF PIPE LINE "WATER", "SEWER" OR "RECLAIM". ROW 2 - SIZE OF MAIN. ROW 3 - THE YEAR OF INSTALLATION.
3. LOCATE WIRE SHALL BE #10 AWG SOLID COPPER OR COPPER CLAD. INSULATION COLOR SHALL BE BLUE FOR WATER, GREEN FOR SEWER AND PURPLE FOR RECLAIMED WATER. LOCATE WIRE SHALL BE PULLED UP IN A CONTINUOUS LOOP INTO THE 3" PVC PIPE. LOCATE WIRE SHALL EXTEND 18" ABOVE PAD.
4. LOCATE WIRE RISERS SHALL BE USED ON LONGER INSTALLATIONS OF PIPE WHERE THERE ARE NO VALVE PADS TO ACCESS THE LOCATE WIRE. TYPICALLY INSTALLED NO MORE THAN EVERY 1000 LF OF PIPE.

NOT TO SCALE

HERNANDO COUNTY
UTILITIES DEPARTMENT
15365 CORTEZ BOULEVARD
BROOKSVILLE, FLORIDA 34613
OFFICE: (352) 754-4037 FAX: (352) 754-4485

LOCATE WIRE RISER

DATE:
JUNE 2023

DETAIL: G-04

PIPE SIZE (INCHES)	4	6	8	10	12	14	16	18	20	24
11 $\frac{1}{4}$ ° BEND	2(3)	3(4)	4(5)	5(6)	6(6)	6(7)	7(8)	8(9)	8(9)	9(11)
22 $\frac{1}{2}$ ° BEND	5(5)	6(7)	8(9)	9(11)	11(12)	12(14)	13(16)	15(17)	16(18)	18(21)
45° BEND	9(10)	12(14)	16(18)	19(22)	22(25)	25(28)	27(32)	30(35)	33(38)	37(43)
90° BEND	21(24)	29(33)	37(44)	44(52)	52(60)	59(68)	65(76)	72(83)	78(91)	90(104)
CAPPED END *	43(61)	59(85)	78(111)	93(132)	109(155)	124(177)	139(198)	153(218)	167(238)	194(277)
IN-LINE VALVE **	35(50)	49(71)	64(92)	77(111)	90(130)	103(148)	115(165)	128(182)	139(198)	160(230)

DUCTILE IRON PIPE RESTRAINED JOINTS FOR HORIZONTAL FITTINGS

PIPE SIZE (INCHES)	4	6	8	10	12	14	16	18	20	24
11 $\frac{1}{4}$ ° BEND	5(6)	6(9)	8(11)	10(13)	11(16)	13(18)	14(20)	15(22)	17(24)	20(28)
22 $\frac{1}{2}$ ° BEND	9(12)	12(17)	16(22)	19(27)	22(31)	25(36)	28(40)	31(44)	34(48)	39(56)
45° BEND	18(25)	25(35)	32(46)	39(55)	45(65)	52(73)	58(82)	64(91)	69(99)	81(115)
90° BEND	43(61)	59(85)	78(111)	93(132)	109(155)	124(177)	139(198)	153(218)	167(238)	194(277)

DUCTILE IRON PIPE RESTRAINED JOINTS FOR VERTICAL FITTINGS

BRANCH (INCHES)											
RUN (INCHES)		4	6	8	10	12	14	16	18	20	24
	4	21(30)									
	6	11(15)	38(54)								
	8	0(0)	31(44)	56(79)							
	10	0(0)	23(32)	50(71)	71(101)						
	12	0(0)	15(21)	44(62)	66(94)	87(123)					
	14	0(0)	6(9)	37(53)	61(87)	82(117)	101(144)				
	16	0(0)	0(0)	31(44)	56(79)	78(111)	98(139)	116(166)			
	18	0(0)	0(0)	24(34)	50(71)	73(105)	94(134)	113(161)	130(185)		
	20	0(0)	0(0)	17(24)	45(63)	69(98)	90(128)	109(156)	127(181)	144(205)	
	24	0(0)	0(0)	2(3)	33(46)	59(84)	81(116)	102(146)	121(172)	138(197)	171(244)

DUCTILE IRON PIPE TEE RESTRAINED JOINTS

NOTES:

1. THE PROGRAM "THRUST RESTRAINT DESIGN FOR DUCTILE IRON PIPE" ON THE DUCTILE IRON PIPE RESEARCH ASSOCIATION (DIPRA) WEB SITE WAS USED TO CALCULATE THE LENGTH OF RESTRAINED JOINTS. THE CALCULATIONS ARE BASED ON TYPE 3 LAYING CONDITIONS, SANDY/SILTY SOIL DESIGNATION, 3.0 FEET MINIMUM COVERAGE AND 150 PSI OPERATING PRESSURE WITH A 1.5 TO 1 SAFETY FACTOR. THE LINEAR FEET SHOWN ARE MINIMUM REQUIREMENTS.
2. THE NUMBER IN PARENTHESIS REPRESENTS LINEAR FEET OF RESTRAINT FOR PVC PIPE AND POLY WRAPPED DUCTILE IRON PIPE.
3. THE LINEAR FEET OF PIPE IS MEASURED FROM THE FITTING OR VALVE OUT TO THE AMOUNT SHOWN ON THE CHART. ANY BELL OR JOINT WITHIN THAT MEASUREMENT SHALL HAVE A BELL OR JOINT RESTRAINT INSTALLED.
4. ALL BEND FITTINGS SHALL HAVE RESTRAINTS INSTALLED PER THE CHART IN BOTH DIRECTIONS.
5. BRANCH SIDE OF TEE IS TO BE RESTRAINED PER THE CHART.

* CAPPED ENDS ALSO INCLUDES VALVES INSTALLED AT THE END OF THE PIPE.

** IN-LINE VALVES SHALL BE RESTRAINED IN BOTH DIRECTIONS THE AMOUNT SHOWN ON CHART.

HERNANDO COUNTY
UTILITIES DEPARTMENT
15365 CORTEZ BOULEVARD
BROOKSVILLE, FLORIDA 34613
OFFICE: (352) 754-4037 FAX: (352) 754-4485

PIPELINE JOINT RESTRAINT TABLE

DATE:
JUNE 2023

DETAIL: G-05

LOCATION OF PUBLIC WATER SYSTEM MAINS IN ACCORDANCE WITH F.A.C. RULE 62-555.314

OTHER PIPE	HORIZONTAL SEPARATION	CROSSINGS (1)	JOINT SPACING AT CROSSINGS (FULL JOINT CENTERED)
STORM SEWER, STORM WATER FORCE MAIN, RECLAIMED WATER (2)	WATER MAIN 3 FEET MINIMUM	WATER MAIN 12 INCHES MINIMUM, EXCEPT FOR STORM SEWER, THEN 6 INCHES IS MINIMUM, 12 INCHES PREFERRED	WATER MAIN ALTERNATE 3 FOOT MINIMUM
VACUUM SANITARY SEWER	WATER MAIN 10 FEET PREFERRED 3 FEET MINIMUM	WATER MAIN 12 INCHES PREFERRED 6 INCHES MINIMUM	WATER MAIN ALTERNATE 3 FOOT MINIMUM
GRAVITY OR PRESSURE, SANITARY SEWER, SANITARY SEWER FORCE MAIN, RECLAIMED WATER (4)	WATER MAIN 10 FEET PREFERRED 6 FEET MINIMUM (3)	WATER MAIN 12 INCHES MINIMUM, EXCEPT FOR GRAVITY SEWER, THEN 6 INCHES IS MINIMUM, 12 INCHES PREFERRED	WATER MAIN ALTERNATE 6 FOOT MINIMUM
ON-SITE SEWAGE TREATMENT AND DISPOSAL SYSTEM	10 FEET MINIMUM	----	----

NOTES: (1) WATER MAIN SHOULD CROSS ABOVE OTHER PIPE. WHEN WATER MAIN MUST BE BELOW OTHER PIPE, THE MINIMUM SEPARATION IS 12 INCHES.

(2) RECLAIMED WATER REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C.

(3) 3 FEET FOR GRAVITY SANITARY SEWER WHERE THE BOTTOM OF THE WATER MAIN IS LAID AT LEAST 6 INCHES ABOVE THE TOP OF THE GRAVITY SANITARY SEWER.

(4) RECLAIMED WATER NOT REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C.

DISCLAIMER - THIS DOCUMENT IS PROVIDED FOR YOUR CONVENIENCE ONLY. PLEASE REFER TO F.A.C. RULE 62-555.314 FOR ADDITIONAL CONSTRUCTION REQUIREMENTS.

NOT TO SCALE

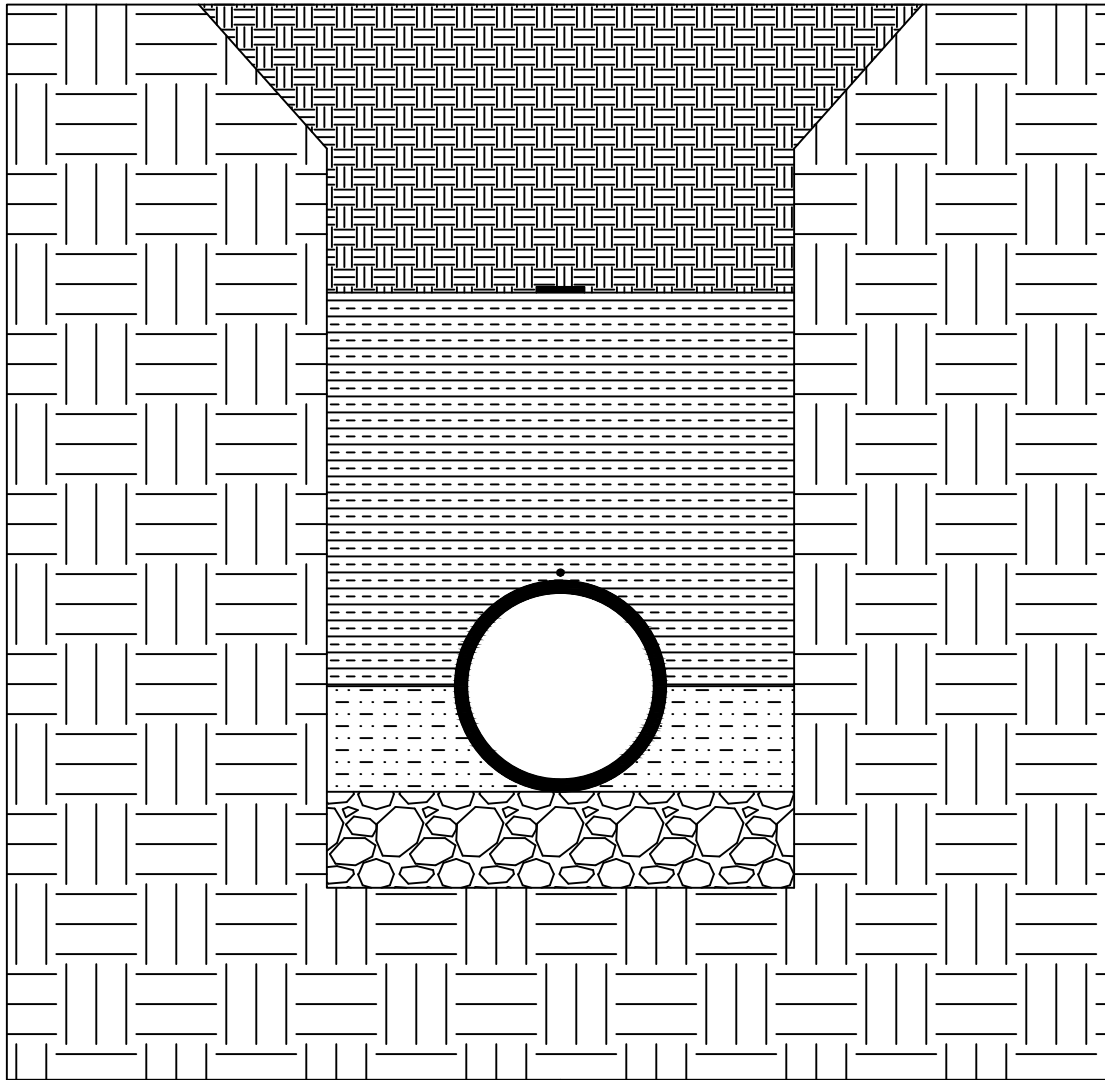
HERNANDO COUNTY
UTILITIES DEPARTMENT

15365 CORTES BOULEVARD
BROOKSVILLE, FLORIDA 34613
OFFICE: (352) 754-4037 FAX: (352) 754-4485

FDEP PIPELINE SEPARATIONS

DATE:
JUNE 2023

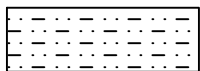
DETAIL: G-06



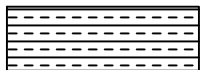
UNDISTURBED GROUND



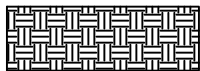
SELECT FILL PIPE BEDDING OR
CRUSHED STONE (WET CONDITIONS)



TAMPED SELECT FILL PIPE BEDDING



SELECT BACKFILL



EXCAVATED MATERIAL



MAGNETIC LOCATE TAPE



#10 AWG LOCATE WIRE

NOTES:

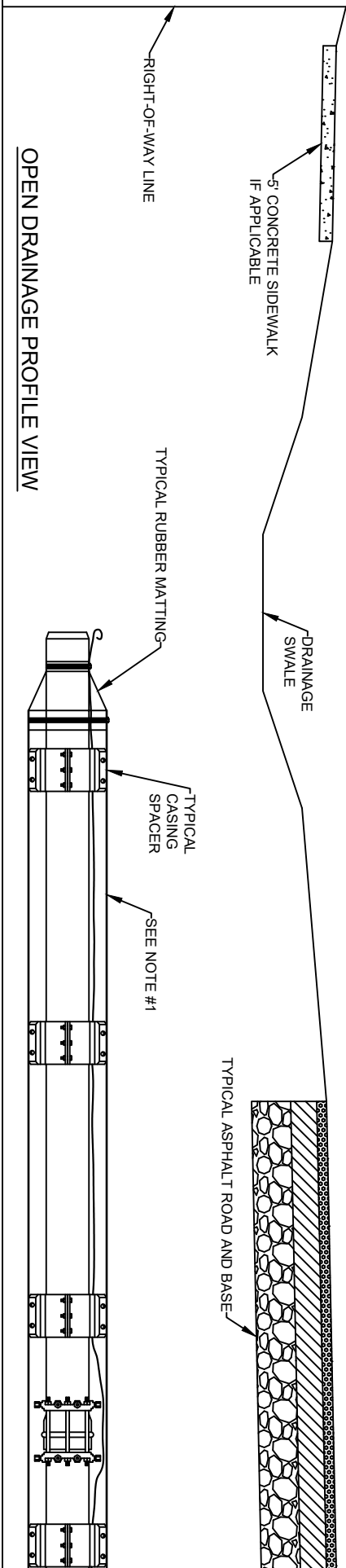
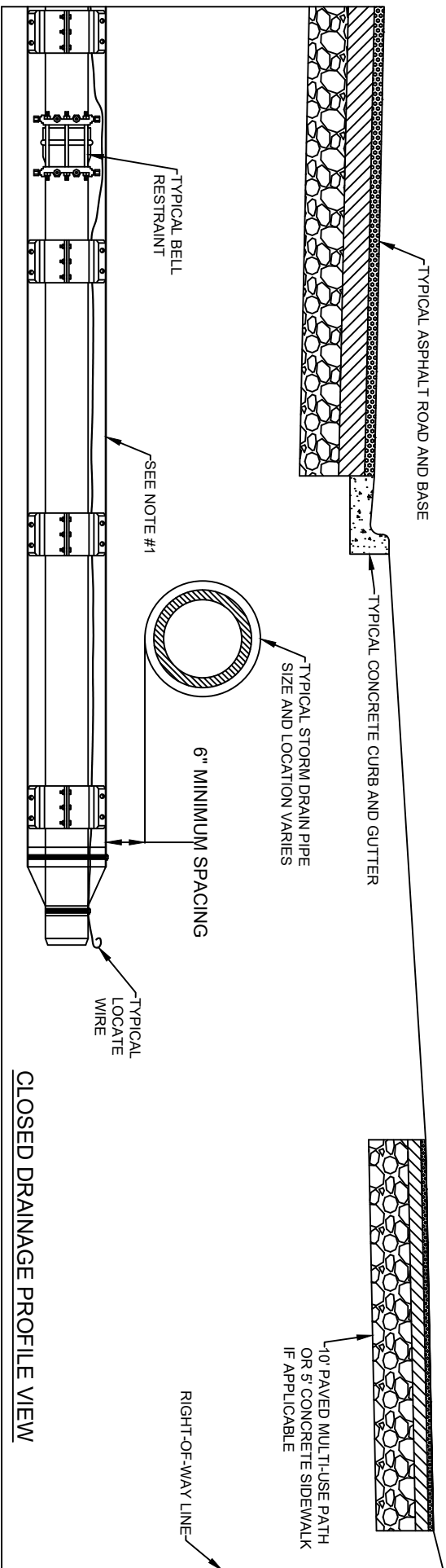
1. SELECT BACKFILL MATERIAL SHALL BE CLEAN SOIL, FREE FROM ROCKS AND OTHER DEBRIS. BACKFILL MATERIAL SHALL BE APPROVED BY HCUD.
2. SELECT PIPE BEDDING MATERIAL SHALL BE CLEAN SOIL, FREE FROM ROCKS AND OTHER DEBRIS, EXCEPT FOR WET CONDITIONS. WET CONDITIONS SHALL REQUIRE CRUSHED STONE PIPE BEDDING. PIPE BEDDING MATERIAL SHALL BE APPROVED BY HCUD.
3. EXCAVATED MATERIAL THAT IS PLACED BACK INTO THE PIPE TRENCH SHALL HAVE ANY LARGE ROCKS, TREE ROOTS AND OTHER UNWANTED DEBRIS REMOVED BEFORE BACKFILLING.
4. #10 AWG LOCATE WIRE SHALL BE SECURELY ATTACHED TO THE TOP OF PIPE.
5. MAGNETIC LOCATE TAPE SHALL BE INSTALLED A MINIMUM OF 18-INCHES ABOVE THE TOP OF PIPE.

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PIPE BACKFILL AND BEDDING

DATE:
JUNE 2023

DETAIL: G-07



NOTES:

- STEEL CASING PIPE AND CASING SPACERS SHALL BE PER HCD SPECIFICATIONS. STEEL CASING PIPE DIAMETER SHALL BE TWO TIMES THE CARRIER PIPE DIAMETER.
- CARRIER PIPE SHALL BE SUPPORTED BY A MINIMUM OF THREE CASING SPACERS PER EACH 20-FOOT LENGTH OF PIPE.
- THE LENGTH OF STEEL CASING PIPE THAT EXTENDS BEYOND THE EDGE OF PAVEMENT SHALL BE DETERMINED BY THE ENGINEER AND SHALL ALLOW HCD UNRESTRICTED ACCESS TO THE END OF THE CASING. THE LOCATION SHALL BE AGREED UPON BY BOTH THE ENGINEER AND HCD.
- THE ENDS OF THE STEEL CASING PIPE SHALL BE SEALED WITH RUBBER MATTING.
- EACH CARRIER PIPE BELL AND SPIGOT SHALL BE RESTRAINED WITH AN HCD APPROVED BELL RESTRAINT.
- LOCATE WIRE SHALL BE PER HCD SPECIFICATIONS AND ATTACHED TO CARRIER PIPE EVERY FOUR FEET THROUGHOUT THE ENTIRE LENGTH OF THE JACK AND BORE BY APPROVED METHODS.

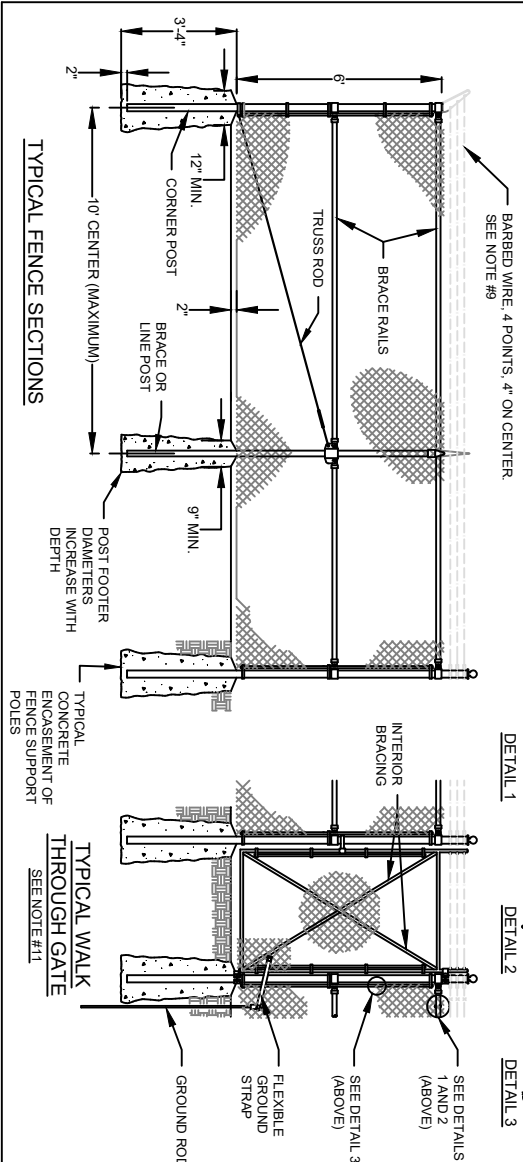
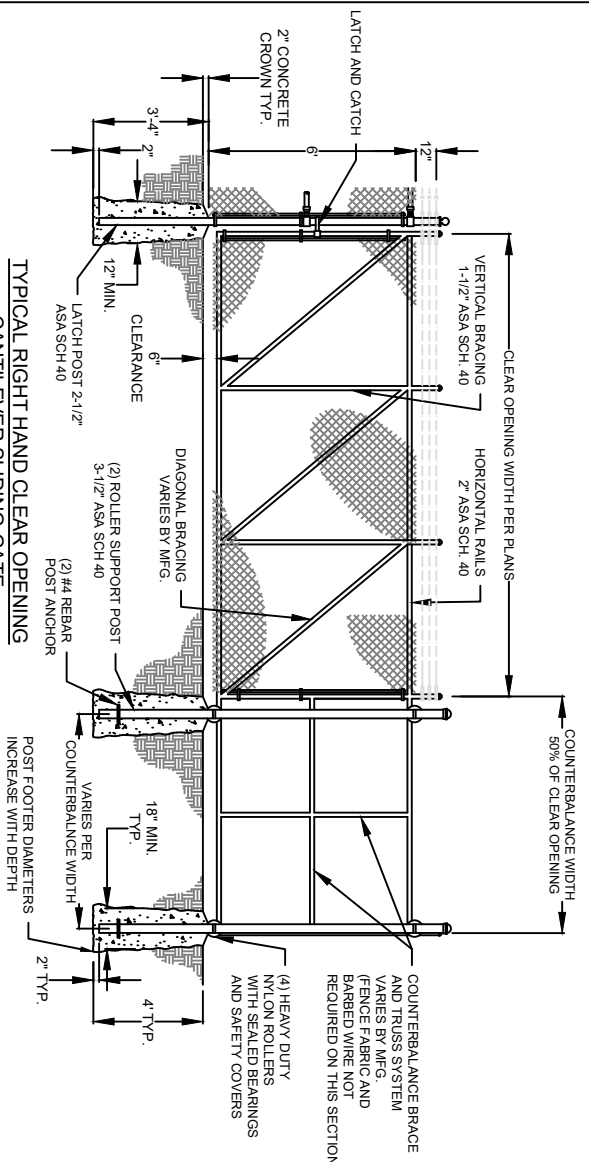
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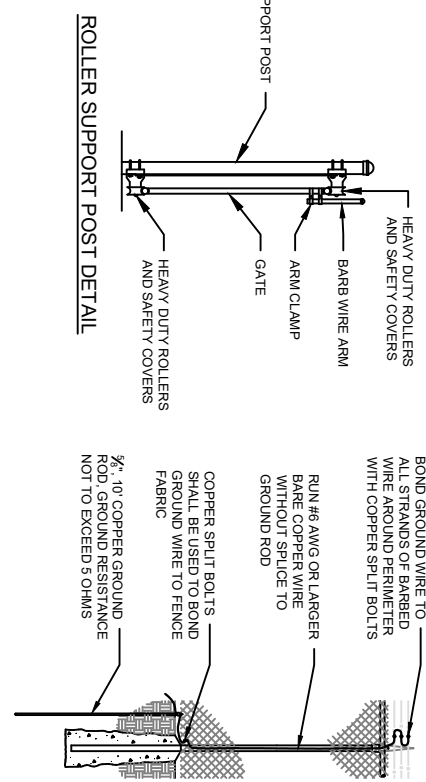
JACK AND BORE HIGHWAY CROSSING

DATE:
JUNE 2023

DETAIL: G-08



ROLLER SUPPORT POST DETAIL



- CHAIN LINK FENCE AND CANTILEVER GATE NOTES:**
1. ALL CORNER, END, AND PULL POST ARE TO BE TUBULAR, 3-INCH ASA SCH. 40, LINE POSTS ARE TO BE TUBULAR, 2 1/2" ASA SCH. 40.
 2. CORNER AND LINE POSTS MAY BE OF A SECTION OF EQUIVALENT STRUCTURAL STRENGTH AS TUBULAR SECTIONS.
 3. CHAIN LINK FABRIC SHALL BE #9 GAUGE WIRE WITH 2-INCH MESH FABRIC, TWISTED AND BARBED TOP AND BOTTOM SELVAGE.
 4. CHAIN LINK FABRIC SHALL BE TIED TO THE SUPPORT RAILS, 24" ON CENTER USING STANDARD #13 GAUGE ALUMINUM.
 5. ALL FENCING SHALL CONFORM TO APPLICABLE PROVISIONS OF FDOT INDEX NO. 802 OF THE FDOT ROADWAY AND TRAFFIC DESIGN STANDARDS, LATEST EDITION.
 6. ALL FENCE COMPONENTS SHALL BE GALVANIZED COATED.
 7. ALL FENCING SHALL HAVE A #7 GAUGE GALVANIZED TENSION WIRE WOVEN ALONG THE BOTTOM EDGE OF THE CHAIN LINK FABRIC. TENSION WIRE SHALL BE LOOPED AROUND THE BOTTOM OF ALL LINE OR BRACE POSTS AND SECURED WITH A STRETCHER BAR BAND TO ALL CORNER POSTS.
 8. CANTILEVER SLIDING GATE HEAVY DUTY ROLLERS SHALL HAVE SAFETY COVERS INSTALLED ON EACH ROLLER.

- BARBED WIRE NOTES:**
9. SEWER PUMP STATION FENCING DOES NOT REQUIRE BARBED WIRE ON TOP OF THE CHAIN LINK FABRIC. BARBED WIRE IS REQUIRED ON ALL OTHER HCD FENCING APPLICATIONS.
 10. SUPPORT ARMS FOR BARBED WIRE APPLICATION SHALL BE POINTED OUTWARDLY. BARBED WIRE SHALL EXTEND 12-INCHES ± ABOVE FENCE.

- WALK THROUGH GATE NOTES:**
11. WALK THROUGH GATE NOT REQUIRED UNLESS SHOWN ON SITE LAYOUT PLANS.
- FENCE FABRIC GROUNDING NOTES:**
12. FENCE GROUNDING SHALL BE BONDED TO THE ELECTRIC SERVICE GROUND.
 13. FENCE GROUND RESISTANCE SHALL NOT EXCEED 5 OHMS.
 14. WALK THROUGH GATE, IF APPLICABLE, SHALL BE GROUND ON THE HINGE SIDE USING A HEAVY DUTY FLEXIBLE GROUNDING STRAP THAT ALLOWS THE GATE TO BE OPENED AND CLOSED.

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DATE:
JUNE 2023

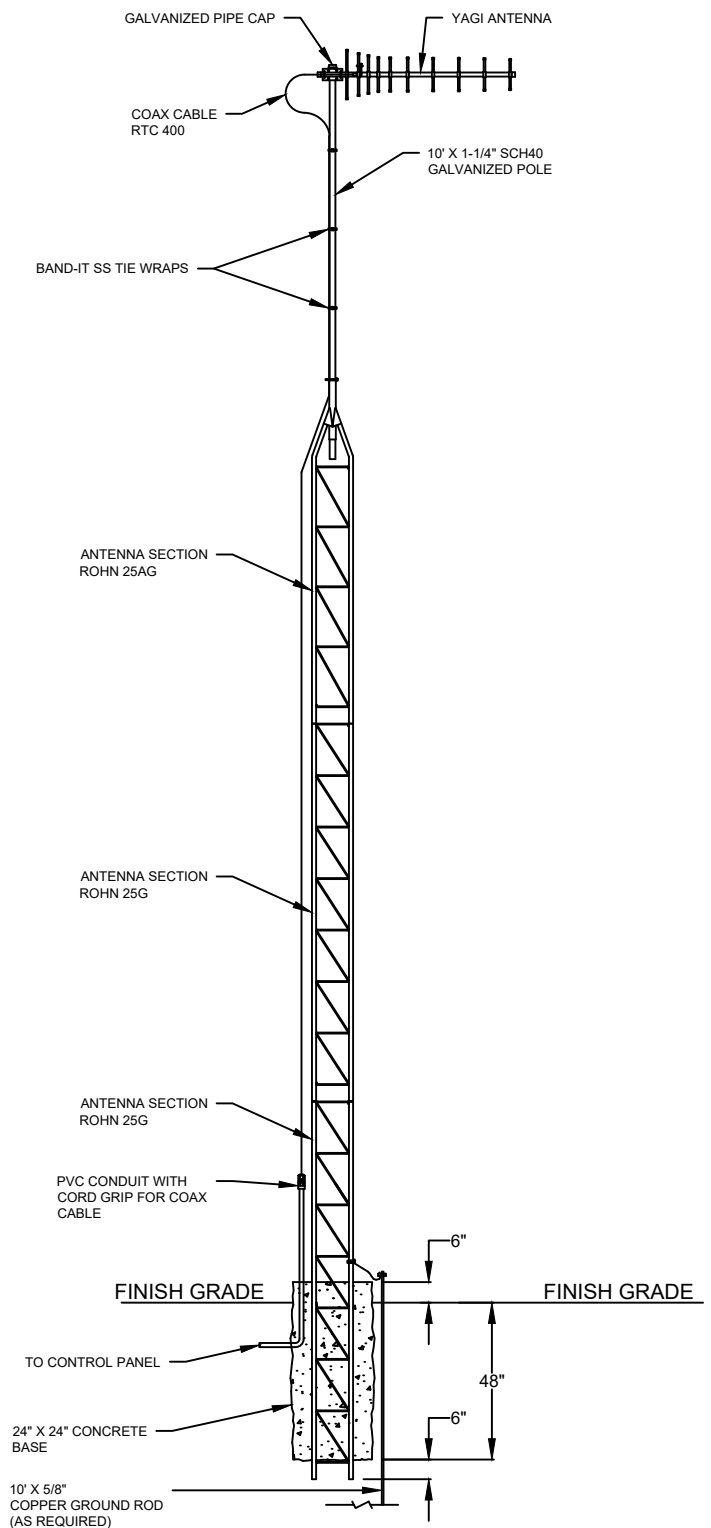
DETAIL: G-09

SECURITY FENCING

NOT TO SCALE

NOTES:

1. COAX CONNECTORS SHALL BE ENCASED IN ALPHA TYPE FIT HEAT SHRINK TUBING.
2. ANTENNA GROUND TO BE BONDED WITH ELECTRIC CONTROL PANEL GROUND ROD.
3. GROUNDING ROD LENGTH AND QUANTITY AS REQUIRED TO ACHIEVE MAXIMUM GROUND RESISTANCE OF 5.0 OHMS.
4. "YAGI" (HIGHLY DIRECTIONAL) ANTENNA MODEL RTA209 AS SUPPLIED BY DATA FLOW SYSTEMS.
5. ANTENNA HEIGHT SHALL BE DETERMINED BY DATA FLOW SYSTEMS PER THEIR RADIO STUDY.



DATA FLOW SYSTEMS ANTENNA
1-1/4" POLE / 150 MPH WIND RATING

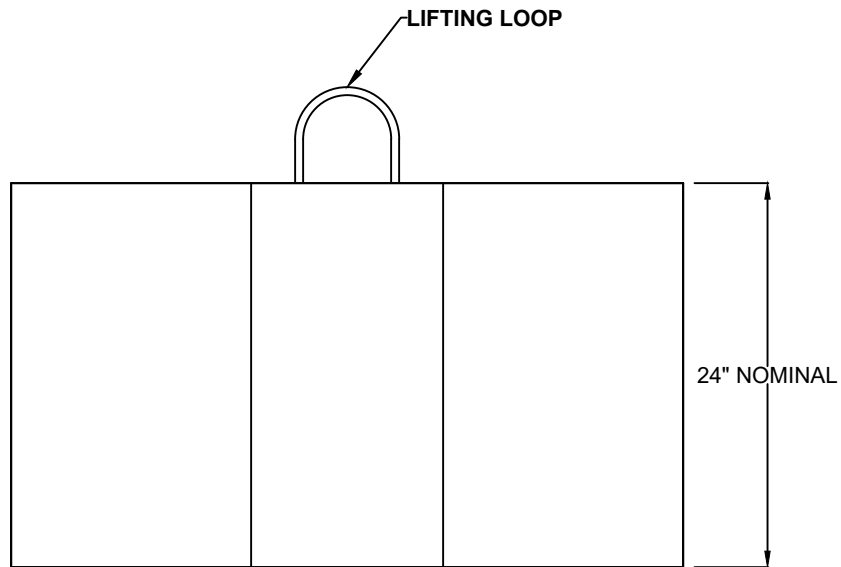
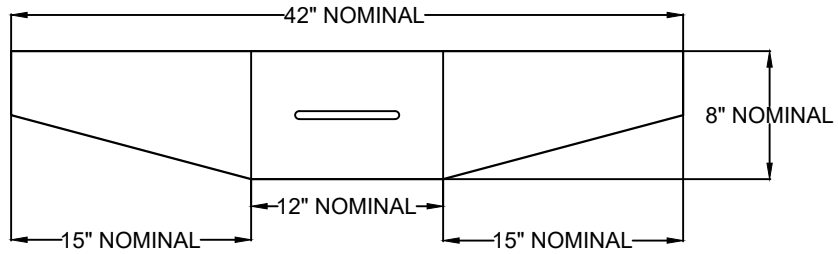
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DATA FLOW SYSTEMS ANTENNA

DATE:
JUNE 2023

DETAIL: G-10



NOTES:

1. CONCRETE THRUST BLOCK SHALL BE CONSTRUCTED FROM MINIMUM 4,000 PSI CONCRETE.
2. USE OF CONCRETE THRUST BLOCKS IN LIEU OF MECHANICAL JOINT RESTRAINTS MUST BE APPROVED BY HCUD PRIOR TO INSTALLATION.

NOT TO SCALE

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500 POUND THRUST BLOCK

DATE:
JUNE 2023

DETAIL: G-11

GRAVITY SEWER LINE TESTING

LOW PRESSURE AIR TEST TABLE

PIPE DIAMETERS IN INCHES

	4"	6"	8"	10"	12"	15"	18"	21"	24"
25	0:04	0:10	0:18	0:28	0:40	1:02	1:27	2:01	2:38
50	0:09	0:20	0:35	0:55	1:19	2:04	2:58	4:03	5:17
75	0:13	0:30	0:53	1:23	1:59	3:06	4:27	6:04	7:55
100	0:18	0:40	1:10	1:50	2:38	4:08	5:56	8:05	10:34
125	0:22	0:50	1:28	2:18	3:18	5:09	7:26	9:55	11:20
150	0:26	0:59	1:46	2:45	3:58	6:11	8:30		
175	0:31	1:09	2:03	3:13	4:37	7:05			
200	0:35	1:19	2:21	3:40	5:17				12:06
225	0:40	1:29	2:38	4:08	5:40			10:25	13:36
250	0:44	1:39	2:56	4:35			8:31	11:35	15:07
275	0:48	1:49	3:14	4:43			9:21	12:44	16:38
300	0:53	1:59	3:31						
350	1:02	2:19	3:47			8:16	11:54	16:12	21:10
400	1:28	2:38			6:03	9:27	13:36	18:31	24:12

LENGTH OF PIPE IN FEET

NOTES:

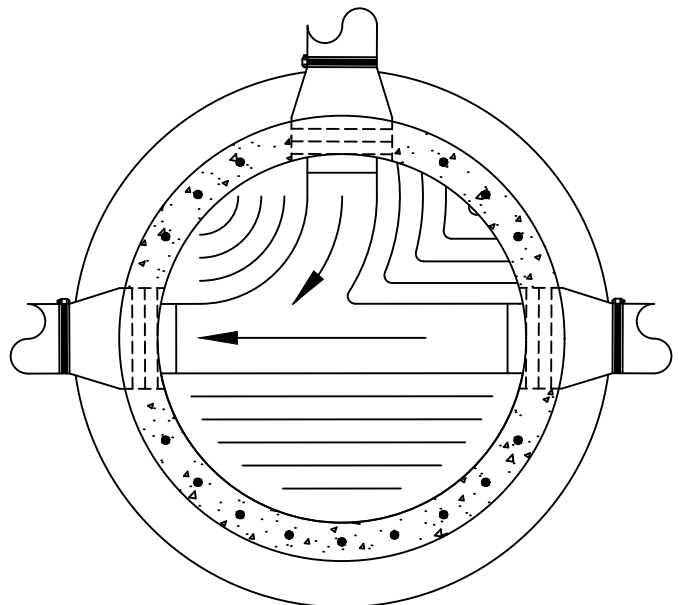
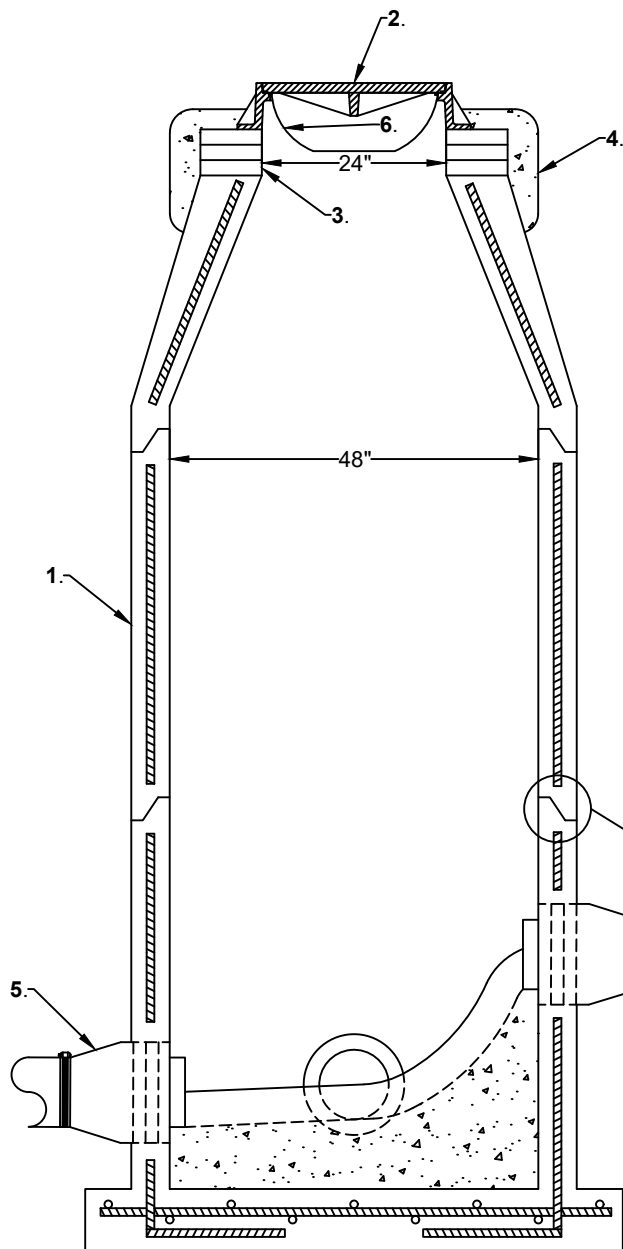
- AIR TEST SHALL START AT 3.5 PSI AND DROP NO MORE THAN 1 PSI IN THE ELAPSED TIME SHOWN ON TABLE.
- AIR PRESSURE GAUGE SHALL BE IN 1 PSI INCREMENTS.

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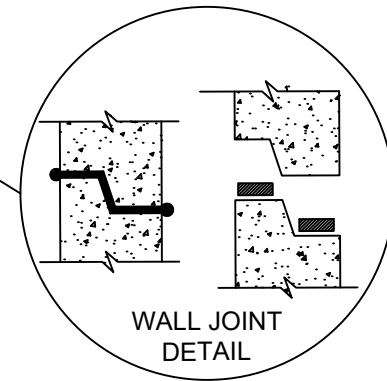
AIR TEST TABLE

DATE:
JUNE 2023

DETAIL: S-01



INVERT FLOW
CHANNELS AND
BENCHES



WALL JOINT
DETAIL

LEGEND:

1. REFER TO THE HCUD STANDARDS AND TECHNICAL SPECIFICATIONS FOR TYPICAL MANHOLE SPECIFICATIONS INCLUDING EXTERIOR AND INTERIOR COATINGS.
2. SEE MANHOLE RING AND COVER DETAIL.
3. CONCRETE ADJUSTMENT RINGS, 18" MAXIMUM HEIGHT. NO BRICK OR BRICK PAVERS ALLOWED.
4. CONCRETE ENCASEMENT.
5. TYPICAL PIPE BOOT.
6. INFLOW PROTECTOR.

NOTES:

7. WALL JOINT DETAIL - USE A NON-HYDROEXPANSIVE WATERSTOP FOR IMPERMEABLE JOINTS BETWEEN PREFABRICATED STRUCTURES BASED ON BITUMINOUS RESINS, "RAM-NEK".
8. TROUGH AND BENCHES SHALL BE POURED WITH NON-SHRINK GROUT, SURFACE SHALL BE SMOOTH.
9. ALL EXPOSED CONCRETE SHALL BE COATED PER HCUD SPECIFICATIONS.
10. INVERT ELEVATIONS GREATER THAN 24" ABOVE THE LOWEST INVERT ELEVATION SHALL BE AN INSIDE DROP. SEE TYPICAL INSIDE DROP MANHOLE DETAIL.

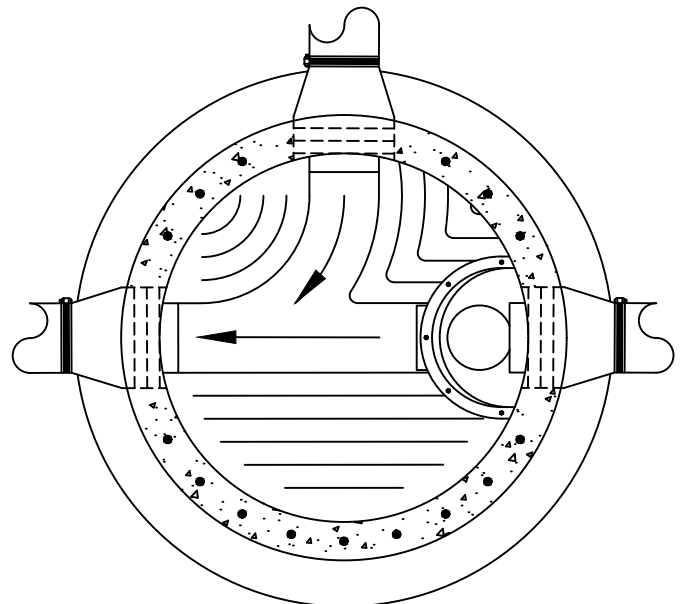
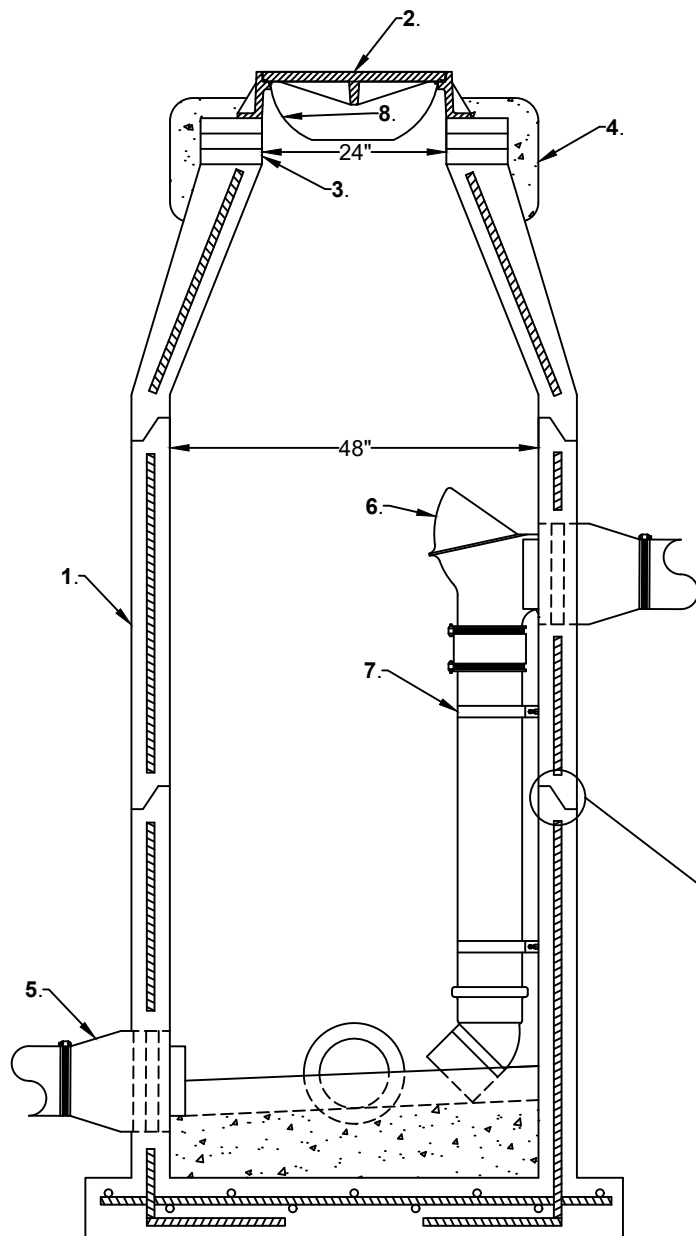
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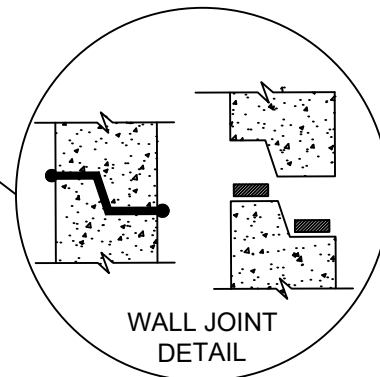
TYPICAL MANHOLE

DATE:
JUNE 2023

DETAIL: S-02



INVERT FLOW
CHANNELS AND
BENCHES



WALL JOINT
DETAIL

LEGEND:

1. REFER TO THE HCUD STANDARDS AND TECHNICAL SPECIFICATIONS FOR TYPICAL MANHOLE SPECIFICATIONS INCLUDING EXTERIOR AND INTERIOR COATINGS.
2. SEE MANHOLE RING AND COVER DETAIL.
3. CONCRETE ADJUSTMENT RINGS, 18" MAXIMUM HEIGHT. NO BRICK OR BRICK PAVERS ALLOWED.
4. CONCRETE ENCASEMENT.
5. TYPICAL PIPE BOOT.
6. SANITARY MANHOLE INSIDE DROP BOWL WITH HOOD. HCUD APPROVED SEALANT SHALL BE USED WHERE DROP BOWL ATTACHES TO INSIDE WALL OF MANHOLE TO PREVENT ANY LEAKAGE.
7. TYPICAL STAINLESS STEEL SUPPORT BRACKET.
8. INFLOW PROTECTOR.

NOTES:

9. WALL JOINT DETAIL - USE A NON-HYDROEXPANSIVE WATERSTOP FOR IMPERMEABLE JOINTS BETWEEN PREFABRICATED STRUCTURES BASED ON BITUMINOUS RESINS, "RAM-NEK".
10. INSIDE DROPS SHALL BE REQUIRED FOR GRAVITY MAINS ENTERING A MANHOLE WHERE THE VERTICAL DISTANCE IS 24" OR MORE ABOVE THE LOWEST INVERT CHANNEL.
11. TROUGH AND BENCHES SHALL BE POURED WITH NON-SHRINK GROUT, SURFACE SHALL BE SMOOTH.
12. ALL EXPOSED CONCRETE SHALL BE COATED PER HCUD SPECIFICATIONS.

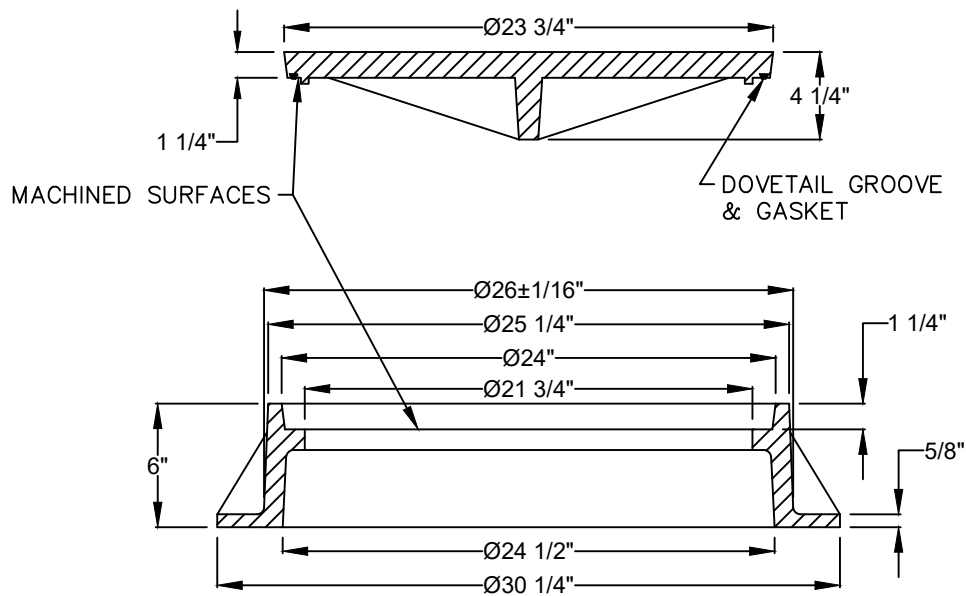
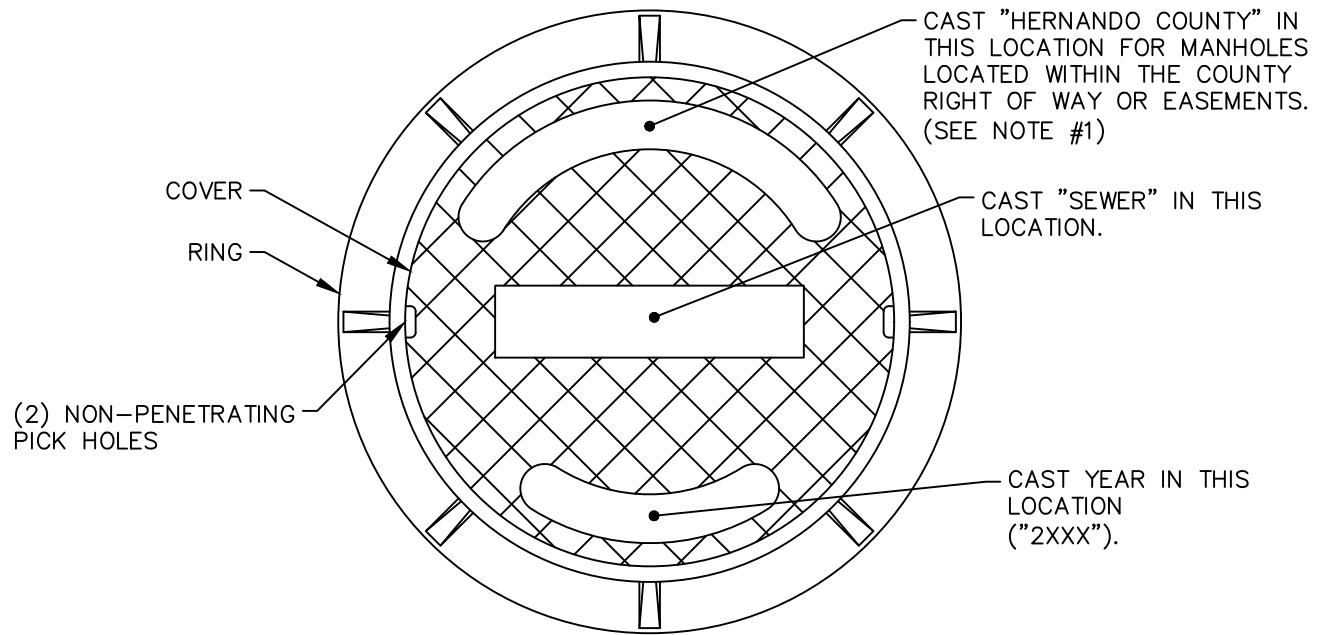
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TYPICAL INSIDE DROP MANHOLE

DATE:
JUNE 2023

DETAIL: S-03



NOTES:

1. ALL NON-HCUD OWNED SEWER MANHOLE COVERS SHALL HAVE ONLY "SEWER" AND "YEAR" CAST IN COVER AS SHOWN.
2. ALL SEWER MANHOLES SHALL HAVE NON-VENTED INFLOW PROTECTORS INSTALLED UNDER THE COVER.
3. RING WEIGHT: APPROXIMATELY 150 LBS.
4. COVER WEIGHT: APPROXIMATELY 150 LBS.

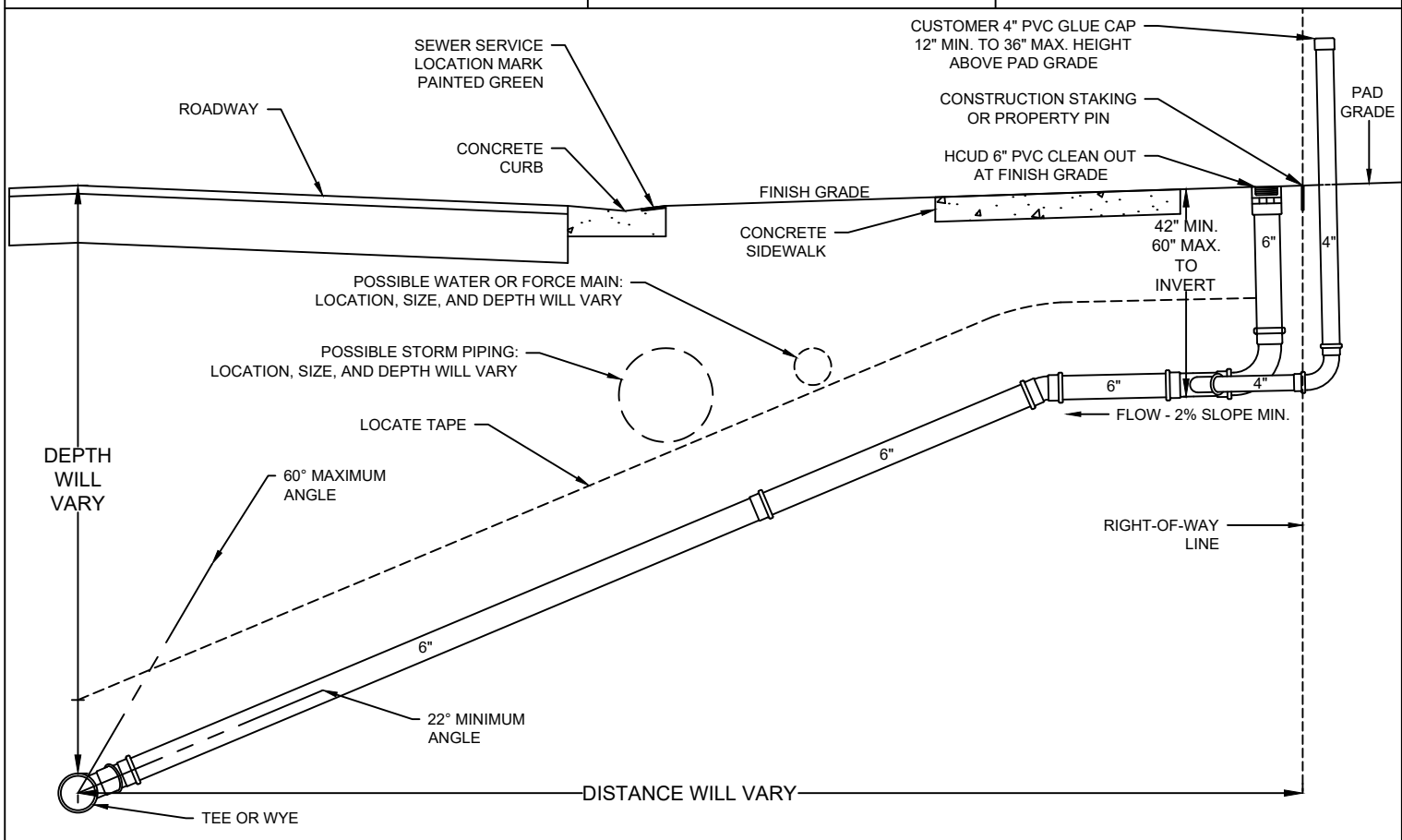
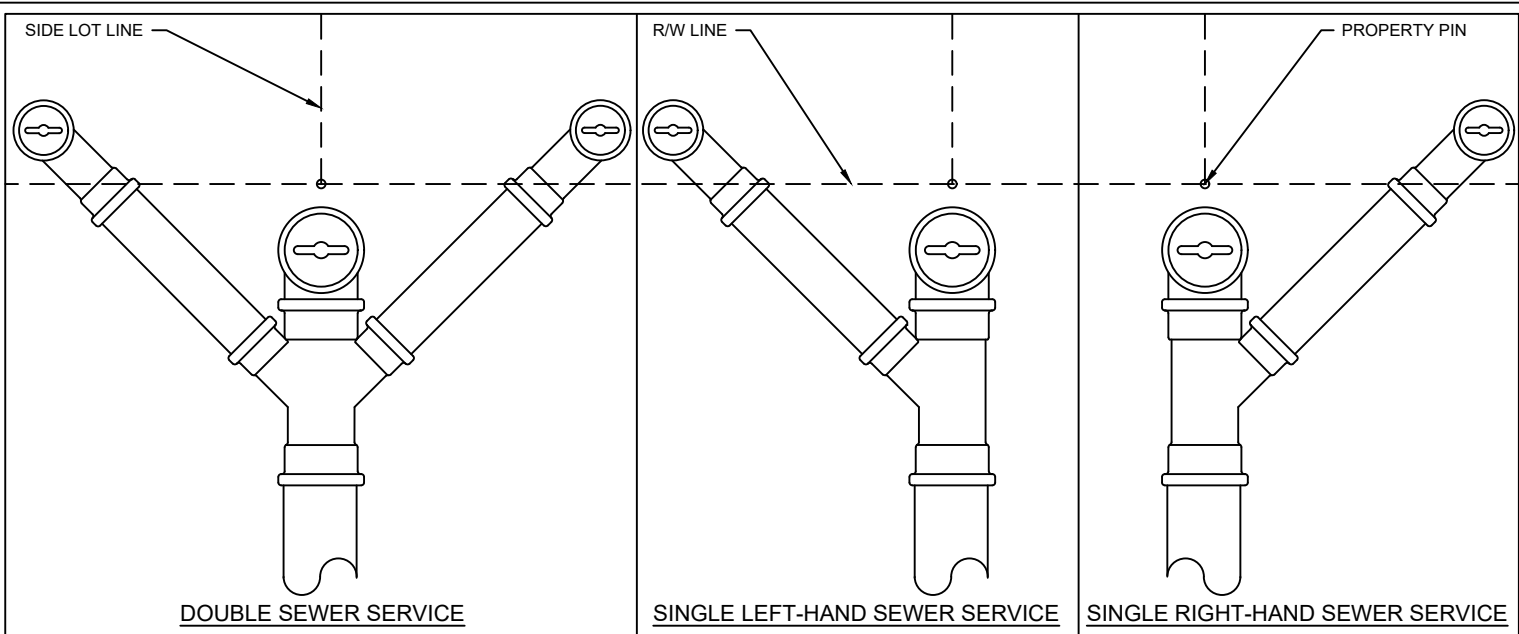
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MANHOLE RING AND COVER

DATE:
JUNE 2023

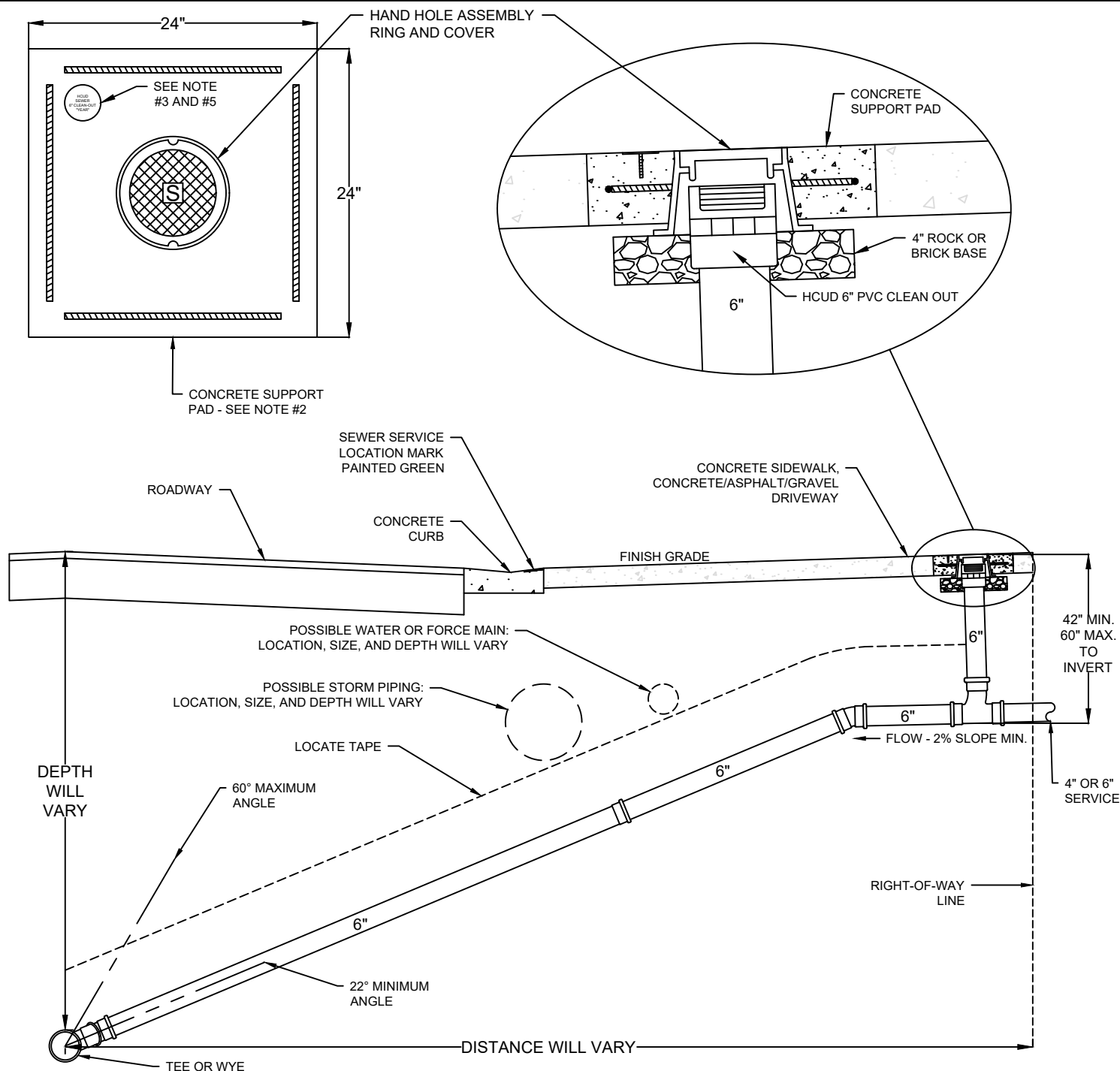
DETAIL: S-04



- NOTES:**
- CLEAN-OUT SHALL HAVE A PVC FLUSH MOUNT THREADED CAP, NO BRASS CAPS ALLOWED. COAT CAP THREADS WITH GREASE OR ANTI-SEIZE LUBRICANT.
 - SINGLE SEWER SERVICES CAN BE EITHER LEFT-HAND OR RIGHT-HAND DEPENDING ON THE APPLICATION.
 - INSTALL SEWER LOCATE TAPE ON ALL SEWER SERVICES.
 - CONTRACTOR SHALL LOWER HCUD 6" CLEAN-OUTS FLUSH WITH FINISHED GRADE PRIOR TO PRELIMINARY WALK-THROUGH.
 - PLUMBING CONTRACTOR SHALL LOWER CUSTOMER 4" CLEAN-OUT FLUSH WITH PAD GRADE ONCE HOME IS CONNECTED.

NOT TO SCALE

HERNANDO COUNTY UTILITIES DEPARTMENT 15365 CORTEZ BOULEVARD BROOKSVILLE, FLORIDA 34613 OFFICE: (352) 754-4037 FAX: (352) 754-4485	RESIDENTIAL SEWER SERVICE DATE: JUNE 2023 DETAIL: S-05



NOTES:

1. CLEAN-OUT SHALL HAVE A PVC FLUSH MOUNT THREADED CAP, NO BRASS CAPS ALLOWED. COAT CAP THREADS WITH GREASE OR ANTI-SEIZE LUBRICANT.
2. 24"x24"x6" POURED IN PLACE 4000 PSI CONCRETE PAD. INSTALLATION INCLUDES MINIMUM FOUR #4 REBAR AROUND THE PERIMETER OF PAD, ONE 3" ROUND SOLID CAST BRASS VALVE IDENTIFICATION TAG WITH 2"x 1/4" THEFT PROOF ANCHOR PIN AND ONE HAND HOLE ASSEMBLY WITH RING AND COVER, AS SHOWN.
3. 3" ROUND SOLID CAST BRASS VALVE IDENTIFICATION TAG SHALL HAVE THE FOLLOWING INFORMATION ENGRAVED IN FOUR ROWS WITH 3/8" LETTER HEIGHT ON THE ROUND DISK: ROW 1 - "HCUD". ROW 2 - "SEWER" ROW 3 - "6"CLEAN-OUT ". ROW 4 - THE YEAR OF INSTALLATION.
4. INSTALL SEWER LOCATE TAPE ON ALL SEWER SERVICES.
5. IF THE CLEAN-OUT HAS TO BE INSTALLED OUTSIDE OF THE COUNTY RIGHT-OF-WAY OR HCUD EASEMENT, THE BRASS IDENTIFICATION TAG WILL NOT BE REQUIRED. IN THIS INSTANCE, HCUD WILL NOT OWN OR MAINTAIN THE CLEAN-OUT.
6. FOR COMMERCIAL APPLICATIONS, THIS DETAIL SHALL BE FOLLOWED.

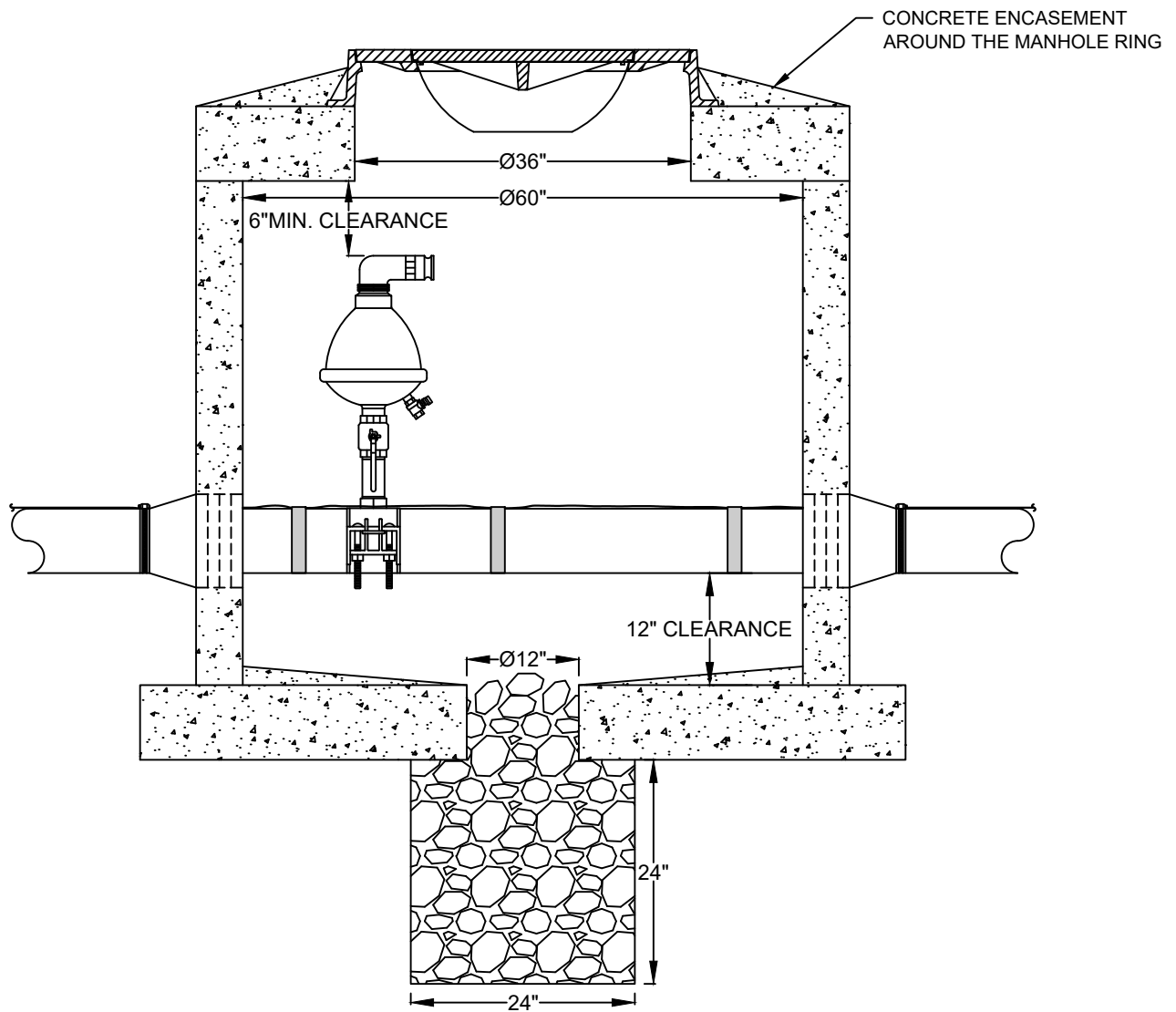
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CLEAN-OUT INSTALLATION IN CONCRETE OR ASPHALT PAVEMENT

DATE:
JUNE 2023

DETAIL: S-06



NOTES:

1. 36" RING AND COVER, SEE ARV RING AND COVER DETAIL. INFLOW PROTECTOR REQUIRED ON 24" COVER, AS SHOWN. INFLOW PROTECTOR IS UTILIZED TO PREVENT THE INNER AND OUTER COVER FROM STICKING TOGETHER.
2. AIR/VACUUM RELEASE VALVE CONCRETE MANHOLE STRUCTURE SHALL BE PRECAST DESIGN WITH THE BASE SECTION MONOLITHICALLY CAST AND A 12-INCH DIAMETER SUMP OPENING FOR DRAINAGE. THE TOP AND BOTTOM SHALL BE MINIMUM 8" THICK WITH 5" THICK WALL. CONCRETE SHALL BE 4000 PSI MINIMUM. ASPHALT MASTIC JOINT COMPOUND SHALL BE USED TO SEAL THE TOP TO THE BARREL SECTION OF MANHOLE. DOG HOUSE STYLE MANHOLES ARE NOT ACCEPTABLE.
3. THE DRAINAGE SUMP SHALL BE LINED WITH FILTER FABRIC AND FILLED WITH FDOT #57 AGGREGATE TO THE DIMENSIONS SHOWN.
4. PIPE PENETRATION INTO MANHOLE SHALL UTILIZE A FLEXIBLE PIPE BOOT CONNECTOR.
5. TAPPING SADDLE SHALL BE STAINLESS STEEL WITH STAINLESS STEEL HARDWARE.
6. ALL 2" PIPING, FITTINGS, ISOLATION BALL VALVE, AND HARDWARE SHALL BE MINIMUM 316 STAINLESS STEEL. ISOLATION BALL VALVE SHALL BE ONE PIECE DESIGN, FULL PORT OPENING TYPE WITH NON-LOCKING OPERATING HANDLE.
7. AIR/VACUUM RELEASE VALVE SHALL HAVE A 2-INCH MIP THREADED INLET.
8. LOCATE WIRE SHALL BE #10 AWG SOLID COPPER OR COPPER CLAD. INSULATION COLOR SHALL BE GREEN FOR SEWER.
9. SEE HCUJ STANDARDS AND TECHNICAL SPECIFICATIONS FOR INTERIOR OF ARV MANHOLE COATING REQUIREMENTS.

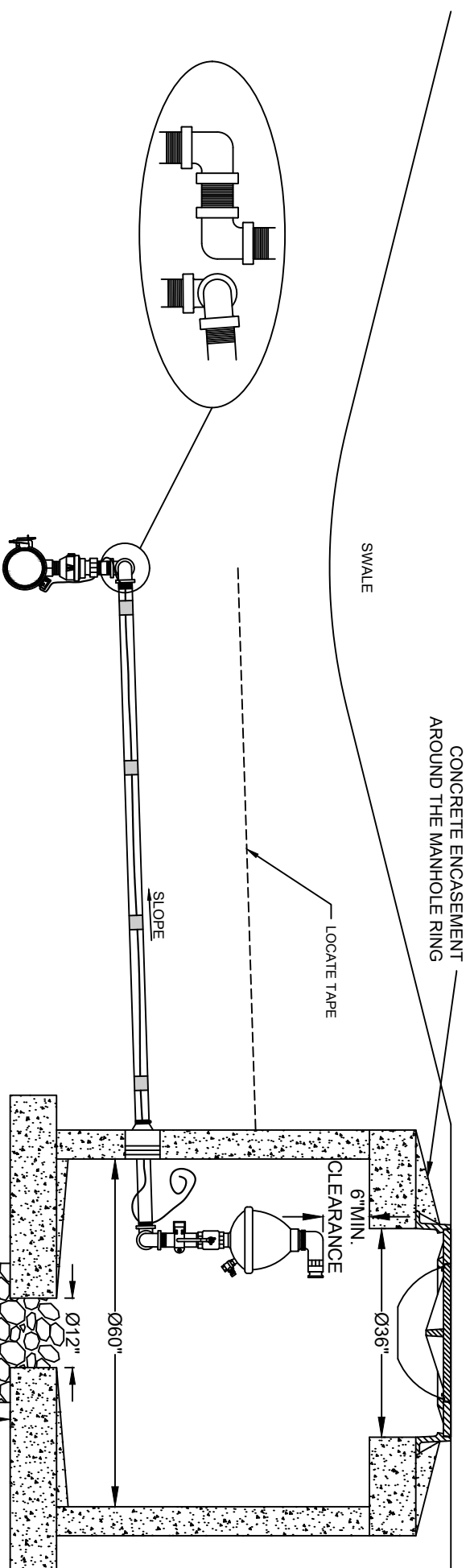
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INLINE ARV MANHOLE

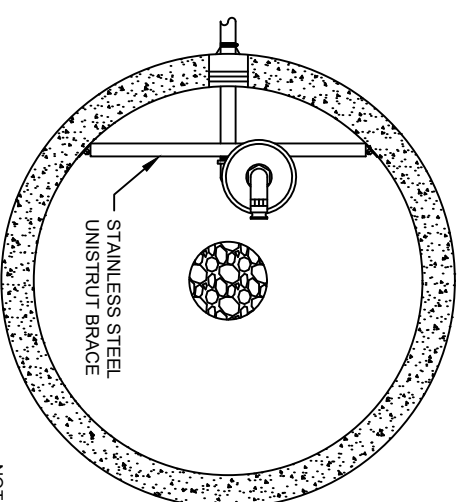
DATE:
JUNE 2023

DETAIL: S-07



NOTES:

1. 36" RING AND COVER, SEE ARV RING AND COVER DETAIL. INFLOW PROTECTOR REQUIRED ON 24" COVER, AS SHOWN. INFLOW PROTECTOR IS UTILIZED TO PREVENT THE INNER AND OUTER COVER FROM STICKING TOGETHER.
2. AIR/VACUUM RELEASE VALVE CONCRETE MANHOLE STRUCTURE SHALL BE PRECAST DESIGN WITH THE BASE SECTION MONOLITHICALLY CAST AND A 12-INCH DIAMETER SUMP OPENING FOR DRAINAGE. THE TOP AND BOTTOM SHALL BE MINIMUM 8" THICK WITH 5" THICK WALL. CONCRETE SHALL BE 4000 PSI MINIMUM. ASPHALT MASTIC JOINT COMPOUND SHALL BE USED TO SEAL THE TOP TO THE BARREL SECTION OF MANHOLE.
3. THE DRAINAGE SUMP SHALL BE LINED WITH FILTER FABRIC AND FILLED WITH FDOT #57 AGGREGATE TO THE DIMENSIONS SHOWN.
4. PIPE PENETRATION INTO MANHOLE SHALL UTILIZE A FLEXIBLE PIPE BOOT CONNECTOR.
5. TAPPING SADDLE SHALL BE STAINLESS STEEL WITH STAINLESS STEEL HARDWARE. 2" CORPORATION STOP IS BRASS.
6. ALL 2" PIPING, FITTINGS, ISOLATION BALL VALVE, BRACING AND HARDWARE SHALL BE MINIMUM 316 STAINLESS STEEL. ISOLATION BALL VALVE SHALL BE ONE PIECE DESIGN, FULL PORT OPENING TYPE WITH NON-LOCKING OPERATING HANDLE.
7. AIR/VACUUM RELEASE VALVE SHALL HAVE A 2-INCH MIP THREADED INLET.
8. LOCATE WIRE SHALL BE #10 AWG SOLID COPPER OR COPPER CLAD. INSULATION COLOR SHALL BE GREEN FOR SEWER. LOCATE WIRE SHALL ATTACH TO THE FORCE MAIN LOCATE WIRE WITH APPROVED CONNECTOR, AS SHOWN.
9. SEE SPECIFICATIONS FOR WASTEWATER STRUCTURE COATINGS FOR INTERIOR OF MANHOLE COATING REQUIREMENTS.
10. INSTALL GREEN LOCATE TAPE ABOVE STAINLESS STEEL PIPING.



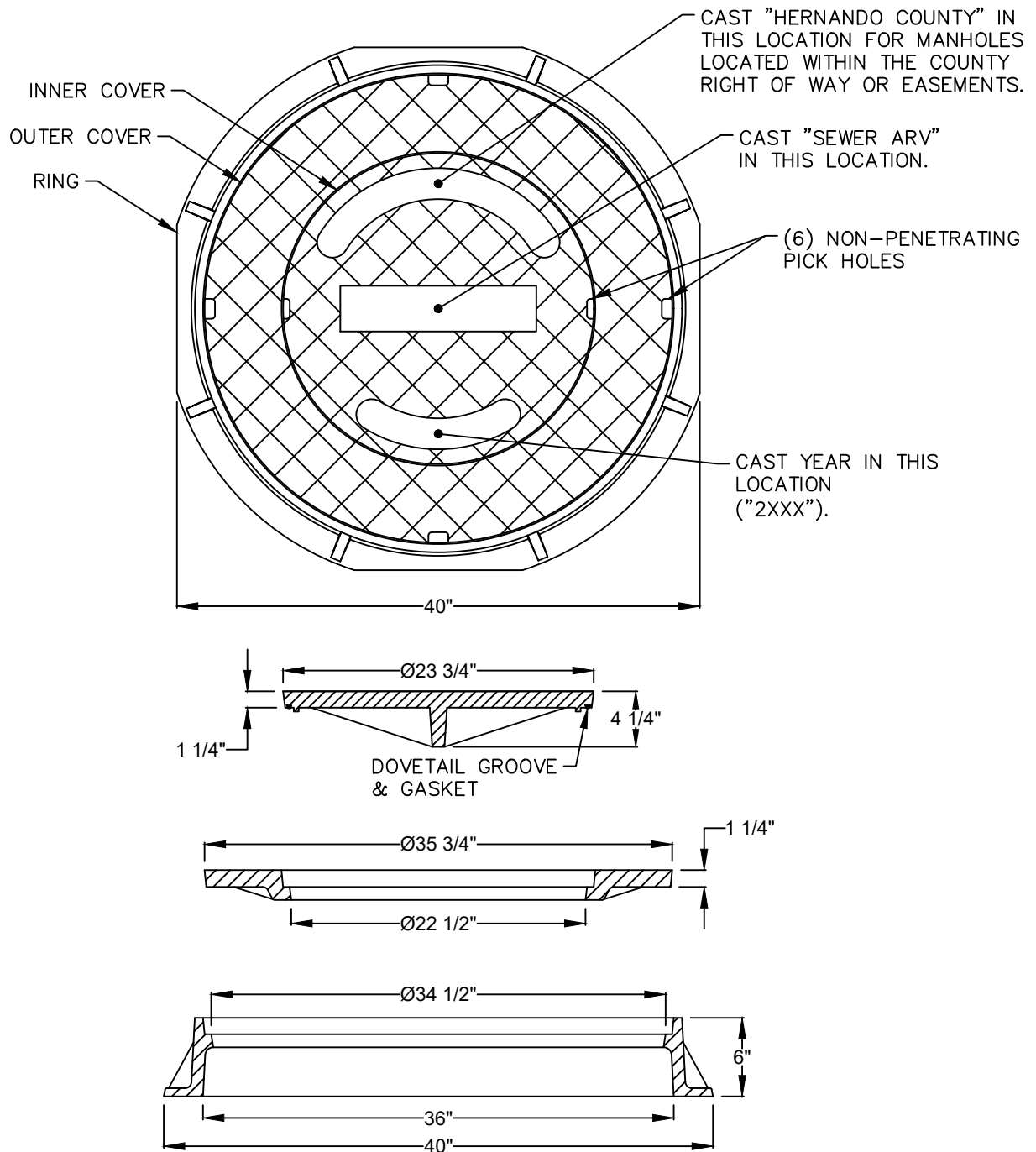
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OFFSET ARV MANHOLE

DATE:
JUNE 2023

DETAIL: S-08



NOTES:

1. ALL SEWER AIR/VACUUM RELEASE VALVE MANHOLES SHALL HAVE NON-VENTED INFLOW PROTECTORS INSTALLED UNDER THE INNER COVER.
2. RING WEIGHT: APPROXIMATELY 220 LBS.
3. INNER/OUTER COVER WEIGHT: APPROXIMATELY 150/220 LBS.

NOT TO SCALE

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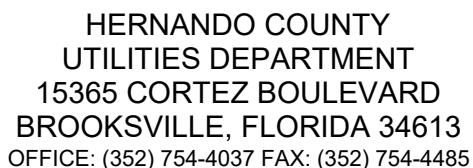
ARV RING AND COVER

DATE:
JUNE 2023

DETAIL: S-09

1. PUMP CONTROL PANEL, ELECTRIC SERVICE AND WATER SERVICE PER PLANS AND SPECIFICATIONS.
2. TRANSFER SWITCH FOR GENERATOR PER PLANS AND SPECIFICATIONS, IF APPLICABLE.
3. WET WELL PER PLANS AND SPECIFICATIONS. ALSO SEE NOTE #II BELOW.
4. VALVE VAULT PER PLANS AND SPECIFICATIONS.
5. ODOR CONTROL SYSTEM PER PLANS AND SPECIFICATIONS, IF APPLICABLE.
6. GENERATOR PER PLANS AND SPECIFICATIONS, IF APPLICABLE. NOTE: IF DIESEL DRIVEN PUMP IS USED IN LIEU OF GENERATOR, SEE STANDBY DIESEL DRIVEN PUMP DETAIL.
7. CONCRETE SUPPORT PAD FOR GENERATOR PER PLANS AND SPECIFICATIONS, IF APPLICABLE.
8. CONDUITS AND WIRING TO TRANSFER SWITCH FROM GENERATOR PER PLANS AND SPECIFICATIONS.
9. FORCE MAIN VALVE AND CONCRETE VALVE PAD PER PLANS AND SPECIFICATIONS.
10. FORCE MAIN PER PLANS AND SPECIFICATIONS.
11. DATA FLOW SYSTEMS ANTENNA AND CONCRETE SUPPORT PAD.
12. SITE LIGHTING, POLE AND CONCRETE BASE PER PLANS AND SPECIFICATIONS.
13. COLLECTOR MANHOLE PER PLANS AND SPECIFICATIONS.
14. HCUD WATER METER AND METER BOX.
15. POLY TUBING WATER SERVICE LINE WITH #10 AWG LOCATE WIRE FROM WATER MAIN PER PLANS AND SPECIFICATIONS.
16. 14' WIDE 4000 PSI CONCRETE, WITH WIRE, DRIVEWAY WITH 32' WIDE ABUTMENT TO BACK OF CURB, AS SHOWN. CONCRETE DRIVEWAY PER PLANS AND SPECIFICATIONS. DRIVEWAY SHALL BE CENTERED TO WET WELL.
17. SINGLE CANTILEVER SLIDE GATE (NO WHEELS ON BOTTOM) PER PLANS AND SPECIFICATIONS.
18. 50' X 50' FENCED PUMP STATION SITE PER PLANS AND SPECIFICATIONS.
19. CONDUIT AND WIRING FROM THE POWER COMPANY TRANSFORMER TO THE ELECTRIC SERVICE ON THE CONTROL PANEL PER PLANS AND SPECIFICATIONS.

- I. PUMP STATION SITE SHALL BE A MINIMUM OF 60' X 50' IN SIZE. ONLY 50' X 50' SHALL BE FENCED BEHIND THE 10' UTILITY EASEMENT.
- II. DO NOT CENTER THE WET WELL ON THE PUMP STATION SITE. THE SINGLE CANTILEVER SLIDE GATE CAN NOT BE INSTALLED PROPERLY IF IT IS CENTERED. THE SINGLE CANTILEVER GATE REQUIRES A MINIMUM OF 21' IN THE OPEN POSITION.
- III. THE FINISH CONCRETE SLAB ELEVATION OF THE TOP OF THE WET WELL AND VALVE VAULT SHALL BE AT OR ABOVE THE 100 YEAR FLOOD ELEVATION OR A MINIMUM OF ONE FOOT ABOVE THE CROWN OF THE ROAD IN FRONT OF THE PUMP STATION SITE, WHICHEVER IS GREATER.
- IV. THIS IS A TYPICAL LAYOUT, OTHER FACTORS DURING DESIGN MAY ALTER THIS LAYOUT. FINAL LAYOUT CONFIGURATION SHALL BE APPROVED BY HCUD.



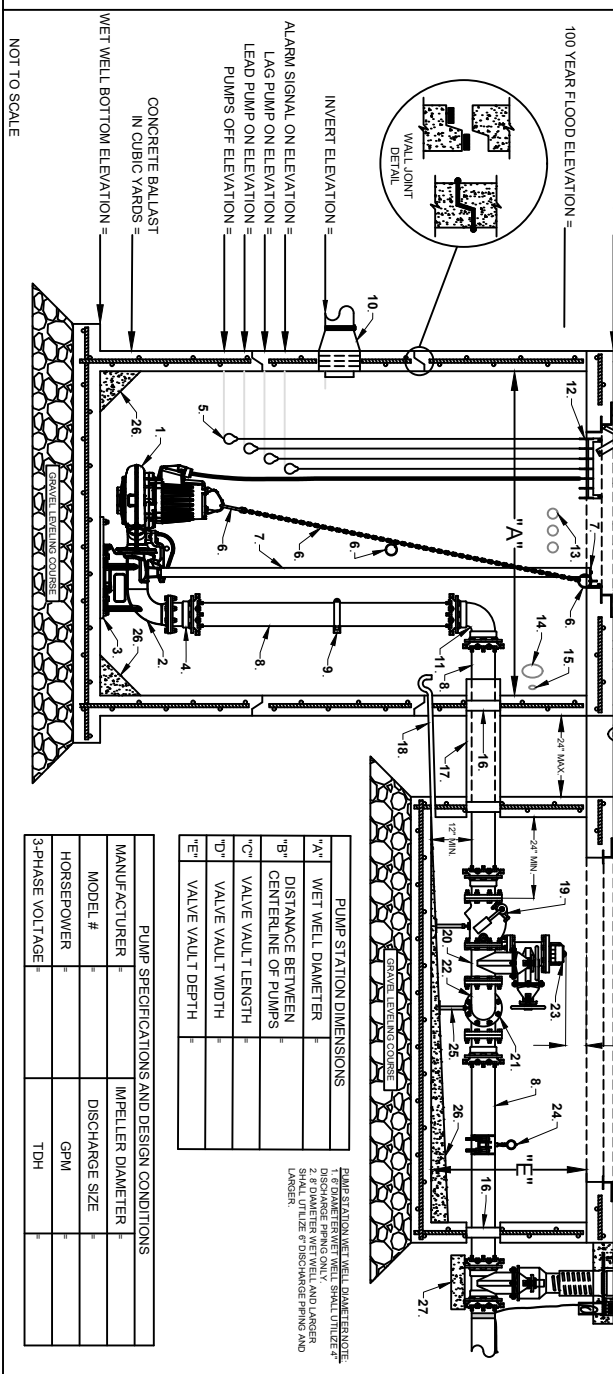
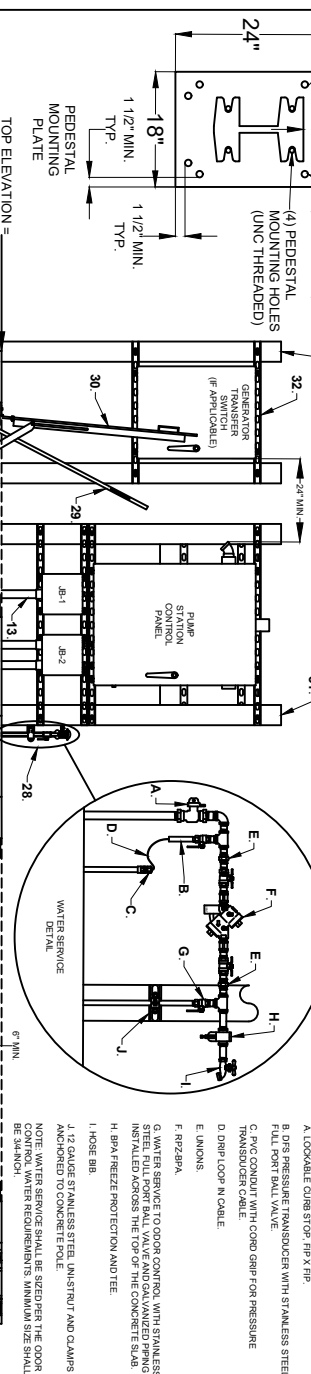
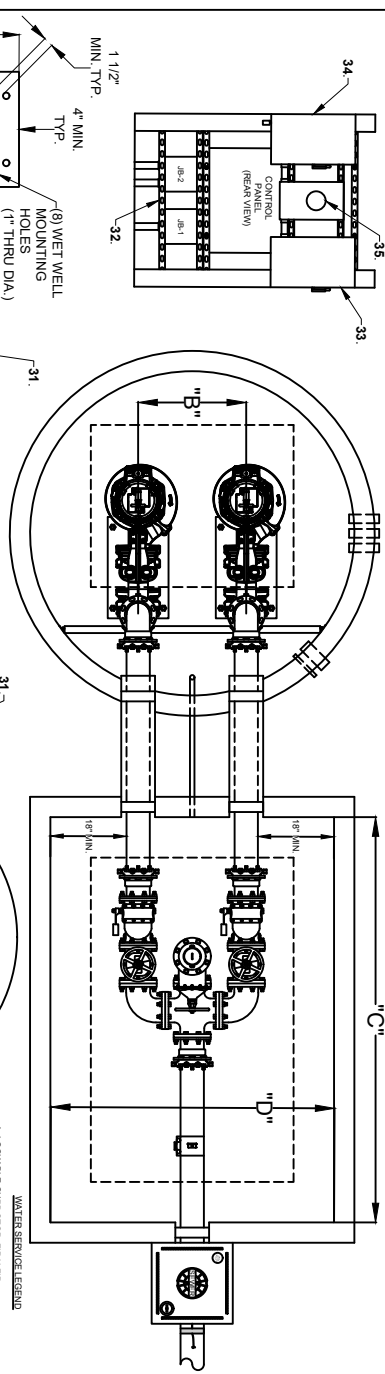
DETAIL: S-10

PUMP STATION LEGEND

1. HCUAD APPROVED SUBMERSIBLE SEWAGE PUMP.
2. PUMP DISCHARGE ELBOW (PEDESTAL).
3. PEDESTAL MOUNTING PLATE. SEE DETAIL THIS PAGE AND NOTE ANY.
4. EPOXY COATED DIPMECHANICAL JOINT (MU) X FLANGED END (FE) ADAPTOR WITH MU RESTRAINT (TYPICAL X3).
5. LIQUID LEVEL SWITCH (CONTROLS (TYPICAL FLOATS X4).
6. 3/16 STAINLESS STEEL (SS) PUMP LIFTING CHAIN WITH SS LIFT RING EYES AND CLEVISES AT THE TOP, MID POINT OF CHAIN, AND PUMP LIFTING BALL, CHAIN, LIFT RING EYES, AND CLEVIS SHALL BE SIZED PER PUMP MANUFACTURER'S RECOMMENDATION.
7. 3/16 SS GUIDE RAIL AND UPPER GUIDE RAIL BRACKET. RAIL DIAMETER SIZE PER PUMP MANUFACTURER'S RECOMMENDATION. CONTRACTOR SHALL CUT TO PROPER LENGTH.
8. C-90 DR-18 PVC PIPE (GREEN). PIPE DIAMETER SHALL BE PER CONSTRUCTION DRAWINGS. LENGTHS OVER 20 FT SHALL BE FUSIBLE PVC. NO BELL JOINTS ALLOWED.
9. DISCHARGE PIPING SUPPORT. 12 GAUGE SS UNISTRUT (B-LINE) AND PIPE CLAMPS. (IF APPLICABLE).
10. PIPE BOOT.
11. EPOXY COATED DIP C-153 MU X MU 90 DEGREE BEND WITH MU RESTRAINTS.
12. 3/16 SS CABLE HOLDER.
13. SCH. 40 PVC CONDUITS FROM JB-1 AND JB-2. 2" MINIMUM SIZE (TYPICAL X3).
14. ODOR CONTROL UNIT SUCTON PIPE PENETRATION. 6" MINIMUM PIPE SIZE WITH PIPE BOOT.
15. ODOR CONTROL UNIT DRAIN PIPE PENETRATION. 2" MINIMUM PIPE SIZE WITH PIPE BOOT.
16. LINK SEAL, INSIDE PVC SLEEVE (TYPICAL X5).
17. PVC PIPE SLEEVE. DIAMETER SIZE DEPENDS ON DISCHARGE PIPING SIZE.
18. 2" PVC DRAIN FROM VALVE VAULT TO WET WELL WITH P-TRAP.
19. HCUAD APPROVED CHECK VALVE (X2).
20. HCUAD APPROVED FE X FE GATE VALVE WITH HAND WHEEL (X3).
21. EPOXY COATED DIP FLANGED 90 DEGREE BEND (X3).
22. EPOXY COATED DIP FLANGED 90 DEGREE BEND (X3).
23. 4" FEMALE TYPE "D" CAMLOCK WITH DUST PLUG.
24. TFS 1/2" SADDLE. 1/2" SS NIPPLE. 1/2" SS FULL PORT BALL VALVE AND 2 1/2" DIAMETER SS LIQUID FILLED BOTTOM MOUNT PRESSURE GAUGE. 60 PSI MAX WITH 1 PSI INCREMENTS.
25. SS ADJUSTABLE PIPE AND VALVE SUPPORTS (TYPICAL X3).
26. CONCRETE FILLET.
27. MU GATE VALVE WITH 2" OPERATING NUT. MU RESTRAINTS. CONCRETE SUPPORT BLOCK. DUCTILE IRON ADJUSTABLE 5 1/4" VALVE CAN WITH SEWER LID, AND CONCRETE VALVE PAD PER HCUAD SPECIFICATIONS.
28. WATER SERVICE. SEE WATER SERVICE DETAIL THIS SHEET.
29. HCUAD APPROVED SAFETY GRATE (NO NETS).
30. HCUAD APPROVED WET WELL LID.
31. CONCRETE SUPPORT POLES. 6" X 6" X 10' MINIMUM SIZE (TYPICAL X4).
32. ALL UNISTRUT SHALL BE 12 GAUGE SS UNISTRUT (B-LINE) WITH SS FUSING NUTS AND SS MOUNTING HARDWARE.
33. SS SAFETY DISCONNECT BEFORE ELECTRIC METER SHALL BE NON-FUSED ON ALL 3-PHASE 277/480 VAC ELECTRIC SERVICES. PROVIDE PLASTIC PLACARD THAT READS "METER DISCONNECT NOT SERVICE EQUIPMENT". 3-PHASE 120/208 VAC OR 120/230 VAC ELECTRIC SERVICES NOT REQUIRED. (POWER COMPANY REQUIREMENT).
34. SS SAFETY DISCONNECT AFTER ELECTRIC METER SHALL BE FUSED TYPE. SHALL BE SERVICE ENTRANCE RATED, AND SHALL HAVE LIGHTNING ARRESTOR EXTERNALLY MOUNTED UNDER DISCONNECT AND WIRED TO THE LOAD SIDE OF DISCONNECT.
35. ELECTRIC METER SOCKET ENCLOSURE. "METER CAN". ELECTRIC SERVICE SHALL BE SIZED PER CONSTRUCTION DRAWINGS. HOWEVER 100 AMPS IS THE MINIMUM.

NOTES:

- I. ALL MOUNTING HARDWARE AND FASTENERS, INCLUDING TEE BOLTS AND NUTS FOR MU FITTINGS SHALL BE 316 STAINLESS STEEL.
- II. ENGINEER SHALL FILL IN ALL INFORMATION ON THE LINE OR SPACE PROVIDED AFTER THE EQUAL (+) SIGN ON THIS DETAIL AND SHOW ON CONSTRUCTION DRAWINGS.
- III. ALL PENETRATIONS INTO THE CONTROL PANEL, TRANSFER SWITCH AND OTHER ELECTRICAL EQUIPMENT SHALL BE FROM THE BOTTOM UNLESS SHOWN DIFFERENTLY IN THE DETAIL.
- IV. TYPICAL MOUNTING PLATE DETAIL - 18" X 24" CARBON STEEL PLATE, 1" THICK (X3).
- AFRFX PLATE TO WET WELL VIA 3/16 SS, 3/4" X 7" EXPANSION (WEDGE) ANCHORS (X4).
- AFRFX PUMP PEDestal TO PLATE VIA THREADED HOLES. HOLE DEPTH TO TRAVEL ENTIRE PLATE THICKNESS. ACTUAL HOLE DIAMETER AND PLACEMENT SHALL BE DICTATED BY THE PEDESTAL BOLT HOLE PATTERN. PEDESTAL MOUNTING BOLTS SHALL BE GRADE 8 AND HAVE UNC THREADS (X4). MOUNTING BOLTS SHALL BE WELDED FLUSH TO THE PLATE ON THE BOTTOM SIDE. PLEASE NOTE THAT LARGER PUMPS WITH LARGER PEDESTALS MAY REQUIRE A LARGER PEDestal PLATE, I.E. 18" X 30" OR 24" X 36". PEDestal PLATE SHALL BE SUBMITTED TO HCUAD FOR APPROVAL.



PUMP STATION DIMENSIONS	
"A"	WET WELL DIAMETER
"B"	DISTANCE BETWEEN CENTERLINE OF PUMPS
"C"	VALVE VAULT LENGTH
"D"	VALVE VAULT WIDTH
"E"	VALVE VAULT DEPTH

PUMP SPECIFICATIONS AND DESIGN CONDITIONS	
MANUFACTURER	IMPELLER DIAMETER
MODEL #	DISCHARGE SIZE
HORSEPOWER	GPM
3-PHASE VOLTAGE	TDH

2. 8" DIAMETER WET WELL AND LARGER DISCHARGE PIPING ONLY.
LARGER SIZE V DISCHARGE PIPING AND LARGER

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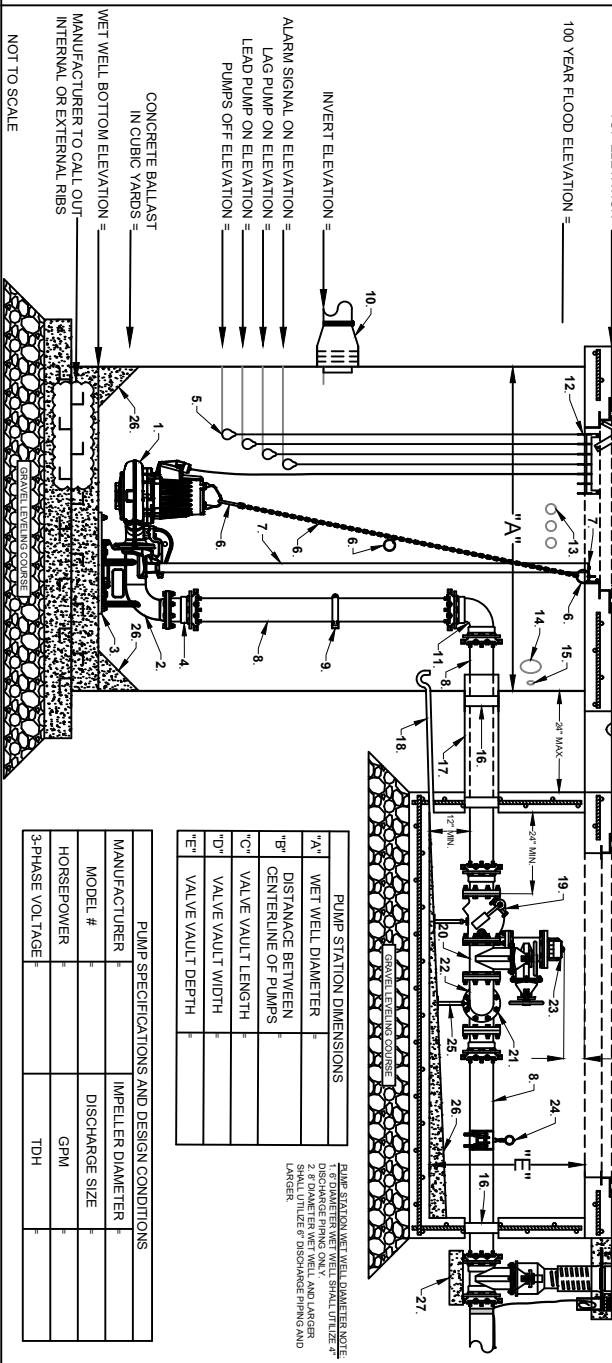
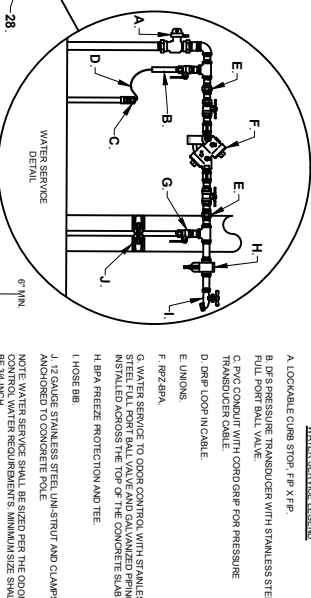
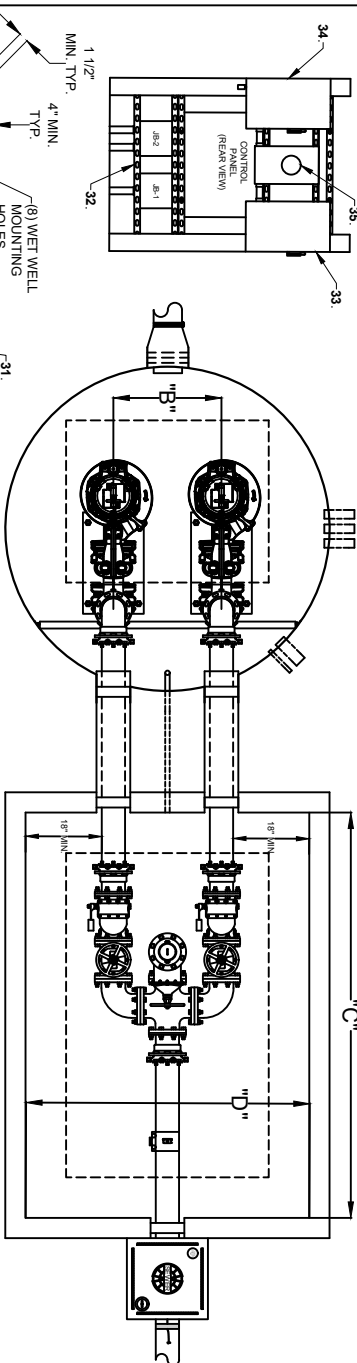
DATE: JUNE 2023
DETAIL: S-11
DUPEX PUMP STATION - CONCRETE WET WELL

PUMP STATION LEGEND

1. HCU4 APPROVED SUBMERSIBLE SEWAGE PUMP.
2. PUMP DISCHARGE ELBOW (PEDESTAL).
3. PEDESTAL MOUNTING PLATE. SEE DETAIL. THIS PAGE AND NOTE #IV.
4. EPOXY COATED DIP MECHANICAL JOINT (MJ) X FLANGED END (FE) ADAPTOR WITH MJ RESTRAINT (TYPICAL X3).
5. LIQUID LEVEL SWITCH CONTROLS (TYPICAL FLOATS X4).
6. 3/16 STAINLESS STEEL (SS) PUMP LIFTING CHAIN WITH SS LIFT RING EYES AND CLEVIS AT THE TOP. MID POINT OF CHAIN, AND PUMP LIFTING BAL. CHAIN, LIFT RING EYES AND CLEVIS SHALL BE SIZED PER PUMP MANUFACTURER'S RECOMMENDATION. MINIMUM CHAIN SIZE SHALL BE 5/16".
7. 3/16 SS GUIDE RAIL AND UPPER GUIDE RAIL BRACKET. RAIL DIAMETER SIZE PER PUMP MANUFACTURER'S RECOMMENDATION. CONTRACTOR SHALL CUT TO PROPER LENGTH.
8. C-900 DR-18 PVC PIPE (GREEN). PIPE DIAMETER SHALL BE PER CONSTRUCTION DRAWINGS. LENGTHS OVER 20 LF SHALL BE FUSIBLE PVC. NO BELL JOINTS ALLOWED.
9. DISCHARGE PIPING SUPPORT. 12 GAUGE SS UNISTRUT (B-LINE) AND PIPE CLAMPS. (IF APPLICABLE).
10. PIPE BOOT.
11. EPOXY COATED DIP C-153 MJ X MJ 90 DEGREE BEND WITH MJ RESTRAINTS.
12. 3/16 SS CABLE HOLDER.
13. SCH. 40 PVC CONDUITS FROM JB-1 AND JB-2. 2" MINIMUM SIZE (TYPICAL X3).
14. ODOOR CONTROL UNIT SITION PIPE PENETRATION. 6" MINIMUM PIPE SIZE WITH PIPE BOOT.
15. ODOOR CONTROL UNIT DRAIN PIPE PENETRATION. 2" MINIMUM PIPE SIZE WITH PIPE BOOT.
16. LINK SEAL INSIDE PVC SLEEVE (TYPICAL X5).
17. PVC PIPE SLEEVE. DIAMETER SIZE DEPENDS ON DISCHARGE PIPING SIZE.
18. 2" PVC DRAIN FROM VALVE VAULT TO WET WELL WITH P-TRAP.
19. HCU4 APPROVED CHECK VALVE (X2).
20. HCU4 APPROVED FE X FE GATE VALVE WITH HAND WHEEL (X3).
21. EPOXY COATED DIP FLANGED CROSS.
22. EPOXY COATED DIP FLANGED 90 DEGREE BEND (X3).
23. 4" FEMALE TYPE "D" CAM LOCK WITH DUST PLUG.
24. TFS 1/3" SADDLE. 1/2" SS NIPPLE. 1/2" SS FULL PORT BALL VALVE AND 2 1/2" DIAMETER SS LIQUID FILLED BOTTOM MOUNT PRESSURE GAUGE - 60 PSI MAX WITH 1 PSI INCREMENTS.
25. SS ADJUSTABLE PIPE AND VALVE SUPPORTS (TYPICAL X3).
26. CONCRETE FILLET.
27. MJ GATE VALVE WITH 2" OPERATING NUT. MJ RESTRAINTS. CONCRETE SUPPORT BLOCK. DUCTILE IRON ADJUSTABLE 5 1/4" VALVE CAN WITH SEWER LID. AND CONCRETE VALVE PAD PER HCU4 SPECIFICATIONS.
28. WATER SERVICE - SEE WATER SERVICE DETAIL THIS SHEET.
29. HCU4 APPROVED WET WELL LID.
30. HCU4 APPROVED WET WELL LID.
31. CONCRETE SUPPORT POLES - 6" X 6" X 10' MINIMUM SIZE (TYPICAL X4).
32. ALL UNISTRUT SHALL BE 12 GAUGE SS UNISTRUT (B-LINE) WITH SS SPRING NUTS AND SS MOUNTING HARDWARE.
33. SS SAFETY DISCONNECT BEFORE ELECTRIC METER SHALL BE NON-FUSED ON ALL 3-PHASE 277/480 VAC ELECTRIC SERVICES. PROVIDE PLASTIC PLACARD THAT READS "ELECTRIC SERVICES NOT REQUIRED. (POWER COMPANY REQUIREMENT)".
34. SS SAFETY DISCONNECT AFTER ELECTRIC METER SHALL BE FUSED TYPE. SHALL BE SERVICE ENTRANCE RATED, AND SHALL HAVE LIGHTNING ARRESTOR EXTERNALLY MOUNTED UNDER DISCONNECT AND WIRED TO THE LOAD SIDE OF THE DISCONNECT.
35. ELECTRIC METER SOCKET ENCLOSURE - "METER CAN". ELECTRIC SERVICE SHALL BE SIZED PER CONSTRUCTION DRAWINGS. HOWEVER 100 AMPS IS THE MINIMUM.

NOTES:

- I. ALL MOUNTING HARDWARE AND FASTENERS, INCLUDING TEE BOLTS AND NUTS FOR MJ FITTINGS SHALL BE 316 STAINLESS STEEL.
- II. ENGINEER SHALL FILL IN ALL INFORMATION ON THE LINE OR SPACE PROVIDED AFTER THE EQUAL (+) SIGN ON THIS DETAIL, AND SHOW ON CONSTRUCTION DRAWINGS.
- III. ALL PENETRATIONS INTO THE CONTROL PANEL, TRANSFER SWITCH AND OTHER ELECTRICAL EQUIPMENT SHALL BE FROM THE BOTTOM UNLESS SHOWN DIFFERENTLY IN THE DETAIL.
- IV. TYPICAL MOUNTING PLATE DETAIL - 18" X 24" CARBON STEEL PLATE. 1" THICK (X3). AFFIX PLATE TO WET WELL VIA 3/16 SS, 3/4" X 7" EXPANSION (WEDGED) ANCHORS (X4). PLATE THICKNESS, ACTUAL HOLE DIAMETER AND PLACEMENT SHALL BE DICTATED BY THE PEDESTAL BOLT HOLE PATTERN. PEDESTAL MOUNTING BOLTS SHALL BE GRADE 8 AND HAVE UNC THREADS (X4). MOUNTING BOLTS SHALL BE WELDED FLUSH TO PLATE ON THE BOTTOM SIDE. PLEASE NOTE THAT LARGER BOLTS WITH LARGER PEDESTALS MAY REQUIRE A LARGER PEDESTAL PLATE. I.E. 18" X 30" OR 24" X 36". PEDESTAL PLATE SHALL BE SUBMITTED TO HCU4 FOR APPROVAL. WET WELL MUST HAVE CONCRETE POURED IN THE BOTTOM TO ATTACH MOUNTING PLATE. DO NOT DRILL THROUGH THE BOTTOM OF THE FRP WET WELL.



PUMP STATION DIMENSIONS	
"A"	WET WELL DIAMETER
"B"	DISTANCE BETWEEN CENTERLINE OF PUMPS
"C"	VALVE VAULT LENGTH
"D"	VALVE VAULT WIDTH
"E"	VALVE VAULT DEPTH

PUMP SPECIFICATIONS AND DESIGN CONDITIONS	
MANUFACTURER	IMPELLER DIAMETER
MODEL #	DISCHARGE SIZE
HORSEPOWER	GPM
3-PHASE VOLTAGE	TDH

PUMP STATION WET WELL DIAMETER NOTE: 1. WET WELL DIAMETER SHALL BE 18" UNLESS OTHERWISE NOTED. 2. 6" DIAMETER WET WELL AND LARGER LARGER. 3. 12" DIAMETER WET WELL AND LARGER LARGER.

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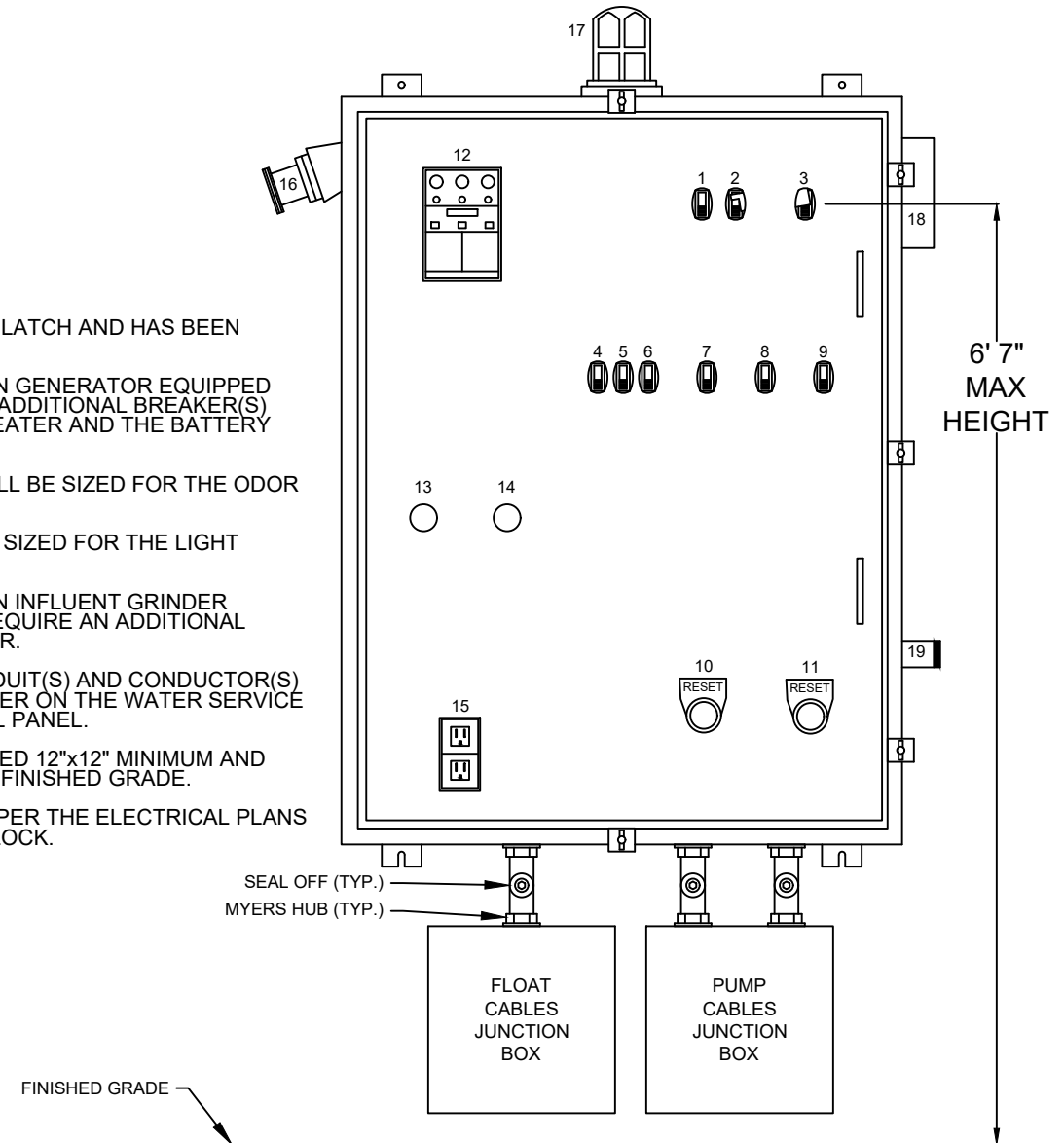
DATE:
JUNE 2023

DETAIL: S-12

DUPEX PUMP STATION - FRP WET WELL

NOTES:

1. OUTER DOORS HAVE A 3 POINT LATCH AND HAS BEEN REMOVED FOR CLARITY.
2. CONTROL PANELS INSTALLED IN GENERATOR EQUIPPED LIFT STATIONS WILL REQUIRE AN ADDITIONAL BREAKER(S) SIZED FOR THE ENGINE BLOCK HEATER AND THE BATTERY CHARGER.
3. ODOR CONTROL BREAKER SHALL BE SIZED FOR THE ODOR CONTROL UNIT INSTALLED.
4. SITE LIGHT BREAKER SHALL BE SIZED FOR THE LIGHT INSTALLED.
5. CONTROL PANELS INSTALLED IN INFLUENT GRINDER EQUIPPED LIFT STATIONS WILL REQUIRE AN ADDITIONAL BREAKER SIZED FOR THE GRINDER.
6. INSTALL THE NECESSARY CONDUIT(S) AND CONDUCTOR(S) FROM THE PRESSURE TRANSDUCER ON THE WATER SERVICE TO THE TCU INSIDE THE CONTROL PANEL.
7. JUNCTION BOXES SHALL BE SIZED 12"x12" MINIMUM AND INSTALLED A MINIMUM 12" ABOVE FINISHED GRADE.
8. MCB AND ECB SHALL BE SIZED PER THE ELECTRICAL PLANS AND SHALL HAVE MANUAL INTERLOCK.



PUMP CONTROL PANEL COMPONENTS (TELEMETRY MODEL)

1. RTU BREAKER	12. DATA FLOW SYSTEMS CONTROLLER W/REAR MOUNTED TCU
2. MCB (MAIN CIRCUIT BREAKER)	13. PL1 MOISTURE 1
3. ECB (EMERGENCY CIRCUIT BREAKER)	14. PL2 MOISTURE 2
4. DRB (DUPLEX RECEPTACLE BREAKER)	15. DR (DUPLEX RECEPTACLE, GFI)
5. CCB (CONTROL CIRCUIT BREAKER)	16. GR (GENERATOR RECEPTACLE)
6. SLB - SITE LIGHT BREAKER	17. AL (ALARM LIGHT, LED)
7. OCB (ODOR CONTROL BREAKER)	18. AH (ALARM HORN)
8. MB1 (MOTOR BREAKER 1)	19. ASB (ALARM SILENCE BUTTON)
9. MB2 (MOTOR BREAKER 2)	
10. OVERLOAD 1 RESET BUTTON	
11. OVERLOAD 2 RESET BUTTON	

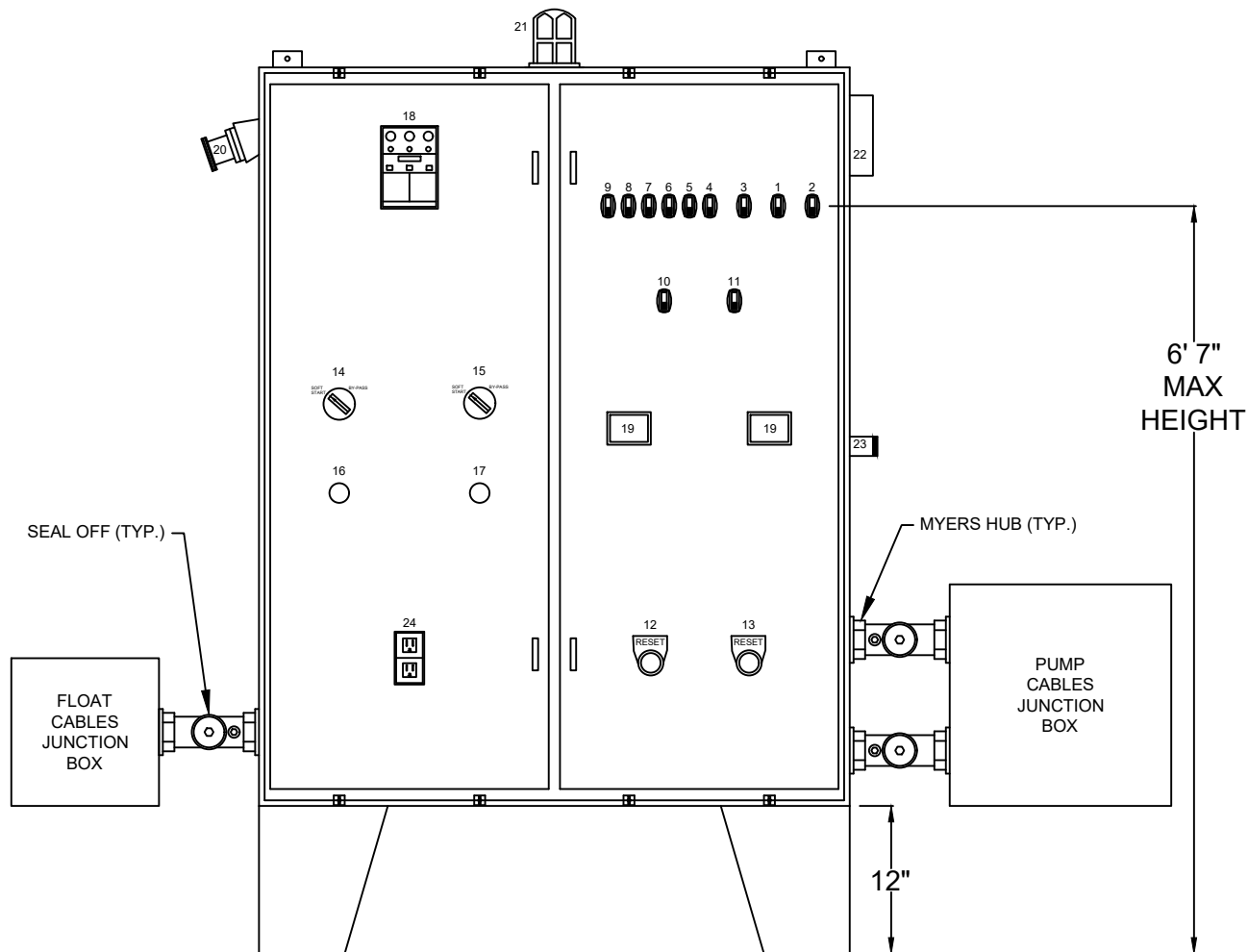
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**DUPLEX PUMP STATION CONTROL PANEL
39 HP OR LESS**

DATE:
JUNE 2023

DETAIL: S-13



NOTES:

1. OUTER DOORS HAVE A 3 POINT LATCH AND HAS BEEN REMOVED FOR CLARITY.
2. 40 HP AND GREATER SHALL HAVE SOFT STARTS WITH ACROSS THE LINE BYPASS MAGNETIC STARTERS FOR EACH PUMP.
3. CONTROL PANELS INSTALLED IN INFLUENT GRINDER EQUIPPED LIFT STATIONS WILL REQUIRE AN ADDITIONAL BREAKER SIZED FOR THE GRINDER.
4. ODOR CONTROL BREAKER SHALL BE SIZED FOR THE ODOR CONTROL UNIT INSTALLED.
5. SITE LIGHT BREAKER SHALL BE SIZED FOR THE LIGHT INSTALLED.
6. INSTALL THE NECESSARY CONDUIT(S) AND CONDUCTOR(S) FROM THE PRESSURE TRANSDUCER ON THE WATER SERVICE TO THE TCU INSIDE THE CONTROL PANEL.
7. JUNCTION BOXES SHALL BE SIZED 12"x12" MINIMUM AND INSTALLED A MINIMUM 12" ABOVE FINISHED GRADE.
8. MCB AND ECB SHALL BE SIZED PER THE ELECTRICAL PLANS AND SHALL HAVE MANUAL INTERLOCK.

LEGEND:

1. MCB - MAIN CONTROL BREAKER	13. OVERLOAD RESET 2
2. GCB - GENERATOR CONTROL BREAKER	14. SOFT START BY-PASS SWITCH 1
3. OCB - ODOR CONTROL BREAKER	15. SOFT START BY-PASS SWITCH 2
4. RTU BREAKER	16. PL1 - MOISTURE 1
5. CCB - CONTROL CIRCUIT BREAKER	17. PL2 - MOISTURE 2
6. DRB - DUPLEX RECEPTACLE BREAKER	18. TCU - DATA FLOW SYSTEMS TELEMETRY CONTROL UNIT
7. SLB - SITE LIGHT BREAKER	19. MSAV 1,2 - MOTOR SAVERS
8. BHB - BLOCK HEATER BREAKER	20. GR - GENERATOR RECEPTACLE
9. BCB - BATTERY CHARGER BREAKER	21. AL - ALARM LIGHT, LED
10. MB1 - MOTOR BREAKER 1	22. AH - ALARM HORN
11. MB2 - MOTOR BREAKER 2	23. ASB - ALARM SILENCE BUTTON
12. OVERLOAD RESET 1	24. DR - DUPLEX RECEPTACLE, GFI

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DUPLEX PUMP STATION CONTROL PANEL 40 HP OR GREATER

DATE:
JUNE 2023

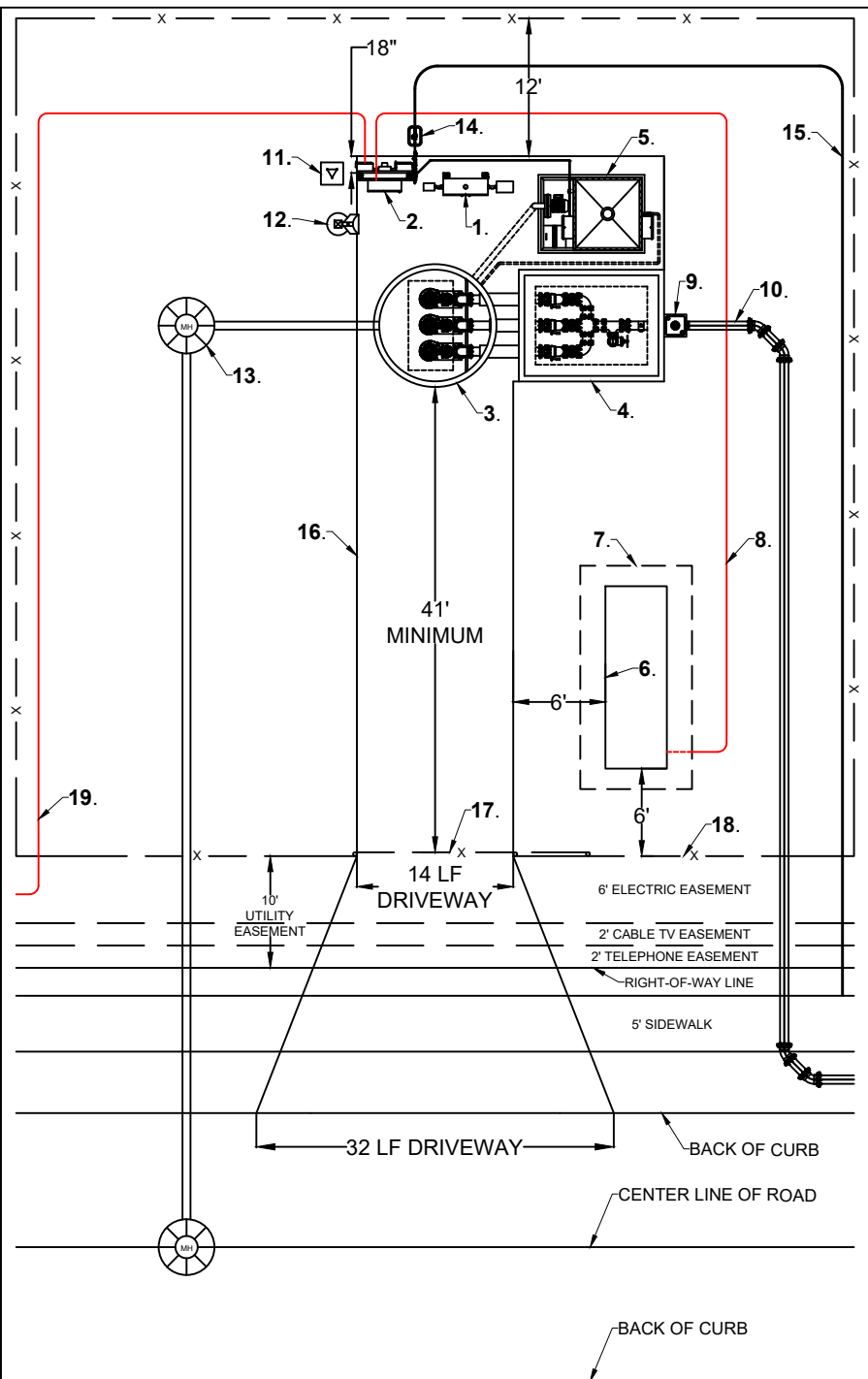
DETAIL: S-14

LEGEND:

1. PUMP CONTROL PANEL PER PLANS AND SPECIFICATIONS.
2. TRANSFER SWITCH FOR GENERATOR, IF APPLICABLE, ELECTRIC SERVICE AND WATER SERVICE PER PLANS AND SPECIFICATIONS.
3. WET WELL PER PLANS AND SPECIFICATIONS.
4. VALVE VAULT PER PLANS AND SPECIFICATIONS.
5. ODOR CONTROL SYSTEM PER PLANS AND SPECIFICATIONS, IF APPLICABLE.
6. GENERATOR PER PLANS AND SPECIFICATIONS, IF APPLICABLE. IF DIESEL DRIVEN PUMP IS USED IN LIEU OF GENERATOR, SEE STANDBY DIESEL DRIVEN PUMP DETAIL.
7. CONCRETE SUPPORT PAD FOR GENERATOR PER PLANS AND SPECIFICATIONS, IF APPLICABLE.
8. CONDUITS AND WIRING TO TRANSFER SWITCH FROM GENERATOR PER PLANS AND SPECIFICATIONS, IF APPLICABLE.
9. FORCE MAIN VALVE AND CONCRETE VALVE PAD PER PLANS AND SPECIFICATIONS.
10. FORCE MAIN PER PLANS AND SPECIFICATIONS.
11. DATA FLOW SYSTEMS ANTENNA AND CONCRETE SUPPORT PAD.
12. SITE LIGHTING, POLE AND CONCRETE BASE PER PLANS AND SPECIFICATIONS.
13. COLLECTOR MANHOLE PER PLANS AND SPECIFICATIONS.
14. HCUD WATER METER AND METER BOX.
15. POLY TUBING WATER SERVICE LINE WITH #10 AWG LOCATE WIRE FROM WATER MAIN PER PLANS AND SPECIFICATIONS.
16. 14' WIDE 4000 PSI CONCRETE, WITH WIRE, DRIVEWAY WITH 32' WIDE ABUTMENT TO BACK OF CURB, AS SHOWN. CONCRETE DRIVEWAY PER PLANS AND SPECIFICATIONS. DRIVEWAY SHALL BE CENTERED TO WET WELL.
17. SINGLE CANTILEVER SLIDE GATE (NO WHEELS ON BOTTOM) PER PLANS AND SPECIFICATIONS.
18. 75' X 75' FENCED PUMP STATION SITE PER PLANS AND SPECIFICATIONS.
19. CONDUIT AND WIRING FROM THE POWER COMPANY TRANSFORMER TO THE ELECTRIC SERVICE PER PLANS AND SPECIFICATIONS.

NOTES:

- I. PUMP STATION SITE SHALL BE A MINIMUM OF 85' X 75' IN SIZE. ONLY 75' X 75' SHALL BE FENCED BEHIND THE 10' UTILITY EASEMENT.
- II. THE FINISH CONCRETE SLAB ELEVATION OF THE TOP OF THE WET WELL AND VALVE VAULT SHALL BE AT OR ABOVE THE 100 YEAR FLOOD ELEVATION OR ONE FOOT HIGHER THAN THE CROWN OF THE ROAD IN FRONT OF THE PUMP STATION, WHICHEVER IS HIGHER.
- III. THIS IS A TYPICAL LAYOUT, OTHER FACTORS DURING DESIGN MAY ALTER THIS LAYOUT. FINAL LAYOUT CONFIGURATION SHALL BE APPROVED BY HCUD.



NOT TO SCALE

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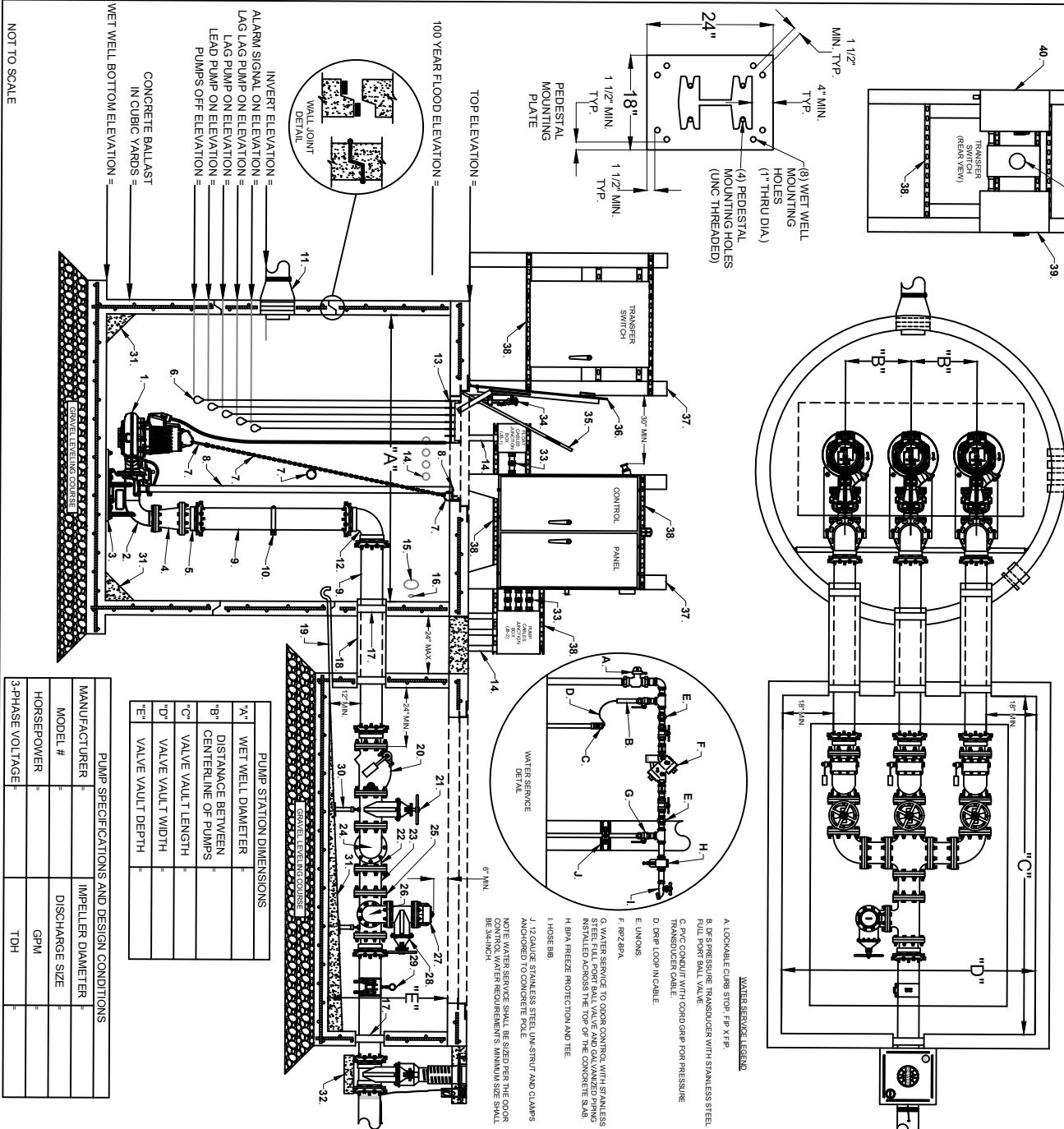
TRIPLEX PUMP STATION LAYOUT

DATE:
JUNE 2023

DETAIL: S-15

PUMP STATION LEGEND

1. H/CUD APPROVED SUBVERSIBLE SEWAGE PUMP.
2. PUMP DISCHARGE ELBOW (PEDESTAL).
3. PEDESTAL MOUNTING PLATE. SEE DETAIL, THIS PAGE AND NOTE #V.
4. EPOXY COATED DUCTILE IRON PIPE (DIP) FLANGED END (FE) X FLANGED END (FE) REDUCER (IF APPLICABLE).
5. EPOXY COATED DIP MECHANICAL JOINT (MJ) X FLANGED END (FE) ADAPTOR WITH MJ RESTRAINT (TYPICAL X7).
6. LIQUID LEVEL SWITCH CONTROLS (TYPICAL FLOATS X5).
7. 3/16 STAINLESS STEEL (SS) PUMP LIFTING CHAIN WITH SS LIFT RING EYES AND CLEVIS. AT THE TOP, MID POINT OF CHAIN, AND PUMP LIFTING BALL, CHAIN, LIFT RING EYES, AND CLEVIS SHALL BE SIZED PER PUMP MANUFACTURER'S RECOMMENDATION. MINIMUM CHAIN SIZE SHALL BE 5/16".
8. 3/16 SS GUIDE RAIL AND UPPER GUIDE RAIL BRACKET. RAIL DIAMETER SIZE PER PUMP MANUFACTURER'S RECOMMENDATION. CONTRACTOR SHALL CUT TO PROPER LENGTH.
9. C-900 DR-18 PVC PIPE (GREEN). PIPE DIAMETER SHALL BE PER CONSTRUCTION DRAWINGS. LENGTHS OVER 20 LF SHALL BE FUSIBLE PVC, NO BELL JOINTS ALLOWED.
10. DISCHARGE PIPING SUPPORT. 12 GAUGE SS UN-STRUT (B-LINE) AND PIPE CLAMPS. (IF APPLICABLE).
11. PIPE BOOT.
12. EPOXY COATED DIP C-153 MJ X MJ 90 DEGREE BEND WITH MJ RESTRAINTS.
13. 3/16 SS CABLE HOLDER.
14. SCH. 40 PVC CONDUITS FROM JB-1 AND JB-2. 2" MINIMUM SIZE (TYPICAL X4).
15. ODOR CONTROL UNIT SUCTON PIPE PENETRATION. 6" MINIMUM PIPE SIZE WITH PIPE BOOT.
16. ODOR CONTROL UNIT DRAIN PIPE PENETRATION. 2" MINIMUM PIPE SIZE WITH PIPE BOOT.
17. LINK SEAL INSIDE PVC SLEEVE (TYPICAL X7).
18. PVC PIPE SLEEVE. DIAMETER SIZE DEPENDS ON DISCHARGE PIPING SIZE.
19. 2" PVC DRAIN FROM VALVE VAULT TO WET WELL WITH P-TRAP.
20. H/CUD APPROVED CHECK VALVE (X3).
21. H/CUD APPROVED FE X FE GATE VALVE WITH HAND WHEEL (X4).
22. EPOXY COATED DIP FLANGED SPOOL. PIECE.
23. EPOXY COATED DIP FLANGED CROSS.
24. EPOXY COATED DIP FLANGED 90 DEGREE BEND.
25. EPOXY COATED DIP FLANGED DISCHARGE PIPING SIZE X 6" (BRANCH SIDE) TEE.
26. EPOXY COATED DIP FLANGED 6" 90 DEGREE BEND.
27. EPOXY COATED DIP 6" FLANGE X 6" NPT, 6" SS CLOSE NIPPLE AND 6" FEMALE TYPE "D" CAMLOCK WITH DUST PLUG.
28. 6" FLANGED GATE VALVE WITH HAND WHEEL.
29. TFS "T" SADDLE, 1/2" SS NIPPLE, 1/2" SS FULL PORT BALL VALVE AND 2 1/2" DIAMETER SS LIQUID FILLED BOTTOM MOUNT PRESSURE GAUGE - 60 PSI MAX WITH 1 PSI INCREMENTS.
30. SS ADJUSTABLE PIPE AND VALVE SUPPORTS (TYPICAL X4).
31. CONCRETE FILLET.
32. MJ GATE VALVE WITH 2" OPERATING NUT, MJ RESTRAINTS, CONCRETE SUPPORT BLOCK, DUCTILE IRON ADJUSTABLE 5 1/4" VALVE CAN WITH SEWER LID, AND CONCRETE VALVE PAD PER H/CUD SPECIFICATIONS.
33. GAS SEAL-OFFS WITH METERS HUBS (TYPICAL X4).
34. WATER SERVICE. - SEE WATER SERVICE DETAIL THIS SHEET.
35. H/CUD APPROVED SAFETY GRATE (NO NETS).
36. H/CUD APPROVED WET WELL LID.
37. CONCRETE SUPPORT POLES - 6" X 6" X 10' MINIMUM SIZE (TYPICAL X4).
38. ALL UN-STRUT SHALL BE 12 GAUGE SS UN-STRUT (B-LINE) WITH SS SPRING NUTS AND SS MOUNTING HARDWARE.
39. SS SAFETY DISCONNECT BEFORE ELECTRIC METER SHALL BE NON-FUSED ON ALL 3-PHASE 277/480 VAC ELECTRIC SERVICES. PROVIDE PLASTIC PLACARD THAT READS "METER DISCONNECT NOT SERVICE EQUIPMENT". 3-PHASE 120/209 VAC OR 120/230 VAC ELECTRIC SERVICES NOT REQUIRED. (POWER COMPANY REQUIREMENT).
40. SS SAFETY DISCONNECT AFTER ELECTRIC METER SHALL BE FUSED TYPE. SHALL BE SERVICE ENTRANCE RATED AND SHALL HAVE LIGHTNING ARRESTOR EXTERNALLY MOUNTED UNDER DISCONNECT AND WIRED TO THE LOAD SIDE OF THE DISCONNECT.
41. ELECTRIC METER SOCKET ENCLOSURE. METER CAN. ELECTRIC SERVICE SHALL BE SIZED PER CONSTRUCTION DRAWINGS. HOWEVER 100 AMPS IS THE MINIMUM.
- NOTES:
I. ALL MOUNTING HARDWARE AND FASTENERS, INCLUDING TEE BOLTS AND NUTS FOR MJ FITTINGS SHALL BE 316 STAINLESS STEEL.
II. ENGINEER SHALL FILL IN ALL INFORMATION ON THE LINE OR SPACE PROVIDED AFTER THE EQUIPMENT IS INSTALLED.
III. ALL PENETRATIONS INTO THE CONTROL PANEL, TRANSFER SWITCH AND OTHER ELECTRICAL EQUIPMENT SHALL BE FROM THE BOTTOM UNLESS SHOWN DIFFERENTLY IN THE DETAIL.
IV. TYPICAL MOUNTING PLATE DETAIL. -18" X 24" CARBON STEEL PLATE, 1" THICK (X3). AFFIX PLATE TO WET WELL VIA 3/16 SS, 3/4" X 7" EXPANSON (WEDGE) ANCHORS (X4). AFFIX PUMP PEDESTAL TO PLATE VIA THREADED HOLES. HOLE DEPTH TO TRAVEL ENTIRE PLATE THICKNESS. ACTUAL HOLE DIAMETER AND PLACEMENT BOLTS SHALL BE DICTATED BY THE PEDestal BOLT HOLE PATTERN. PEDestal MOUNTING BOLTS SHALL BE GRADE 8 AND HAVE UNC THREADS (X4). MOUNTING BOLTS SHALL BE WELDED FLUSH TO PLATE ON THE BOTTOM SIDE. PLEASE NOTE THAT LARGER PUMPS WITH LARGER PEDESTALS MAY REQUIRE A LARGER PEDestal PLATE. I.E. -18" X 30" OR 24" X 36". PEDestal PLATE SHALL BE SUBMITTED TO H/CUD FOR APPROVAL.



PUMP STATION DIMENSIONS			
"A"	WET WELL DIAMETER		
"B"	DISTANCE BETWEEN CENTERLINE OF PUMPS		
"C"	VALVE VAULT LENGTH		
"D"	VALVE VAULT WIDTH		
"E"	VALVE VAULT DEPTH		

PUMP SPECIFICATIONS AND DESIGN CONDITIONS			
MANUFACTURER		IMPELLER DIAMETER	
MODEL #		DISCHARGE SIZE	
HORSEPOWER		GPM	
3-PHASE VOLTAGE		TDH	

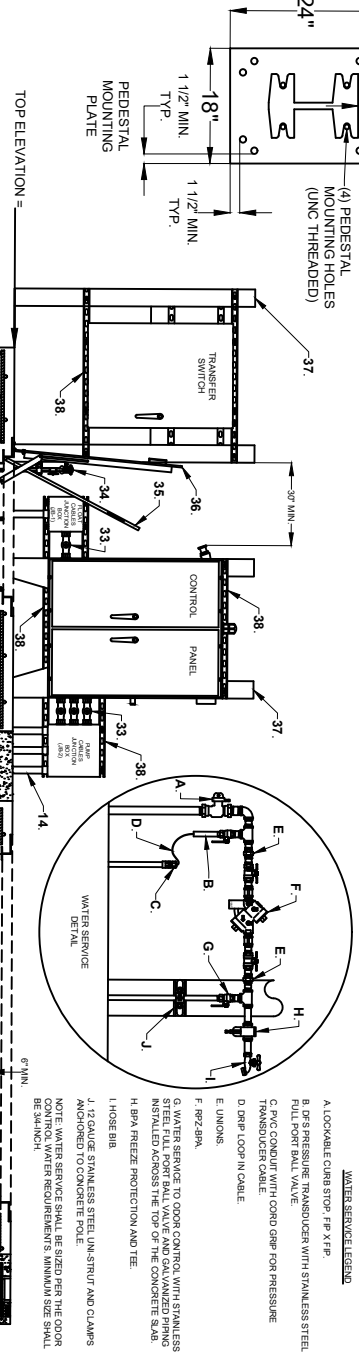
TRIPLEX PUMP STATION - CONCRETE WET WELL

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DATE:
JUNE 2023

DETAIL: S-16

1. FLOOD APPROVED SUBMERGIBLE SEWAGE PUMP.
2. PUMP DISCHARGE ELBOW (PEDISTAL), CONCRETE MUST BE POURED ON THE FLOOR OR WET WELL TO ATTACH PLATE AND PEDISTAL. DO NOT DRILL THROUGH RFP FLOOR.
3. PEDISTAL MOUNTING PLATE. SEE DETAIL. THIS PAGE AND NOTE #/.
4. EPXY COATED DOCTILE IRON PIPE (DIP) FLANGED END (FE) X FLANGED END (FE) REDUCER (IF APPLICABLE).
5. EPXY COATED DIP MECHANICAL JOINT (MJ) X FLANGED END (FE) ADAPTOR WITH MU RESTRAINT (TYPICAL X7).
6. LIQUID LEVEL SWITCH CONTROL S (TYPICAL FLOATS X5)
7. 3/16 STAINLESS STEEL (SS) PUMP LIFT CHAIN WITH SS LIFT RING EYES AND CLEAVES AT THE TOP, MID POINT OF CHAIN, AND PUMP LIFTING BALL, CHAIN, LIFT RING EYES, AND CLEAVES SHALL BE SIZED PER PUMP MANUFACTURERS RECOMMENDATION. MINIMUM CHAIN SIZE SHALL BE 5/16".
8. 3/16 SS GUIDE RAIL, AND UPPER GUIDE RAIL, BRACKET RAIL DIAMETER SIZE PER PUMP MANUFACTURERS RECOMMENDATION. CONTRACTOR SHALL CUT TO PROPER LENGTH.
9. 3/40 DR-18 PVC PIPE (GREEN). PIPE DIAMETER SHALL BE PER CONSTRUCTION DRAINAGES. LENGTHS OVER 20' SHALL BE FUSIBLE PVC. NO BELL JOINTS ALLOWED.
10. DISCHARGE PIPING SUPPORT. 1/2 GAUGE SS UN-STRUCT (B-LINE) AND PIPE CLAMPS. (IF APPLICABLE)

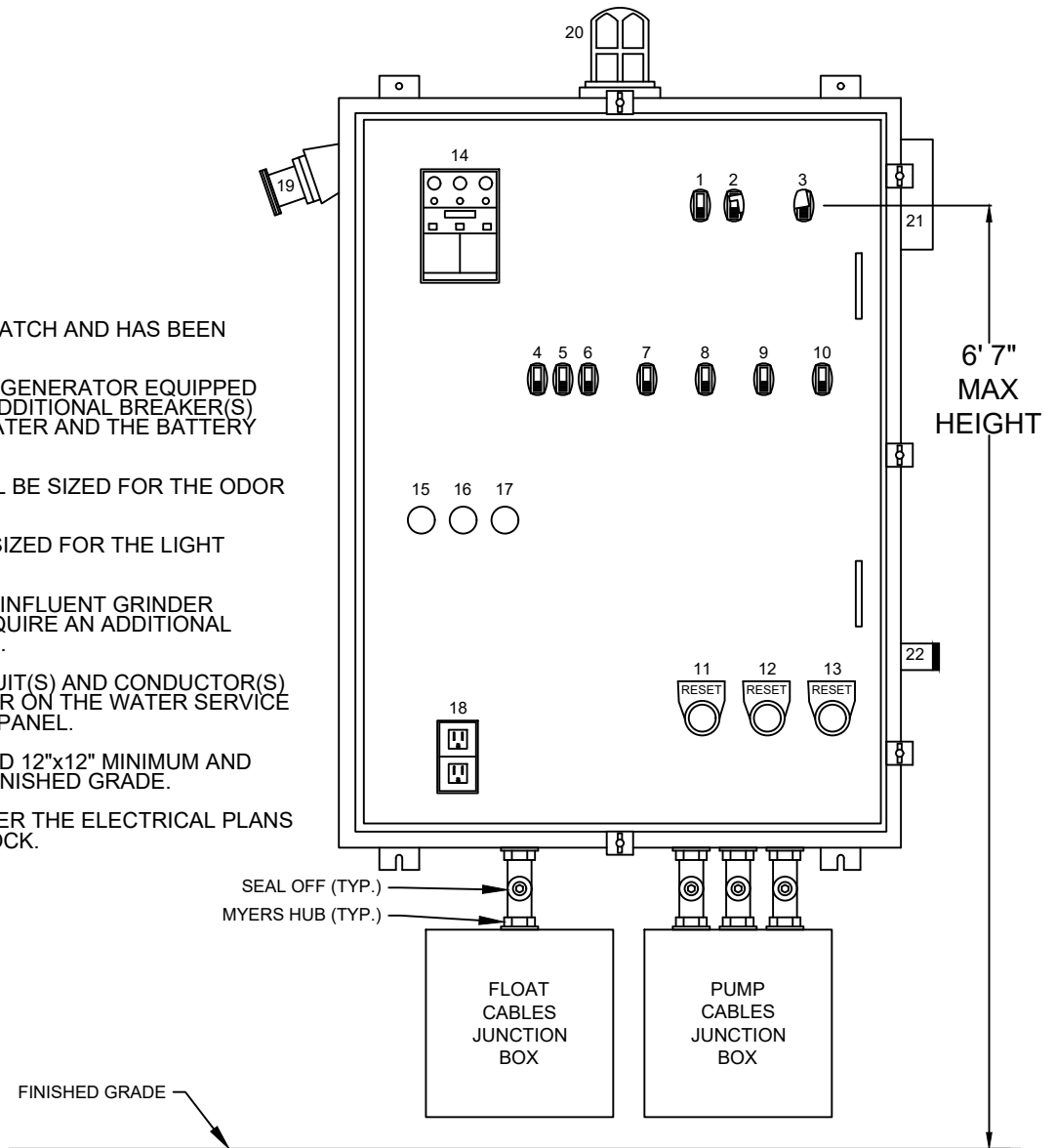


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DETAIL: S-17

NOTES:

1. OUTER DOORS HAVE A 3 POINT LATCH AND HAS BEEN REMOVED FOR CLARITY.
2. CONTROL PANELS INSTALLED IN GENERATOR EQUIPPED LIFT STATIONS WILL REQUIRE AN ADDITIONAL BREAKER(S) SIZED FOR THE ENGINE BLOCK HEATER AND THE BATTERY CHARGER.
3. ODOR CONTROL BREAKER SHALL BE SIZED FOR THE ODOR CONTROL UNIT INSTALLED.
4. SITE LIGHT BREAKER SHALL BE SIZED FOR THE LIGHT INSTALLED.
5. CONTROL PANELS INSTALLED IN INFLUENT GRINDER EQUIPPED LIFT STATIONS WILL REQUIRE AN ADDITIONAL BREAKER SIZED FOR THE GRINDER.
6. INSTALL THE NECESSARY CONDUIT(S) AND CONDUCTOR(S) FROM THE PRESSURE TRANSDUCER ON THE WATER SERVICE TO THE TCU INSIDE THE CONTROL PANEL.
7. JUNCTION BOXES SHALL BE SIZED 12"x12" MINIMUM AND INSTALLED A MINIMUM 12" ABOVE FINISHED GRADE.
8. MCB AND ECB SHALL BE SIZED PER THE ELECTRICAL PLANS AND SHALL HAVE MANUAL INTERLOCK.



PUMP CONTROL PANEL COMPONENTS (TELEMETRY MODEL)	
1. RTU BREAKER	12. OVERLOAD 2 RESET BUTTON
2. MCB (MAIN CIRCUIT BREAKER)	13. OVERLOAD RESET 3 BUTTON
3. ECB (EMERGENCY CIRCUIT BREAKER)	14. DATA FLOW SYSTEMS CONTROLLER W/REAR MOUNTED TCU
4. DRB (DUPLEX RECEPTACLE BREAKER)	15. PL1 MOISTURE 1
5. CCB (CONTROL CIRCUIT BREAKER)	16. PL2 MOISTURE 2
6. SLB (SITE LIGHT BREAKER)	17. PL3 MOISTURE 3
7. OCB (ODOR CONTROL BREAKER)	18. DR (DUPLEX RECEPTACLE, GFI)
8. MB1 (MOTOR BREAKER 1)	19. GR (GENERATOR RECEPTACLE)
9. MB2 (MOTOR BREAKER 2)	20. AL (ALARM LIGHT)
10. MB3 (MOTOR BREAKER 3)	21. AH (ALARM HORN)
11. OVERLOAD 1 RESET BUTTON	22. ASB (ALARM SILENCE BUTTON)

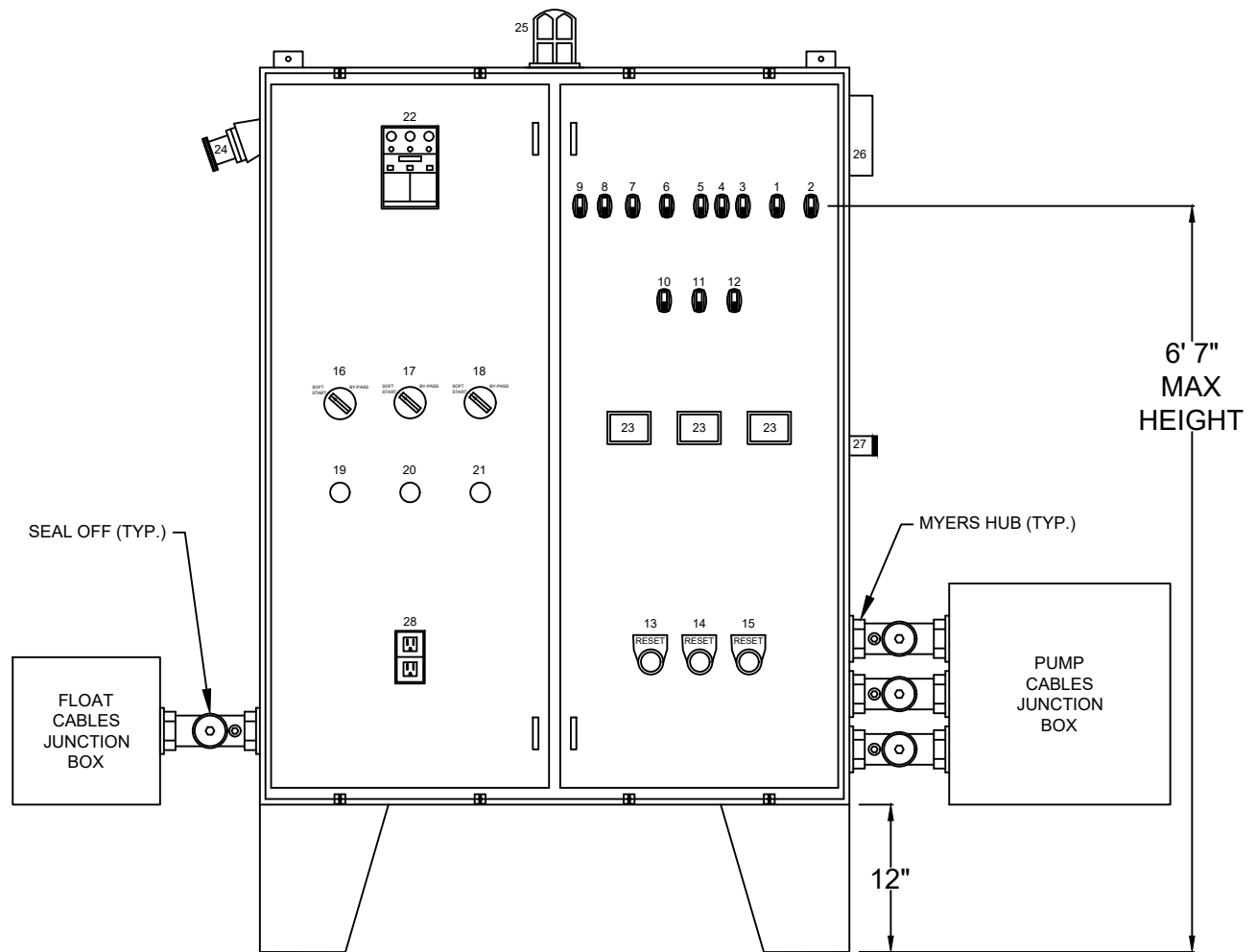
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**TRIPLEX PUMP STATION CONTROL PANEL
39 HP OR LESS**

DATE:
JUNE 2023

DETAIL: S-18



NOTES:

1. OUTER DOORS HAVE A 3 POINT LATCH AND HAS BEEN REMOVED FOR CLARITY.
2. 40 HP AND GREATER SHALL HAVE SOFT STARTS WITH ACROSS THE LINE BYPASS MAGNETIC STARTERS FOR EACH PUMP.
3. CONTROL PANELS INSTALLED IN INFLUENT GRINDER EQUIPPED LIFT STATIONS WILL REQUIRE AN ADDITIONAL BREAKER SIZED FOR THE GRINDER.
4. ODOR CONTROL BREAKER SHALL BE SIZED FOR THE ODOR CONTROL UNIT INSTALLED.
5. INSTALL THE NECESSARY CONDUIT(S) AND CONDUCTOR(S) FROM THE PRESSURE TRANSDUCER ON THE WATER SERVICE TO THE TCU INSIDE THE CONTROL PANEL.
6. SITE LIGHT BREAKER SHALL BE SIZED FOR THE LIGHT INSTALLED.
7. JUNCTION BOXES SHALL BE SIZED 12"x12" MINIMUM AND INSTALLED A MINIMUM 12" ABOVE FINISHED GRADE.
8. MCB AND ECB SHALL BE SIZED PER THE ELECTRICAL PLANS AND SHALL HAVE MANUAL INTERLOCK.

LEGEND:

1. MCB - MAIN CONTROL BREAKER	15. OVERLOAD RESET 3
2. GCB - GENERATOR CONTROL BREAKER	16. SOFT START BY-PASS SWITCH 1
3. CCB - CONTROL CIRCUIT BREAKER	17. SOFT START BY-PASS SWITCH 2
4. RTU BREAKER	18. SOFT START BY-PASS SWITCH 3
5. DRB - DUPLEX RECEPTACLE BREAKER	19. PL1 - MOISTURE 1
6. OCB - ODOR CONTROL BREAKER	20. PL2 - MOISTURE 2
7. SLB - SITE LIGHT BREAKER	21. PL3 MOISTURE 3
8. BHB - BLOCK HEATER BREAKER	22. TCU - DATA FLOW SYSTEMS TELEMETRY CONTROL UNIT
9. BCB - BATTERY CHARGER BREAKER	23. MSAV 1,2,3 - MOTOR SAVERS
10. MB1 - MOTOR BREAKER 1	24. GR - GENERATOR RECEPTACLE
11. MB2 - MOTOR BREAKER 2	25. AL - ALARM LIGHT, LED
12. MB3 - MOTOR BREAKER 3	26. AH - ALARM HORN
13. OVERLOAD RESET 1	27. ASB - ALARM SILENCE BUTTON
14. OVERLOAD RESET 2	28. DR - DUPLEX RECEPTACLE, GFI

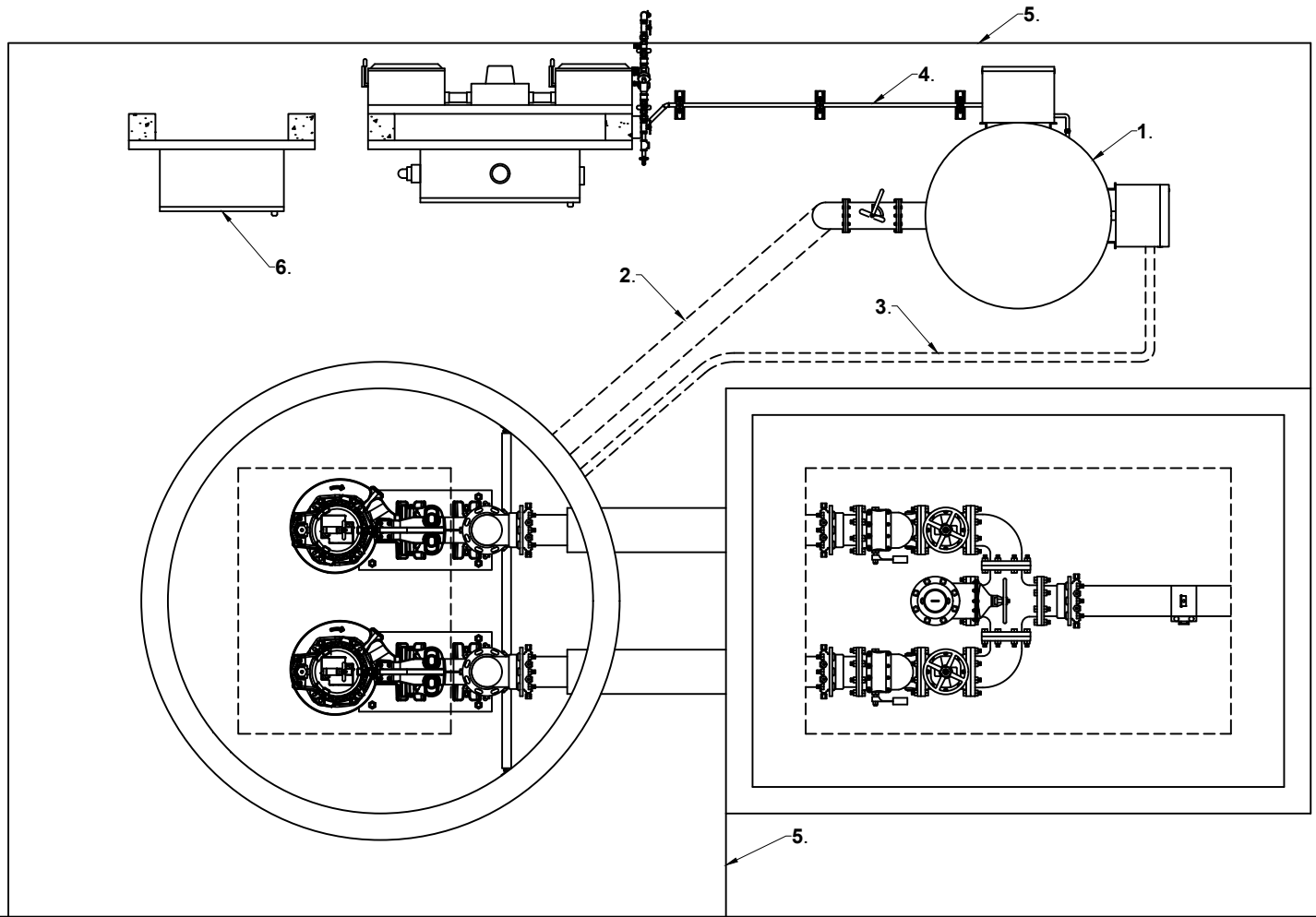
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TRIPLEX PUMP STATION CONTROL PANEL 40 HP OR GREATER

DATE:
JUNE 2023

DETAIL: S-19



LEGEND:

1. ODOR CONTROL SYSTEM (OCS) PER HCUD SPECIFICATION AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. OCS SUCTION PIPING: A MINIMUM 6" PVC SCHEDULE 80 SUCTION PIPE SHALL BE INSTALLED UNDER THE CONCRETE SLAB INTO THE SIDE OF THE WET WELL WITH A PIPE BOOT. PIPE MUST BE INSTALLED WITH A MINIMUM 1% SLOPE FLOWING INTO THE WET WELL TO DRAIN WATER CONDENSATION. PIPING SHALL BE THE SAME DIAMETER THROUGHOUT THE INSTALLATION, NO REDUCERS. THE SECTION OF SUCTION PIPE THAT IS ABOVE THE CONCRETE SLAB CONNECTED TO THE OCS SHALL BE SCHEDULE 80 PVC. A REDUCER MAY BE USED ABOVE GROUND TO CONNECT TO THE OCS IF THE OCS SUCTION PIPING IS SIZED FOR 4". IF OCS SUCTION PIPING IS SIZED LARGER THAN 6", THE LARGER PIPE SIZE SHALL BE SCHEDULE 80 PVC AND INSTALLED THROUGHOUT THE PIPING INSTALLATION WITH NO REDUCERS.
3. OCS DRAIN LINE: A MINIMUM 2" PVC SCHEDULE 80 DRAIN PIPE SHALL BE INSTALLED UNDER THE CONCRETE SLAB INTO THE SIDE OF THE WET WELL WITH A PIPE BOOT. PIPING MUST BE INSTALLED WITH A MINIMUM 1% SLOPE FLOWING INTO THE WET WELL. PIPING SHALL BE THE SAME DIAMETER THROUGHOUT THE INSTALLATION, NO REDUCERS. THE SECTION OF DRAIN LINE THAT IS ABOVE THE CONCRETE SLAB CONNECTED TO THE OCS SHALL BE SCHEDULE 80 PVC. A REDUCER MAY BE USED ABOVE GROUND TO CONNECT TO THE OCS IF THE OCS DRAIN SIZE IS SMALLER THAN 2". IF OCS DRAIN PIPING IS SIZED LARGER THAN 2", THE LARGER PIPE SIZE SHALL BE SCHEDULE 80 PVC AND INSTALLED THROUGHOUT THE PIPING INSTALLATION WITH NO REDUCERS.
4. WATER SUPPLY LINE FROM RPZ-BPA, SIZED PER OCS MANUFACTURER'S RECOMMENDATION. THE PIPING SHALL BE 3/4" MINIMUM DIAMETER THROUGHOUT THE INSTALLATION, NO REDUCERS. THE WATER SUPPLY LINE SHALL BE INSTALLED AND ANCHORED ON TOP OF THE CONCRETE SLAB. THE PIPE MATERIAL SHALL BE GALVANIZED.
5. 4,000 PSI 6" THICK CONCRETE SLAB AND SHALL BE REINFORCED WITH 6 X 6 WIRE.
6. GENERATOR TRANSFER SWITCH, IF APPLICABLE.

NOTES:

7. THE PVC ELECTRICAL CONDUIT SHALL BE INSTALLED FROM THE BOTTOM SIDE OF THE PUMP STATION CONTROL PANEL DOWN THROUGH THE CONCRETE SLAB AND OVER TO THE TO THE OCS CONTROL PANEL AND BACK UP THROUGH THE CONCRETE SLAB (ELECTRICAL CONDUIT NOT SHOWN).

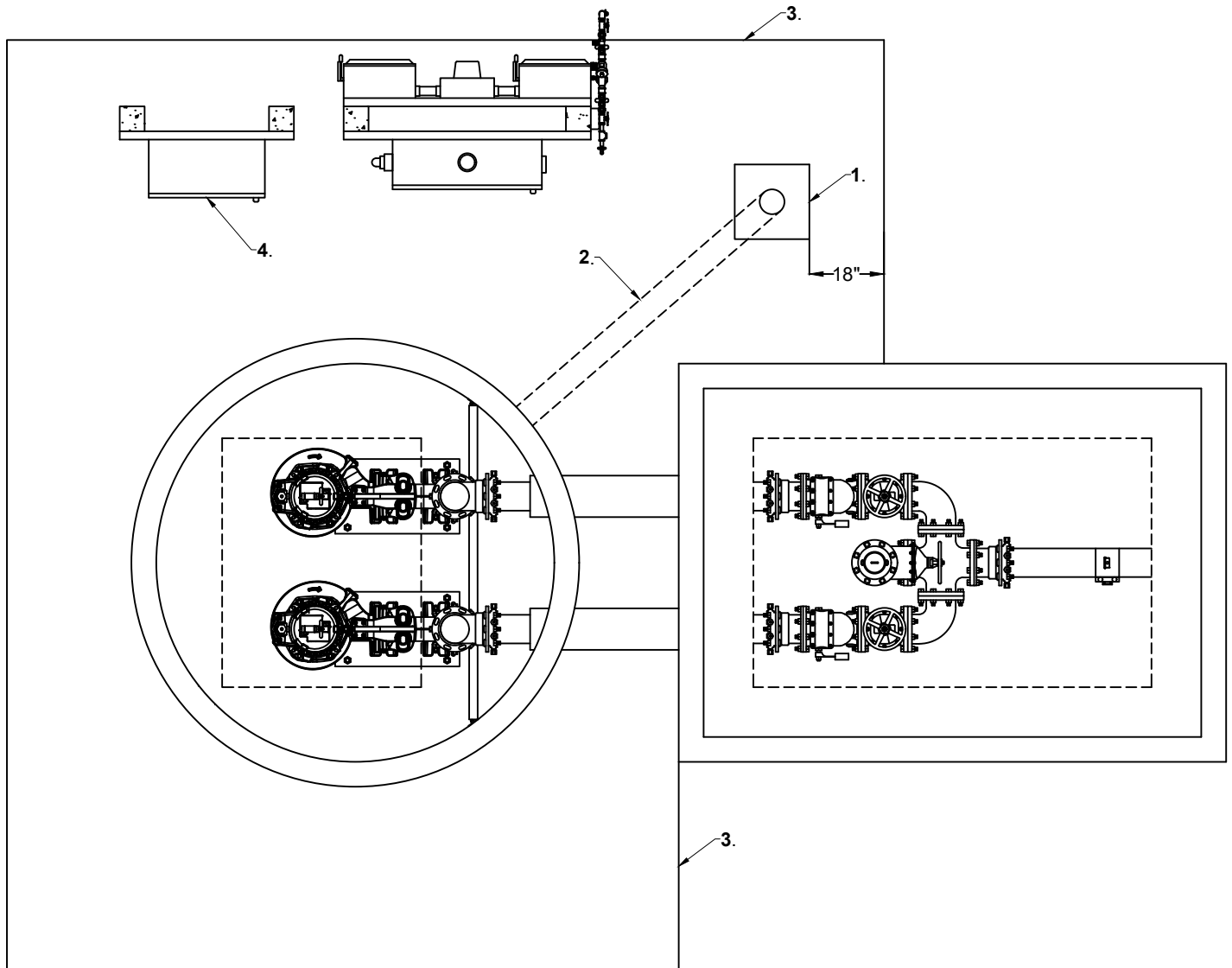
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BIOLOGICAL OXIDATION ODOR CONTROL SYSTEM

DATE:
JUNE 2023

DETAIL: S-20



LEGEND:

1. ODOR CONTROL SYSTEM (OCS) PER HCUJ SPECIFICATION AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. ALSO SEE NOTE 5.
2. 6" PVC SCHEDULE 80 SUCTION PIPE, INSTALLED INTO THE SIDE OF WET WELL WITH A PIPE BOOT. PIPE MUST BE INSTALLED WITH A 1% SLOPE MINIMUM FLOWING INTO THE WET WELL TO DRAIN WATER CONDENSATION. PIPING SHALL BE THE SAME DIAMETER THROUGHOUT THE INSTALLATION, NO REDUCERS. THE SECTION OF SUCTION PIPE THAT IS ABOVE THE CONCRETE SLAB INSTALLED INTO THE OCS SHALL BE SCHEDULE 80 PVC.
3. 4,000 PSI 6" THICK CONCRETE SLAB AND SHALL BE REINFORCED WITH 6 X 6 WIRE.
4. GENERATOR TRANSFER SWITCH, IF APPLICABLE.

NOTES:

5. INSTALL THE MOUNTING FLANGE FOR THE PASSIVE VAPOR OCS A MINIMUM OF 18" ABOVE CONCRETE SLAB.

NOT TO SCALE

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PASSIVE VAPOR ODOR CONTROL SYSTEM

DATE:
JUNE 2023

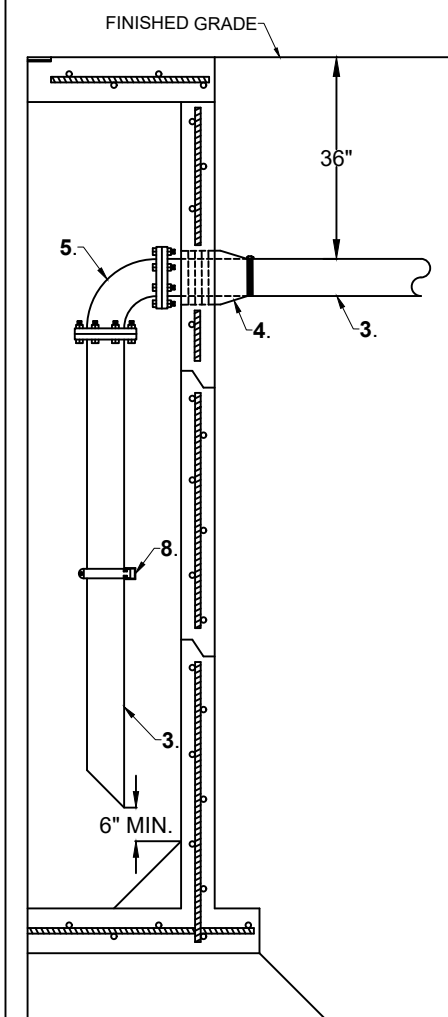
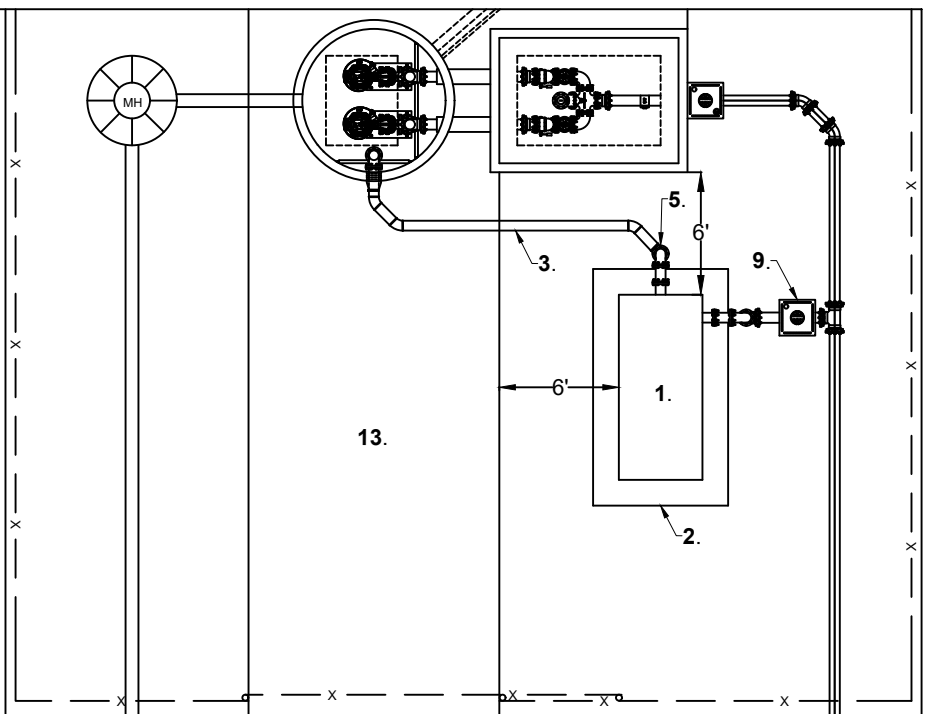
DETAIL: S-21

LEGEND:

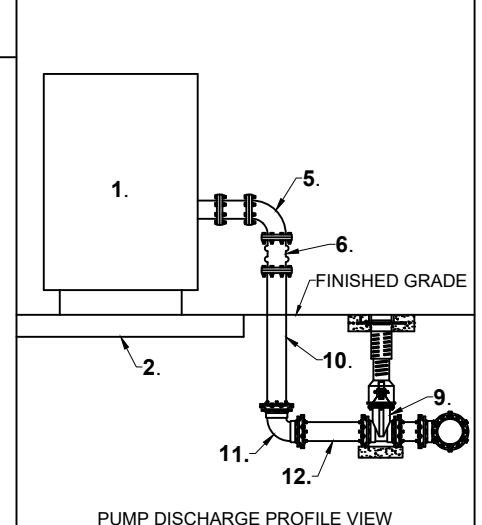
1. STANDBY DIESEL DRIVEN PUMP PER PLANS AND SPECIFICATIONS.
2. CONCRETE SUPPORT PAD FOR STANDBY DIESEL DRIVEN PUMP PER PLANS AND SPECIFICATIONS.
3. 316 STAINLESS STEEL (SS) SCHEDULE 40 SUCTION PIPE AND LONG RADIUS FITTINGS PER PLANS AND SPECIFICATIONS. NOTE: UNLESS SHOWN OR CALLED OUT AS FLANGED, ALL STAINLESS STEEL PIPING AND FITTINGS SHALL BE BUTT WELDED TO FORM A VACUUM TIGHT SEAL. SUCTION PIPING SHALL NOT PENETRATE THROUGH CONCRETE SUPPORT PAD.
4. TYPICAL PIPE BOOT.
5. TYPICAL 316 SS SCHEDULE 40 FLANGED LONG RADIUS 90° FITTING WITH SS FLANGED SPOOL PIECE CONNECTED TO PUMP.
6. TYPICAL FLEXIBLE DOUBLE EXPANSION JOINT.
7. 316 SS SCHEDULE 40 LONG RADIUS 90° FITTING.
8. SUCTION PIPING SUPPORT. 12 GAUGE SS UNI-STRUT (B-LINE) AND PIPE CLAMPS.
9. FORCE MAIN VALVE AND CONCRETE VALVE PAD PER PLANS AND SPECIFICATIONS. NOTE: 3" PVC WIRE PORT IS NOT REQUIRED ON THIS VALVE PAD.
10. PUMP DISCHARGE PIPING, 316 SS SCHEDULE 40 FLG X PE PIPE PER PLANS AND SPECIFICATIONS. DISCHARGE PIPING SHALL NOT PENETRATE THROUGH CONCRETE SUPPORT SLAB.
11. DUCTILE IRON SPECIAL COATED 90° FITTING WITH MECHANICAL JOINT RESTRAINTS.
12. PUMP DISCHARGE PIPING, C900 DR18 PVC SEWER FORCE MAIN PIPE.
13. 14' WIDE CONCRETE DRIVEWAY.

NOTES:

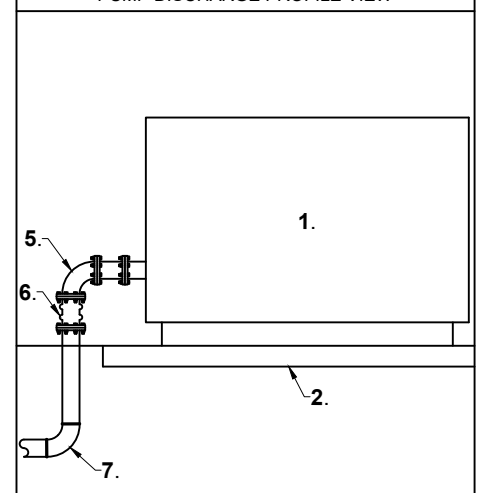
14. THIS IS A TYPICAL LAYOUT FOR THE STANDBY DIESEL DRIVEN PUMP, OTHER FACTORS DURING DESIGN, SUCH AS THE LOCATION OF THE SUCTION AND DISCHARGE PIPING FROM THE PUMP, MAY ALTER THIS LAYOUT. FINAL LAYOUT CONFIGURATION SHALL BE APPROVED BY HCUD.



WETWELL SUCTION PIPE PROFILE VIEW



PUMP DISCHARGE PROFILE VIEW



PUMP SUCTION PROFILE VIEW

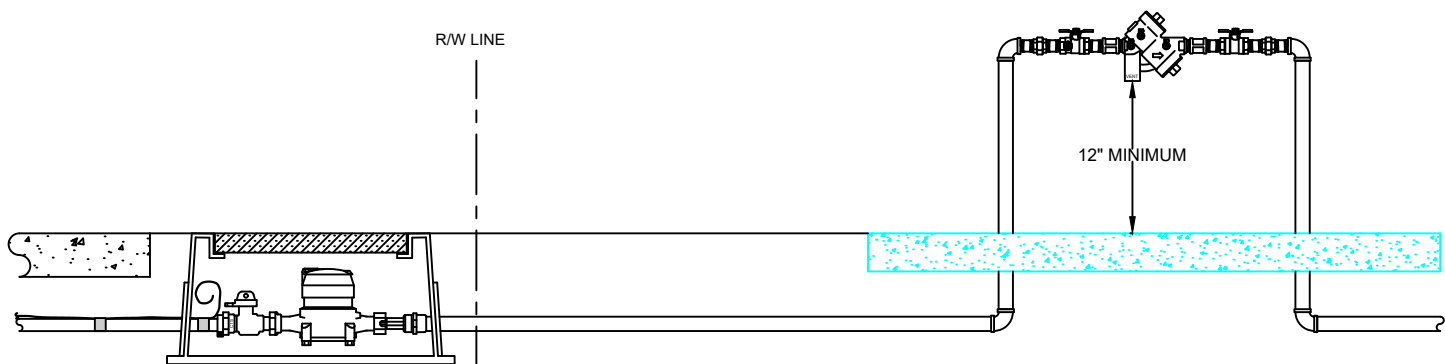
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STANDBY DIESEL DRIVEN PUMP

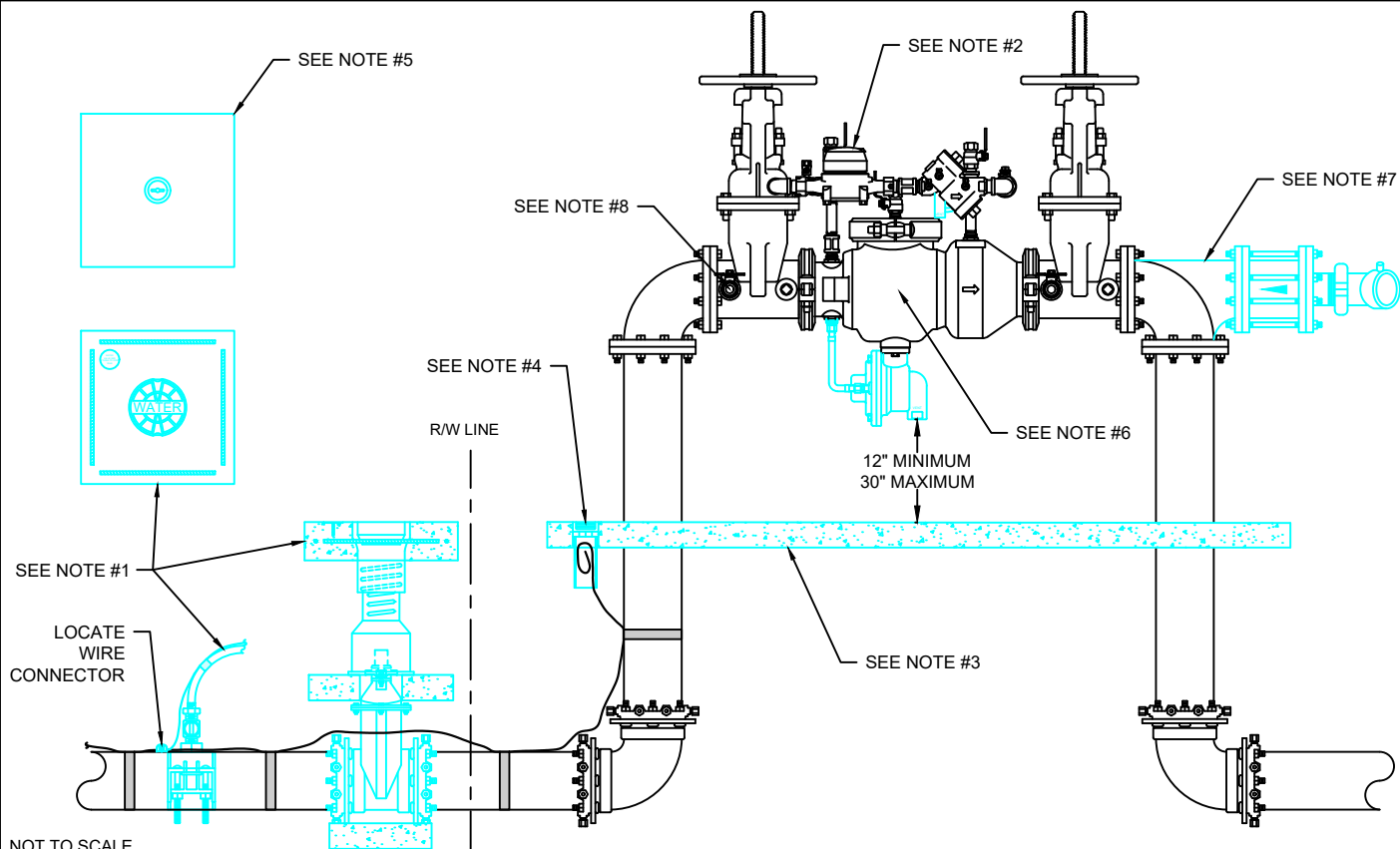
DATE:
JUNE 2023

DETAIL: S-22



NOTES:

1. DISTANCE BETWEEN RIGHT-OF-WAY (R/W) LINE AND RPZ-BPA SHALL BE BETWEEN 24 AND 48 INCHES.
2. RPZ-BPA CONCRETE SUPPORT SLAB IS OPTIONAL.



NOT TO SCALE

NOTES:

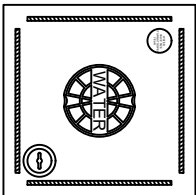
1. IF THE FIRE LINE AND THE POTABLE WATER MAIN ARE THE SAME, A GATE VALVE MUST BE INSTALLED AFTER THE WATER SERVICE CONNECTION AND BEFORE THE FIRE LINE BPA WITHIN THE COUNTY RIGHT-OF-WAY (R/W) LINE FOR ISOLATION.
2. THE BPA SHALL HAVE A LOW FLOW BY-PASS DETECTOR ASSEMBLY WITH A 5/8" x 3/4" NEPTUNE R900i PROCODER RADIO READ METER.
3. BPA CONCRETE SUPPORT SLAB IS OPTIONAL.
4. IF THE SUPPORT SLAB IS INSTALLED, A #10 AWG LOCATE WIRE SHALL BE INSTALLED UP TO THE BEGINNING OF THE FIRE MAIN BPA AND TERMINATE IN A THREE INCH WIRE PORT FOR ACCESS, AS SHOWN. COAT THREADS ON PVC CAP WITH GREASE OR ANTI-SEIZE LUBRICANT.
5. IF THE SUPPORT SLAB IS NOT INSTALLED ON THE FIRE LINE BPA, A 24" x 24" x 6" CONCRETE LOCATE WIRE RISER PAD SHALL BE INSTALLED FOR ACCESS TO THE LOCATE WIRE. CONCRETE PAD SHALL BE PER PLAN AND SPECIFICATION.
6. DEPENDING ON THE FIRE LINE APPLICATION, THE TYPE OF BPA WITH LOW FLOW DETECTOR WILL VARY. SEE THE HCUD CROSS-CONNECTION CONTROL PLAN.
7. AS AN OPTION WITH APPROVAL FROM THE FIRE DEPARTMENT, A TEE, CHECK VALVE, AND FDC CAN BE INSTALLED IN PLACE OF THE 90 DEGREE FITTING DOWN STREAM OF THE BPA, AS SHOWN.
8. WATER SAMPLES CAN BE TAKEN FROM TEST PORT #1 ON THE BPA.

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COMMERCIAL WATER SERVICE 2-INCH OR LESS
AND FIRE LINE

DATE:
JUNE 2023

DETAIL: W-01

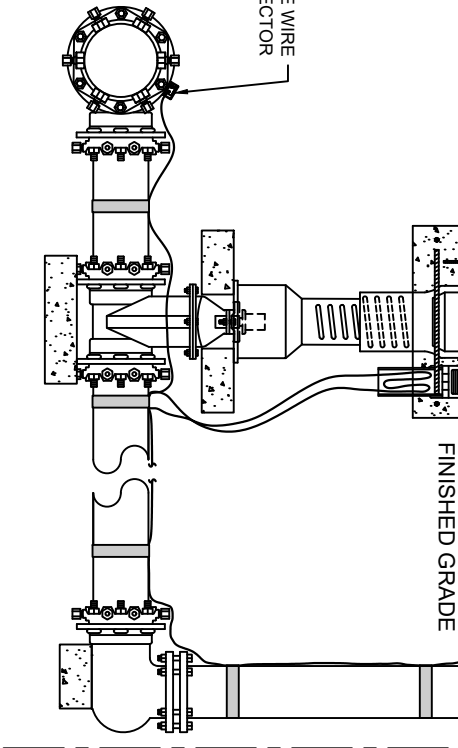


R/W LINE

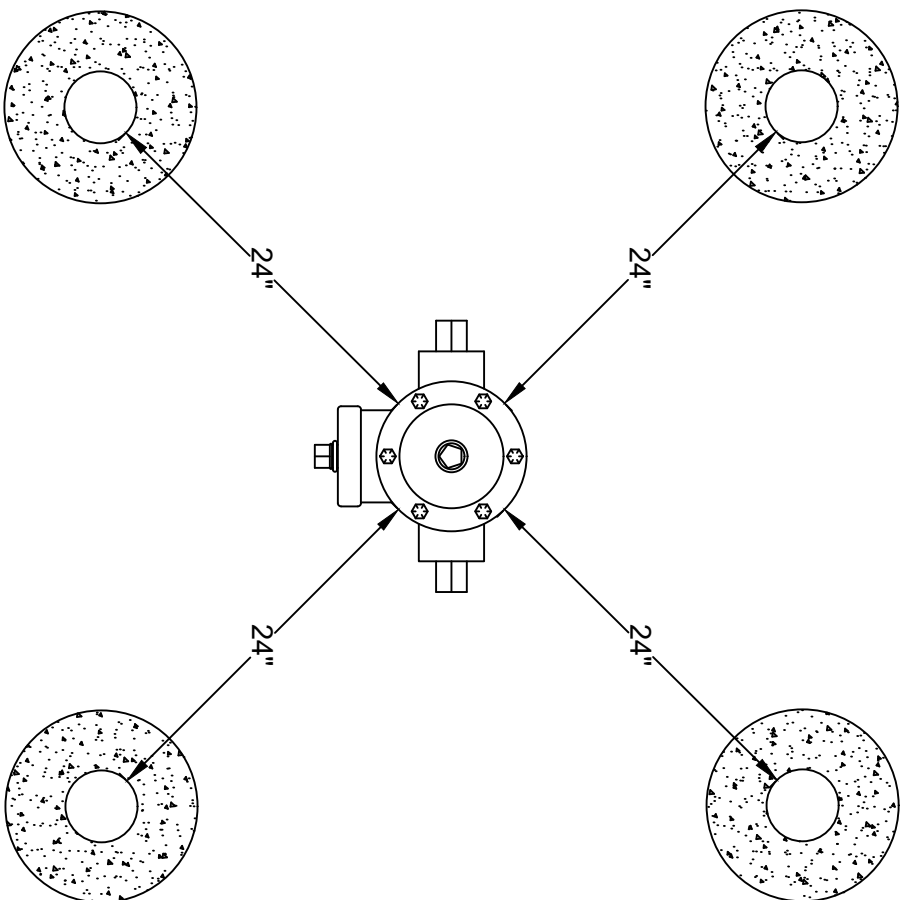
18" MIN.
24" MAX.

FINISHED GRADE

LOCATE WIRE
CONNECTOR



NOT TO SCALE



PROTECTIVE BOLLARD INSTALLATION

NOTES:

1. INSTALL FIRE HYDRANT STEAMER NOZZLE FACING STREET IF INSTALLED WITHIN COUNTY ROAD RIGHT-OF-WAY.
2. FIRE HYDRANT ASSEMBLY AND ISOLATION GATE VALVE SHALL HAVE A PRE-CAST CONCRETE SUPPORT BLOCK INSTALLED AS SHOWN. 16"x8"x4" MINIMUM SIZE.
3. ISOLATION GATE VALVES SHALL HAVE A HCUJ SPECIFIED CONCRETE VALVE PAD AND #10 AWG LOCATE WIRE AS SHOWN.
4. WHEN FIRE HYDRANT ASSEMBLIES ARE INSTALLED IN PAVED SERVICE AREAS, PROTECTIVE BOLLARD STRUCTURES SHALL BE INSTALLED.
5. PROTECTIVE BOLLARD STRUCTURES SHALL CONSIST OF FOUR 4" SCHEDULE 40 STEEL PIPE, 72" EACH IN LENGTH, INSTALLED IN THE CENTER OF A TWELVE INCH DIAMETER HOLE 36" DEEP, ENCASED IN 4000 PSI CONCRETE MINIMUM AND SPACED AS SHOWN FROM THE FIRE HYDRANT.
6. BOLLARDS SHALL BE POURED SOLID WITH 4000 PSI MINIMUM CONCRETE AND PAINTED SAFETY YELLOW.
7. INSTALL BLUE LOCATE TAPE PER HCUJ SPECIFICATIONS.

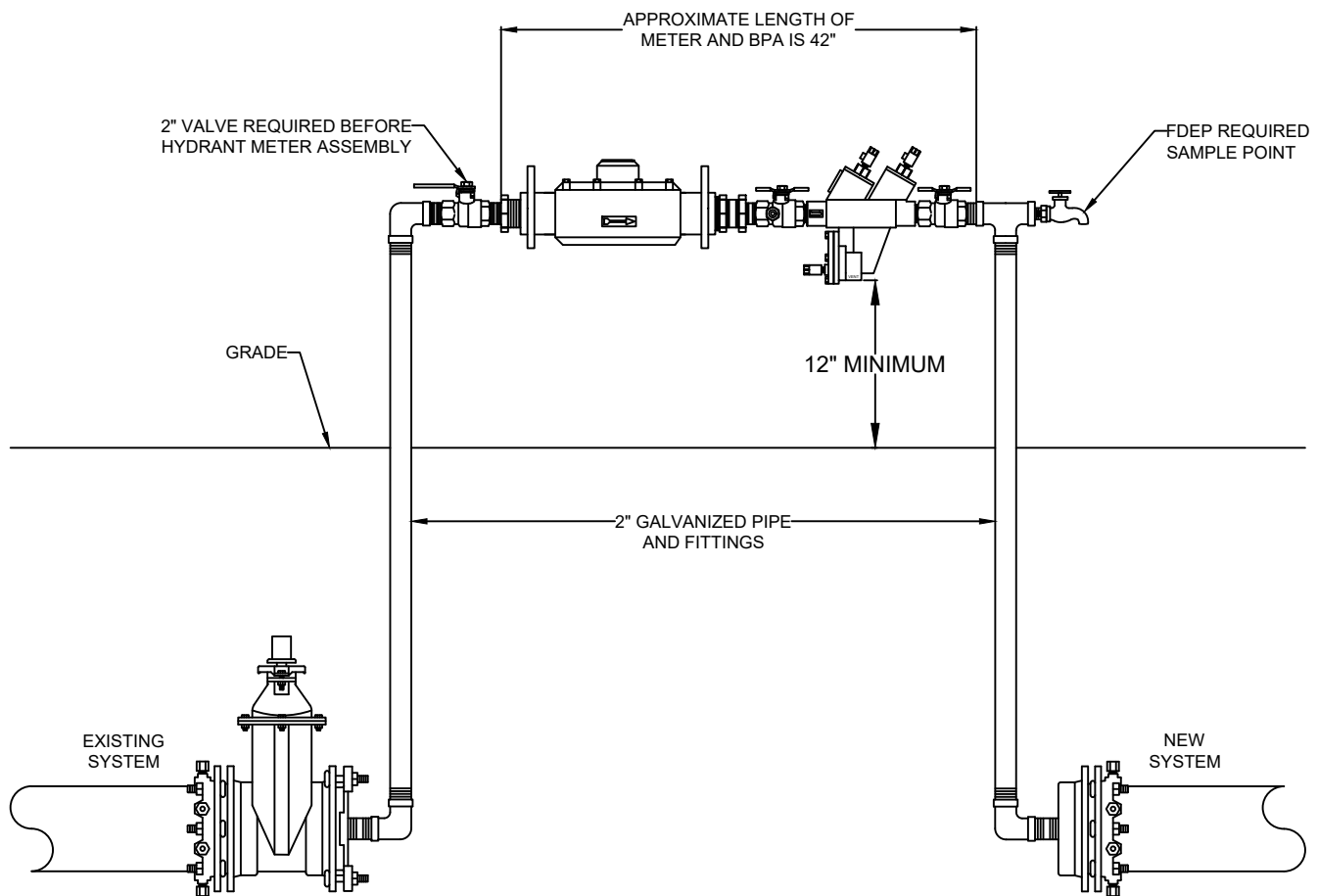
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FIRE HYDRANT ASSEMBLY

DATE:
JUNE 2023

DETAIL: W-02



NOTES:

1. CONTACT HCUD TO SIGN UP FOR A HYDRANT METER ACCOUNT.
2. HCUD WILL SUPPLY METER AND BPA ASSEMBLY AFTER ACCOUNT IS SET UP AND FEES ARE PAID.
3. JUMPER METER ASSEMBLY SHALL BE PROPERLY SUPPORTED AT ALL TIMES.

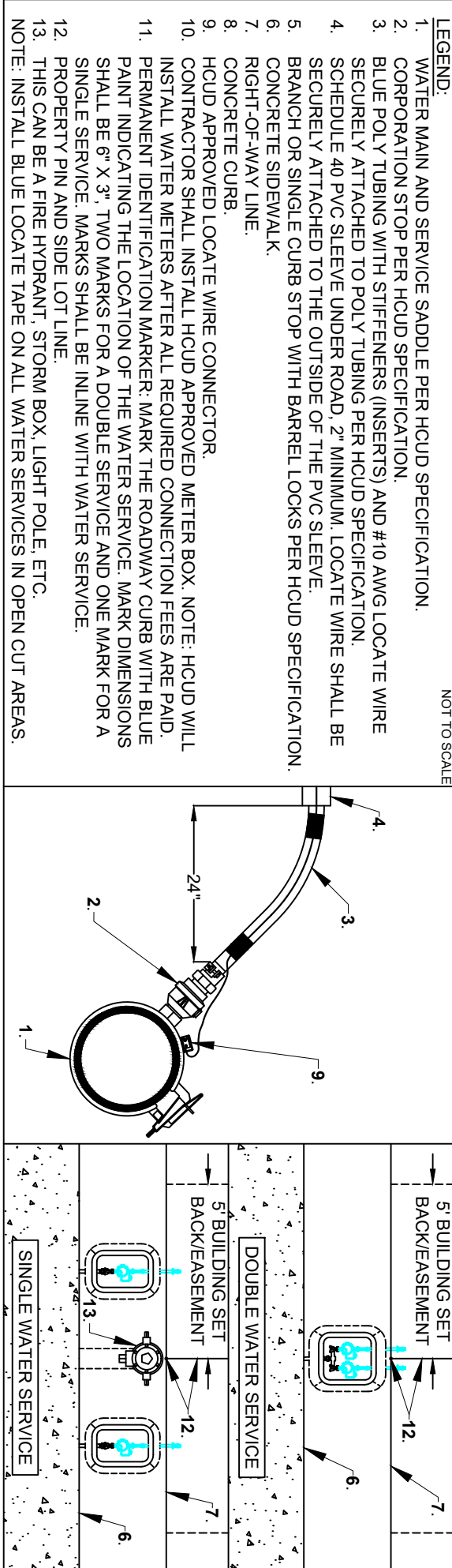
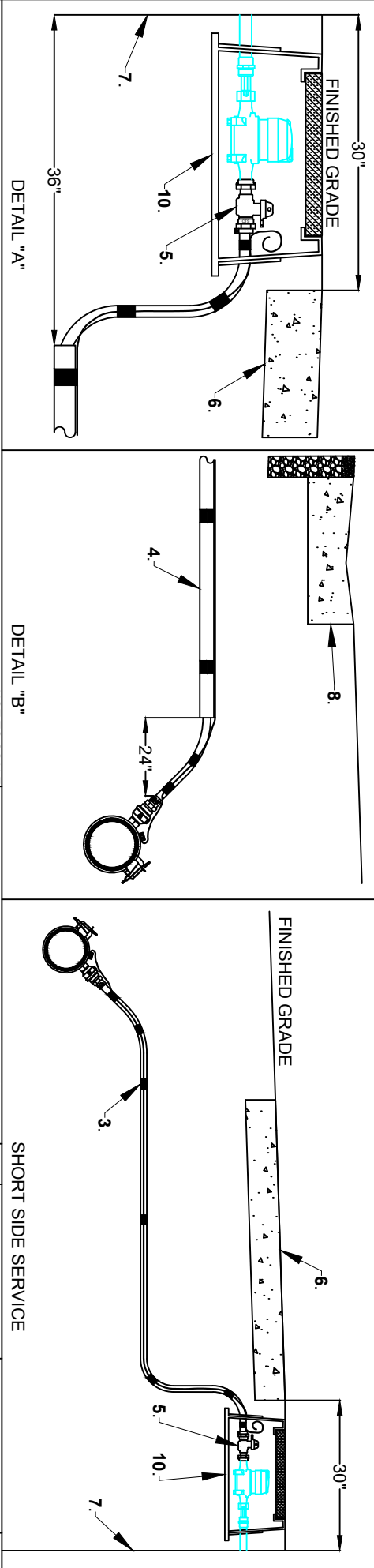
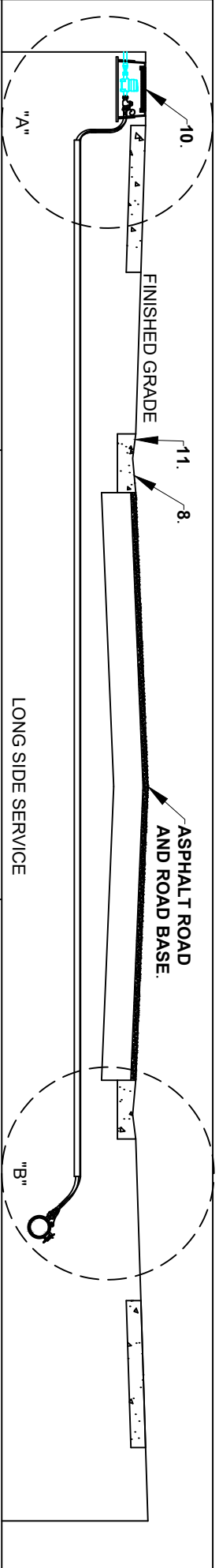
NOT TO SCALE

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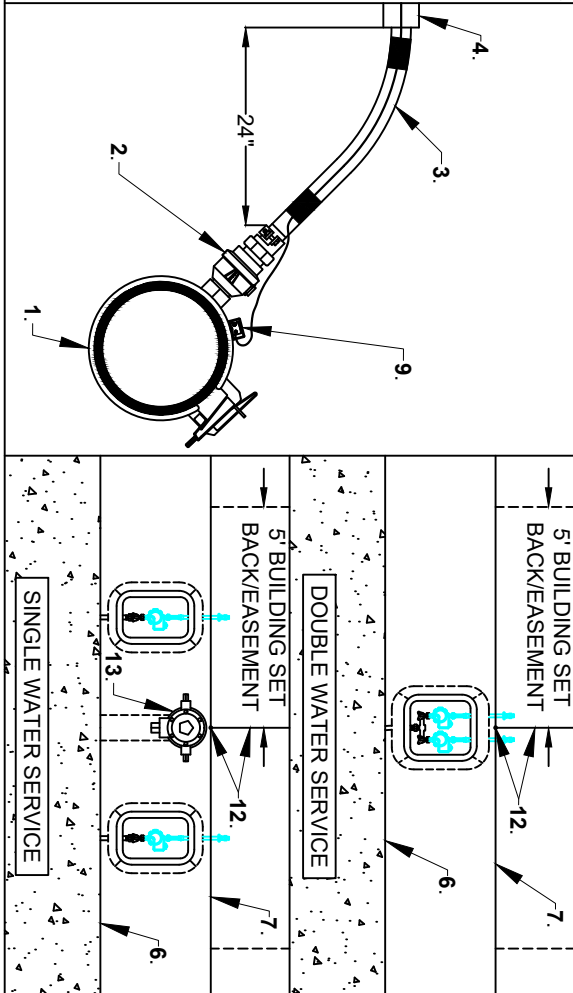
**TEMPORARY WATER SERVICE CONNECTION/
JUMPER METER**

DATE:
JUNE 2023

DETAIL: W-03



- LEGEND:**
1. WATER MAIN AND SERVICE SADDLE PER HCUD SPECIFICATION.
 2. CORPORATION STOP PER HCUD SPECIFICATION.
 3. BLUE POLY TUBING WITH STIFFENERS (INSERTS) AND #10 AWG LOCATE WIRE SECURELY ATTACHED TO POLY TUBING PER HCUD SPECIFICATION.
 4. SCHEDULE 40 PVC SLEEVE UNDER ROAD. 2" MINIMUM. LOCATE WIRE SHALL BE SECURELY ATTACHED TO THE OUTSIDE OF THE PVC SLEEVE.
 5. BRANCH OR SINGLE CURB STOP WITH BARREL LOCKS PER HCUD SPECIFICATION.
 6. CONCRETE SIDEWALK.
 7. RIGHT-OF-WAY LINE.
 8. CONCRETE CURB.
 9. HCUD APPROVED LOCATE WIRE CONNECTOR.
 10. CONTRACTOR SHALL INSTALL HCUD APPROVED METER BOX. NOTE: HCUD WILL INSTALL WATER METERS AFTER ALL REQUIRED CONNECTION FEES ARE PAID.
 11. PERMANENT IDENTIFICATION MARKER. MARK THE ROADWAY CURB WITH BLUE PAINT INDICATING THE LOCATION OF THE WATER SERVICE. MARK DIMENSIONS SHALL BE 6" X 3". TWO MARKS FOR A DOUBLE SERVICE AND ONE MARK FOR A SINGLE SERVICE. MARKS SHALL BE IN LINE WITH WATER SERVICE.
 12. PROPERTY PIN AND SIDE LOT LINE.
 13. THIS CAN BE A FIRE HYDRANT, STORM BOX, LIGHT POLE, ETC.
- NOTE: INSTALL BLUE LOCATE TAPE ON ALL WATER SERVICES IN OPEN CUT AREAS.

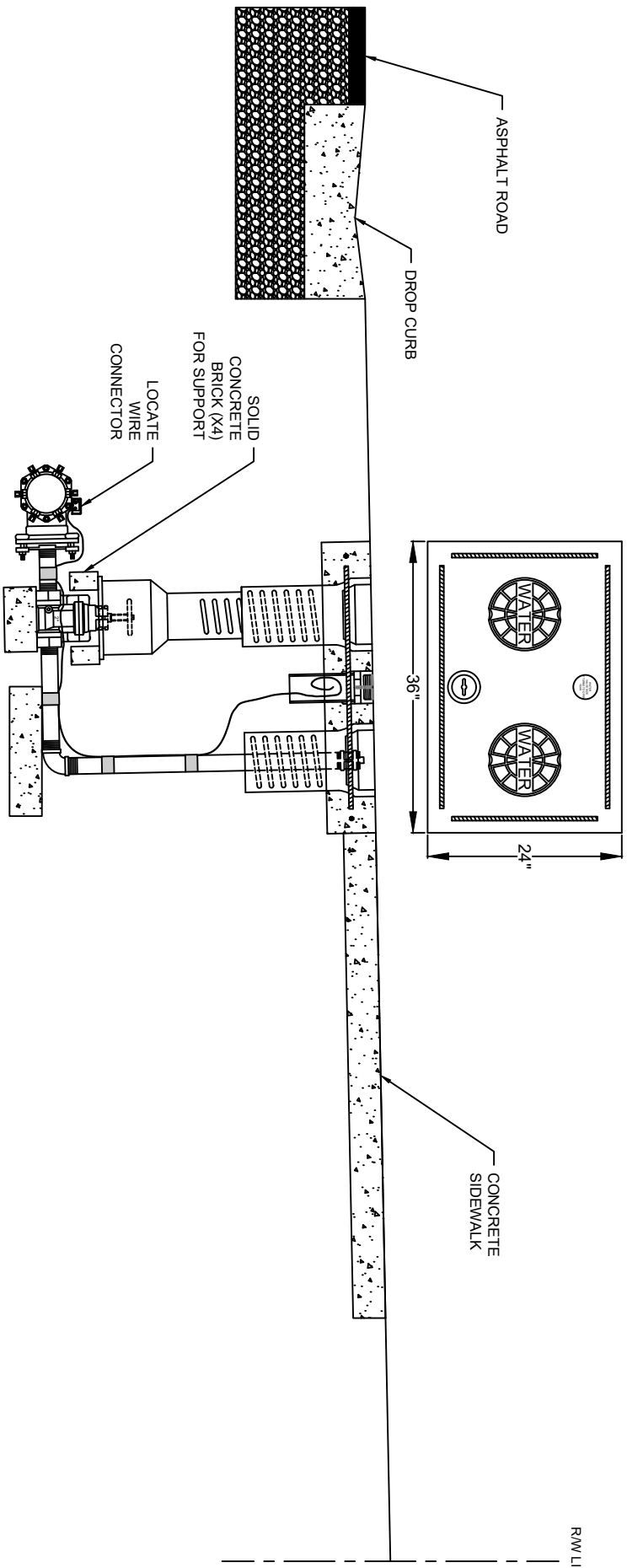


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LONG AND SHORT SIDE WATER SERVICES

DATE:
JUNE 2023

DETAIL: W-04

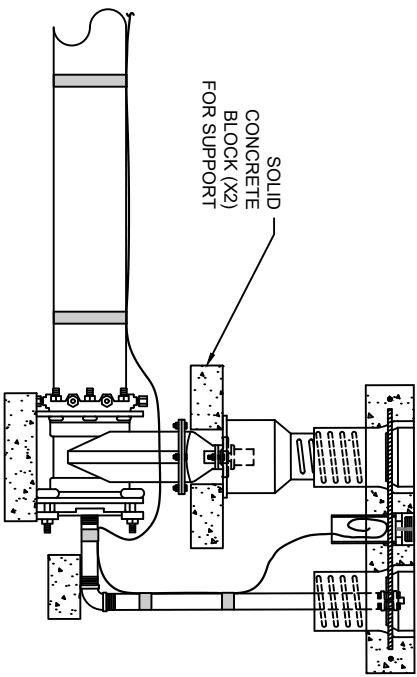


TYPICAL RESIDENTIAL CUL-DE-SAC INSTALLATION

NOT TO SCALE

NOTES:

1. CUL-DE-SAC INSTALLATION: 2" GATE VALVE SHALL BE RESILIENT WEDGE TYPE WITH NPT CONNECTIONS AND A 4.5" DIAMETER HAND WHEEL TO OPERATE VALVE. GATE VALVE AND PIPING SHALL BE SUPPORTED BY A 16"x8"x4" SOLID CONCRETE BLOCK, AS SHOWN.
2. PIPE SHALL BE 2" NPT GALVANIZED. PIPING SHALL BE THREADED INTO A MECHANICAL JOINT PLUG INSTALLED IN THE MAIN LINE TEE. PIPING WITH THREADED GALVANIZED COUPLING AND PLUG SHALL EXTEND UP INTO CAST IRON VALVE BOX AS CLOSE AS POSSIBLE TO TOP OF VALVE PAD AND STILL ALLOW THE VALVE BOX LID TO CLOSE PROPERLY. PLUG SHALL BE HAND TIGHT ONLY.
3. A HCUD SPECIFIED 36"x24"x6" POURED IN PLACE CONCRETE VALVE PAD WITH 3" PVC LOCATE WIRE RISER AND 3" BRASS VALVE IDENTIFICATION TAG SHALL BE INSTALLED, AS SHOWN. COAT THREADS ON PVC CAP WITH GREASE OR ANTI-SEIZE LUBRICANT.
4. END OF WATER MAIN INSTALLATION: NO 2" GATE VALVE IS REQUIRED. GALVANIZED PIPING SHALL BE THREADED INTO MECHANICAL JOINT PLUG INSTALLED IN MAIN LINE GATE VALVE, AS SHOWN. MAIN LINE SHALL BE RESTRAINED PER HCUD PIPELINE JOINT RESTRAINT DETAIL.



TYPICAL END OF WATER MAIN INSTALLATION

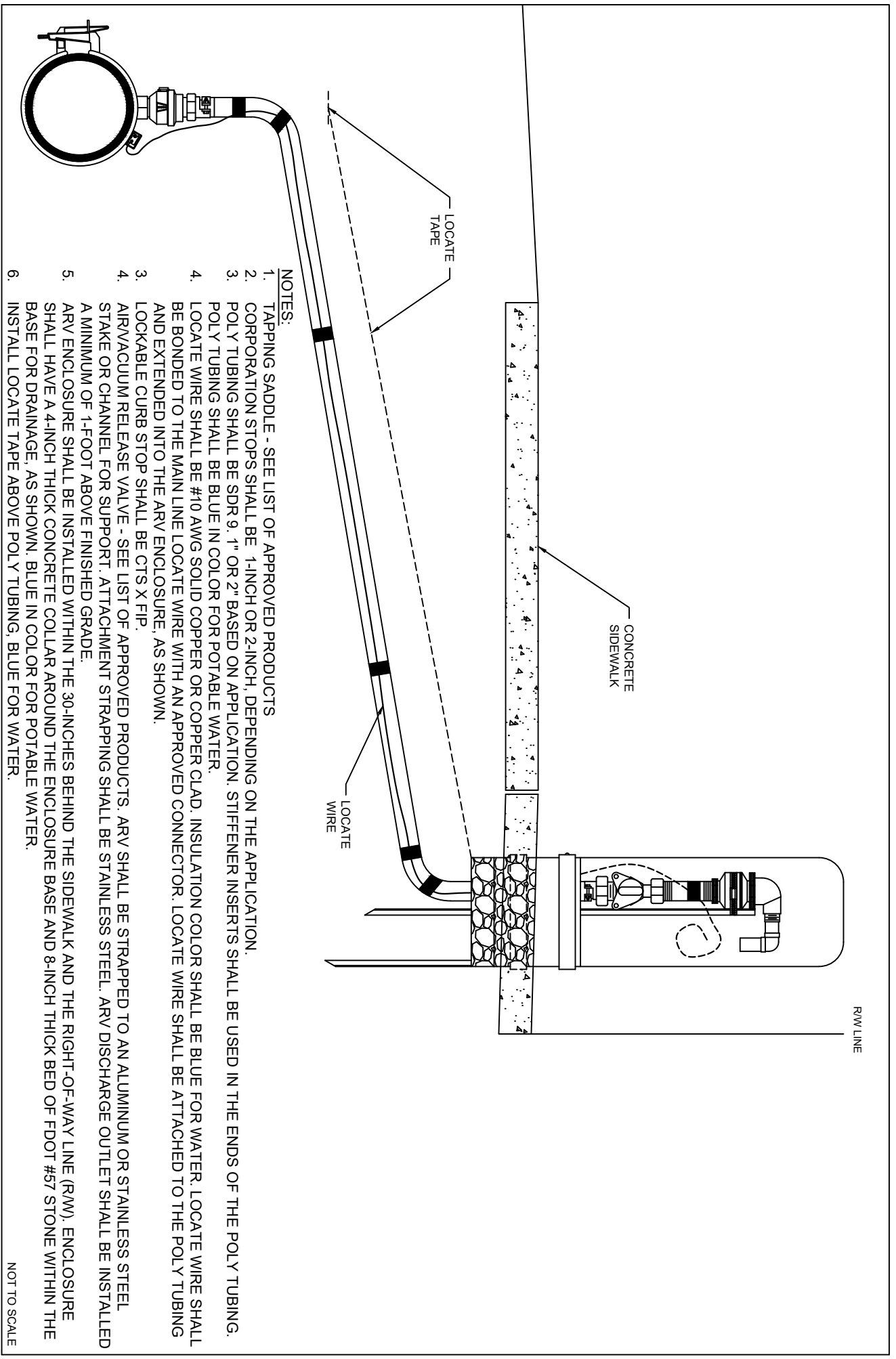
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WATER MAIN BLOW-OFF

DATE:
JUNE 2023

DETAIL: W-05



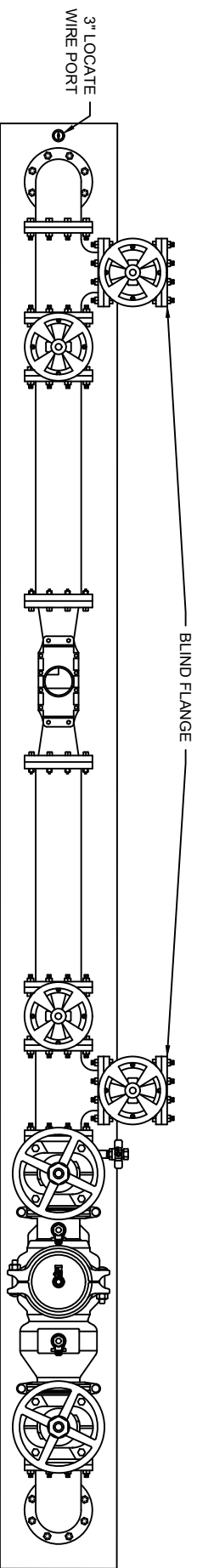
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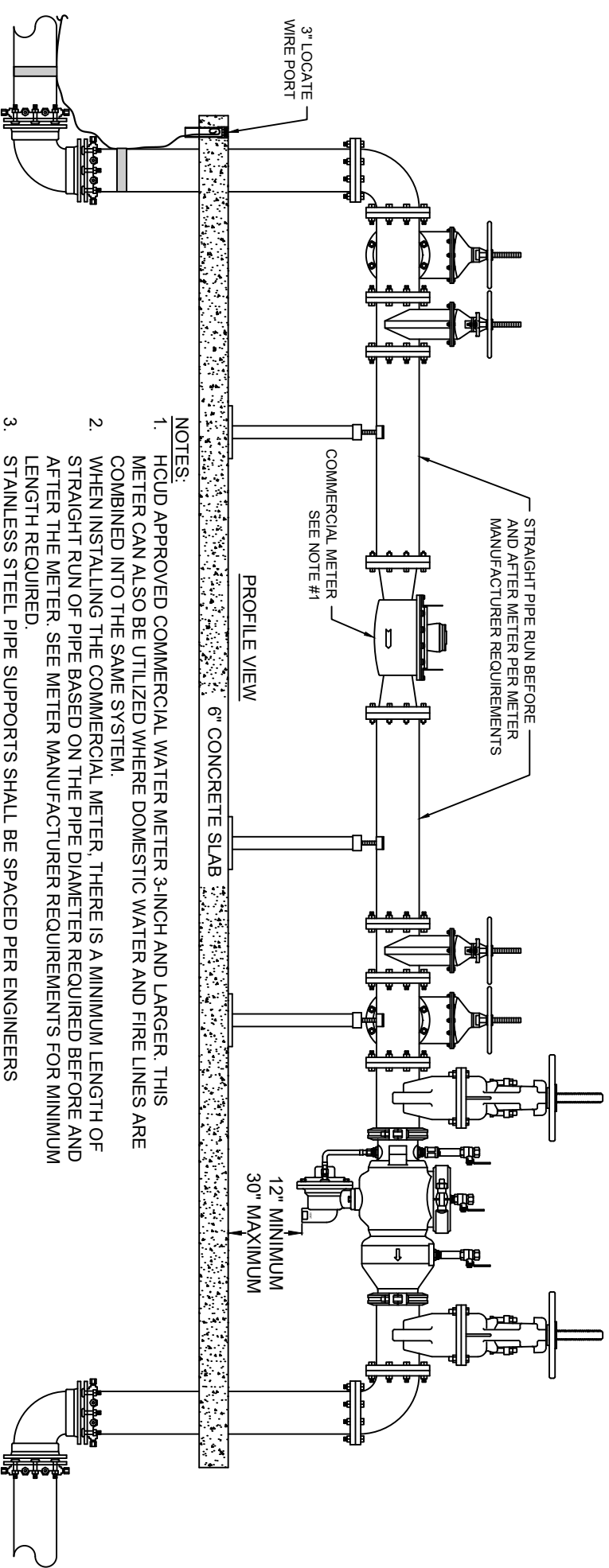
WATER ARV

DATE:
JUNE 2023

DETAIL: W-06



PLAN VIEW



NOTES:

1. HCUJ APPROVED COMMERCIAL WATER METER 3-INCH AND LARGER. THIS METER CAN ALSO BE UTILIZED WHERE DOMESTIC WATER AND FIRE LINES ARE COMBINED INTO THE SAME SYSTEM.
2. WHEN INSTALLING THE COMMERCIAL METER, THERE IS A MINIMUM LENGTH OF STRAIGHT RUN OF PIPE BASED ON THE PIPE DIAMETER REQUIRED BEFORE AND AFTER THE METER. SEE METER MANUFACTURER REQUIREMENTS FOR MINIMUM LENGTH REQUIRED.
3. STAINLESS STEEL PIPE SUPPORTS SHALL BE SPACED PER ENGINEERS RECOMMENDATIONS TO SUPPORT THE METER ASSEMBLY.
4. THE BACK FLOW PREVENTION DEVICE SHALL BE A REDUCED PRESSURE ZONE ASSEMBLY (RPZ).
5. ALL ABOVE GROUND FITTINGS AND PIPE SHALL BE FLANGE TO FLANGE DUCTILE IRON PIPE AND PAINTED BLUE PER HCUJ SPECIFICATIONS.
6. CONCRETE SUPPORT SLAB SHALL BE PER PLANS AND SPECIFICATION, AND EXTEND A MINIMUM OF ONE FOOT FROM THE OUTSIDE OF THE PIPING IN ALL DIRECTIONS AS SHOWN.

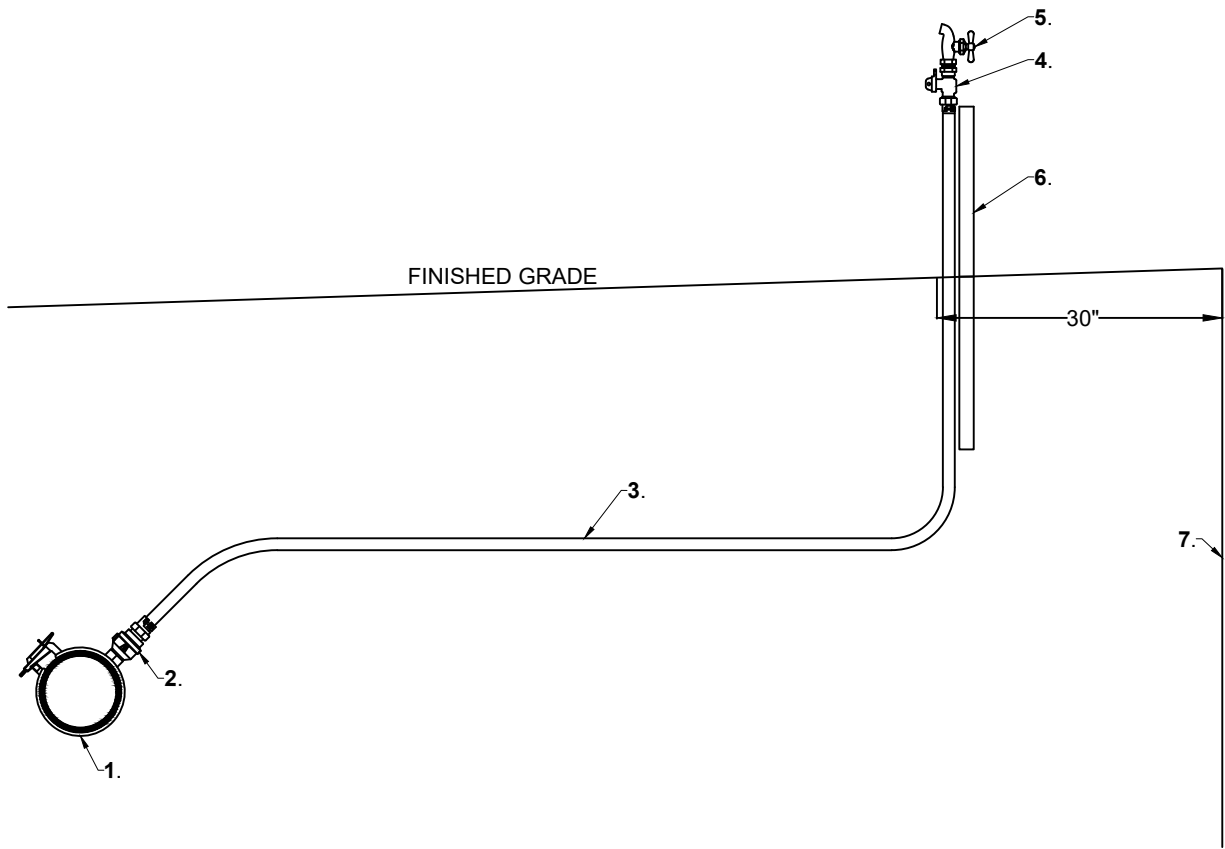
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COMMERCIAL WATER METER
3-INCH AND LARGER

DATE:
JUNE 2023

DETAIL: W-07



LEGEND:

1. WATER MAIN AND SERVICE SADDLE PER HCUD SPECIFICATION.
2. CORPORATION STOP PER HCUD SPECIFICATION.
3. BLUE POLY TUBING WITH STIFFENERS (INSERTS). NO LOCATE WIRE IS REQUIRED ON THE TEMPORARY SAMPLE POINT.
4. SINGLE CTS X FIP CURB STOP WITH BARREL LOCK PER HCUD SPECIFICATION.
5. 3/4" HOSE BIB. HOSE BIB SHALL HAVE THE THREADED DISCHARGE END REMOVED SO THAT NO HOSES CAN BE ATTACHED TO IT.
6. WOOD 2X4 SUPPORT STAKE. TEMPORARY WATER SAMPLE POINT SHALL BE SECURELY ATTACHED TO SUPPORT STAKE.
7. RIGHT-OF-WAY LINE.

NOTES:

8. TEMPORARY WATER SAMPLE POINT SHALL BE REMOVED EXCEPT FOR SERVICE SADDLE AND CORPORATION STOP AFTER THE PASSING WATER SAMPLE RESULTS ARE SUBMITTED AND THE WATER SYSTEM IS PLACED INTO SERVICE BY FDEP. THE CORPORATION STOP SHALL BE CLOSED AND THE END CAPPED WITH A SCHEDULE 40 PVC CAP.
9. THE CONTRACTOR CAN NOT COLLECT THEIR OWN WATER SAMPLES. WATER SAMPLES MUST BE COLLECTED AND PROCESSED BY A STATE CERTIFIED LAB.

NOT TO SCALE

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TEMPORARY WATER SAMPLE POINT

DATE:
JUNE 2023

DETAIL: W-08



UTILITIES DEPARTMENT

WATER ♦ WASTEWATER ♦ RECLAIMED WATER ♦ ENGINEERING ♦ CUSTOMER SERVICE

15365 CORTEZ BOULEVARD ♦ BROOKSVILLE, FLORIDA 34613
P 352.754.4037 ♦ F 352.754.4485 ♦ W www.HernandoCounty.us

I, Ron Patel, professional engineer licensed in Florida, am in responsible charge of preparing the 2023 Details included in the Hernando County Utilities Department's "Water, Reclaimed Water and Wastewater Construction Specifications Manual."

I certify that, to the best of my knowledge and belief, these details, when used in combination with sound engineering principles, will meet applicable local, state, and federal standards for water utilities projects.

This certification does not relieve any design engineer from the responsibility to utilize sound engineering judgment in all projects where these Details will be used.



ARTICLE V
HERNANDO COUNTY
UTILITIES DEPARTMENT
(HCUD)



WATER, RECLAIMED WATER AND
WASTEWATER CONSTRUCTION
SPECIFICATIONS MANUAL

JANUARY 2013
EDITION

SPECIFICATIONS MANUAL CONTENTS

PREFACE LIST OF CHANGES SINCE THE JANUARY 2008 EDITION

LIST OF ABBREVIATIONS

SECTION 1 GENERAL INFORMATION

SECTION 2 PLANS PREPARATION

SECTION 3 SPECIFICATIONS FOR POTABLE WATER DISTRIBUTION SYSTEMS DESIGN AND
INSTALLATION

SECTION 4 SPECIFICATIONS FOR WASTEWATER COLLECTION/TRANSMISSION SYSTEMS
DESIGN AND INSTALLATION:

4A GENERAL WASTEWATER SPECIFICATIONS

4B GRAVITY SYSTEMS SPECIFICATIONS

4C FORCE MAIN SYSTEMS SPECIFICATIONS

4D PUMP STATION SPECIFICATIONS

SECTION 5 SPECIFICATIONS FOR RECLAIMED WATER (RW) DISTRIBUTION SYSTEMS DESIGN
AND INSTALLATION

SECTION 6 SPECIFICATIONS FOR EMERGENCY POWER GENERATOR SYSTEM (EPGS)

SECTION 7 SPECIFICATIONS FOR TRENCHLESS PIPE INSTALLATION (HDD)

7A FUSIBLE PVC PIPE SPECIFICATIONS

7B RESTRAINED JOINT PVC PIPE SPECIFICATIONS

7C CERTAINTED CERTA-LOK PIPE SPECIFICATIONS

7D HIGH DENSITY POLYETHYLENE PIPE SPECIFICATIONS

SECTION 8 SPECIFICATIONS FOR JACK AND BORE

SECTION 9 SPECIFICATIONS FOR IET COATINGS

SECTION 10 SPECIFICATIONS FOR BACKFLOW PREVENTION ASSEMBLIES

SECTION 11 ELECTRICAL SPECIFICATIONS

SECTION 12 CHECK LIST

LIST OF CHANGES

LIST OF CHANGES

SECTION 1: GENERAL INFORMATION

<u>PARAGRAPH</u>	<u>REVISIONS/ADDITIONS</u>
1.4.2	ADDED EASEMENTS
1.9	ADDED PUBLIC SERVICE ANNOUNCEMENT (PSA) CHANGE 48 HOURS TO 5 WORKING DAYS
1.23.2	CHANGED 24 HOURS TO 48 HOURS

SECTION 2: PLANS PREPARATION

<u>PARAGRAPH</u>	<u>REVISIONS/ADDITIONS</u>
2.3.1.13	ADDED CERTAINTED CERTA-LOK OPTION, ADDED FUSIBLE PVC OPTION.
2.3.2.1	REMOVED POURED IN PLACE THRUST BLOCK OPTION
2.3.4.1	REMOVED POURED IN PLACE THRUST BLOCK OPTION
2.3.5.1	REMOVED POURED IN PLACE THRUST BLOCK OPTION

SECTION 3: SPECIFICATIONS FOR POTABLE WATER DESIGN AND INSTALLATION

<u>PARAGRAPH</u>	<u>REVISIONS/ADDITIONS</u>
3.1.2	ADDED NSF/ANSI 372 REQUIREMENTS
3.4.3.4	ADDED RPDA REQUIREMENT
3.7.3.1	CHANGED TO PUBLIC SERVICE ANNOUNCEMENT (PSA) CHANGED 48 HOURS TO 5 WORKING DAYS
3.8.1	CHANGED FIRE HYDRANT SPACING TO REFER TO THE FIRE MARSHAL AND FLORIDA ADMINISTRATIVE CODES.
3.8.3.3	REVISED 24 INCH PUMPER NOZZLE TO READ MAXIMUM CLEARANCE OF 24 INCHES
3.9.1	CHANGED C909 TO C905
3.9.3.7	ADDED CERTAINTED CERTA-LOK OPTION IN LIEU OF PVC WITH RESTRAINED JOINTS
3.10.1.3	CHANGED AMERICAN FLOW CONTROL TRENCH ADAPTOR TO PENTEK ROADWAY VALVE BOX CHANGED 30 TO 36
3.10.2.3	CHANGED AMERICAN FLOW CONTROL TRENCH ADAPTOR TO PENTEK ROADWAY VALVE BOX

	CHANGED 30 TO 36
3.10.6.1	ADDED NSF/ANSI 372 REQUIREMENT
3.10.10.2	CHANGED AMERICAN FLOW TRENCH ADAPTOR TO PENTEK ROADWAY VALVE BOX
3.11.1.4	CHANGED 36 INCHES TO MINIMUM 30 INCHES AND MAXIMUM 42 INCHES
3.11.7	REVISED METERS
3.15.2	ADDED COPPERHEAD INDUSTRIES TRACER WIRE REMOVED LOCATOR BALL OPTION ADDED CONTINUITY TEST BY CONTRACTOR
3.16.3	ADDED THREADLESS HOSE BIBS

SECTION 4: SPECIFICATIONS FOR WASTEWATER COLLECTION/TRANSMISSION SYSTEMS DESIGN AND INSTALLATION

<u>PARAGRAPH</u>	<u>REVISIONS/ADDITIONS</u>
4A.10	ADDED DUMPSTER DRAINS
4B.2.6	REMOVED THIS SECTION IT'S INCLUDED IN SECTION 4B.7 - TESTING
4B.3.5	ADDED LATERAL LENGTH
4B.5.1.6	ADDED LF MANUFACTURING
4B.5.1.7	ADDED LF MANUFACTURING
4B.7.1	CHANGED TAPE TO INSPECTION
4B.7.3	CHANGED VIDEOTAPE TEST TO VIDEO INSPECTION
4B.7.3.1	CHANGED TAPED TO INSPECTED; CHANGED DEVELOPER TO CONTRACTOR; ADDED NO VHS TAPES ACCEPTED
4B.7.3.2	CHANGED VIDEOTAPE TEST TO VIDEO INSPECTION
4B.7.3.2.4	CHANGED TAPING TO INSPECTIONS
4B.7.3.2.7	CHANGED TAPED TO INSPECTED
4B.7.3.2.8	CHANGED VIDEOTAPE TO DVD OR CD; CHANGED TAPE TO DVD
4C.1.3	CHANGED C909 TO C905
4C.2.1	CHANGED BROWN TO GREEN
4C.2.5	REMOVED LAST SENTENCE
4C.2.6	REMOVED LAST SENTENCE
4C.3.1	CHANGED BROWN TO GREEN
4C.4.1	CHANGED BROWN TO GREEN

4C.4.2	ADDED COPPERHEAD INDUSTRIES TRACER WIRE REMOVED LOCATOR BALL OPTION
4C.5.4	UPDATED SECTION
4C.5.4.1	ADDED SUB-SECTION: INLINE ARV MANHOLE OPTION
4C.5.4.2	ADDED SUB-SECTION: OFFSET ARV MANHOLE OPTION
4C.5.5.2	ADDED PENTEK ROADWAY VALVE BOX
4D.3	ADDED SECTIONS 4D.3.4, 4D.3.5, AND 4D.3.6 TO THE ODOR CONTROL SYSTEMS
4D.8.1.6	CHANGED 35 TO 30
4D.8.2.4	CHANGE HATCH DOOR SIZE FOR DUPLEX STATIONS
4D.9.2.6	ADDED HOMA OR BARNES PUMPS
4D.10.1	REMOVED AIR-FILLED
4D.14.5	REMOVED CONCRETE AND MORTAR PIERS, ADDED STAINLESS STEEL STAND

SECTION 5: SPECIFICATIONS FOR RECLAIMED WATER DISTRIBUTIONS SYSTEMS DESIGN AND INSTALLATION

<u>PARAGRAPH</u>	<u>REVISIONS/ADDITIONS</u>
5.8.1	CHANGED C909 TO C905
5.8.4.2	ADDED COPPERHEAD INDUSTRIES TRACER WIRE REMOVED LOCATER BALL OPTION
5.8.5.1.3	CHANGED TRENCH ADAPTOR TO PENTEK VALVE BOX

SECTION 6: EMERGENCY POWER GENERATOR SYSTEMS (EPGS)

<u>PARAGRAPH</u>	<u>REVISIONS/ADDITIONS</u>
6.1.3.1	ADDED TRADEWINDS AND MTU ONSITE ENERGY REMOVED CUMMINS, CATERPILLAR, AND KOHLER
6.2.1.10.2.1	ADDED CANNOT EXCEED 500 GALLONS CAPACITY
6.3.1.1.1	ADDED SOUND ATTENUATION REQUIREMENTS FOR ENCLOSURES
6.3.1.1.2	ADDED SOUND ATTENUATION REQUIREMENTS FOR EXHAUST SILENCERS
6.4.1	ADDED THOMPSON TECHNOLOGY AND ONAN
6.5.6.2	REMOVED APPLICABLE TREATMENT PLANTS

SECTION 7: TRENCHLESS PIPE INSTALLATION (HDD)

REVISED SECTION, ADDED FUSIBLE PVC OPTION, ADDED RESTRAINED JOINT PVC OPTION,

ADDED CERTAINTeed CERTA-LOK OPTION (for water mains only),

7, A, B, C, D ADDED COPPERHEAD INDUSTRIES TRACER WIRE TO ALL SUBSECTIONS

SECTION 8: JACK AND BORE

COMBINED SECTION ON CASING SPACERS AND JACK AND BORE

SECTION 10: BACKFLOW PREVENTION ASSEMBLIES SPECIFICATIONS

<u>PARAGRAPH</u>	<u>REVISIONS/ADDITIONS</u>

10.1.1	REVISED AMES AND CONBRACO MODELS
10.2.4	ADDED TEST PORTS WITH THREADED CAP OR PLUG.
10.4.5	ADDED TESTED BY STATE CERTIFIED TESTER.

SECTION 11: ELECTRICAL SPECIFICATIONS

<u>PARAGRAPH</u>	<u>REVISIONS/ADDITIONS</u>

11.2.1	ADDED TCU INSTALLED IN CONTROL PANEL ADDED NO EXTENAL ENCLOSURES ALLOWED
11.2.4	REMOVED ENTIRE SECTION AND REPLACED WITH NO EXTERNAL ENCLOSURES ALLOWED
11.3.5.1	CHANGED FAL TO H OR J FRAME
11.3.5.19	CHANGED FAL TO H OR J FRAME
11.3.5.24.2	CHANGED FAL TO H OR J FRAME
11.4	CHANGED FAL TO H OR J FRAME
11.8.6	CHANGED FLOWMETER TYPE FROM UNIMAG TO ROSEMOUNT

SECTION 12: CHECK LIST

<u>PARAGRAPH</u>	<u>REVISIONS/ADDITIONS</u>

SECTION 12	REVISED ENTIRE SECTION

LIST OF DETAILS

<u>DETAIL</u>	<u>REVISIONS/ADDITIONS</u>
3	INCLUDED COMMERCIAL APPLICATIONS, ADDED 1 INCH MINIMUM FOR COMMERCIAL APPLICATIONS, ADDED NO LEAD REQUIREMENT
4	ADDED NO LEAD REQUIREMENT
5	ADDED NO LEAD REQUIREMENT
7	ADDED 2 SPOOL PIECES AND STRAINER. MOVED BYPASS LINE CONNECTION. ADDED RPDA.
8	ELIMINATED OPTION B, ADDED BYPASS METER, ADDED PIPE SUPPORTS. ADDED RESIDENTIAL APPLICATION
9	REVISED BOLLARD SPACING
12	CHANGED DETAIL
14	CHANGED DETAIL
24A	INLINE SEWER FORCE MAIN ARV DETAIL
24B	OFFSET SEWER FORCE MAIN ARV DETAIL
25	WATER ARV DETAIL
32	CLARIFIED INTERIOR/EXTERIOR SPECIFICATIONS
34	CHANGED ITEMS ON DETAIL
38	ADDED CONDUIT FOR PRESSURE TRANSDUCER CABLE
39	ADDED CONDUIT FOR PRESSURE TRANSDUCER CABLE
45	ADDED PVB BPA DETAIL
46	ADDED OCS PIPING DETAIL

LIST OF ABBREVIATIONS

LIST OF ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
AC	Alternating Current
ADF	Average Daily Flow
AMPS	Amperes
ANSI	American National Standards Institute
ARV	Air Release Valve
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing Materials
ATS	Automatic Transfer Switch
AVK	Fittings Manufacturer
AWG	American Wire Gauge
AWS	American Welding Society
AWWA	American Water Works Association
BOA	Blow-Off Assembly
BPA	Backflow Prevention Assembly
BV	Butterfly Valve
CCR	Code Compliance Review
CMH	Collector Manhole
CSV	Curb Stop Valve
DC	Direct Current
DCDA	Double Check Detector Assembly
DFS	Data Flow Systems Inc.
DIP	Ductile Iron Pipe
DLW	Detector Locating Wire
DR	Dimension Ratio
EBBA	Joint Restrainer Manufacturer
ELW	Electronic Locator Wire
EOR	Engineer of Record
EPA	U.S. Environmental Protection Agency
EPDM	Ethylene Propylene Diene Monomer
EPGS	Emergency Power Generator System
ERU	Equivalent Residential Unit
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FHA	Fire Hydrant Assembly
FLA	Full Load Amps
FM	Force Main
FPS	Feet per Second
FRP	Fiberglass Reinforced Plastic
FT. LBS	Foot Pounds of Torque
GFI	Ground Fault Interrupter
GPM	Gallons
GPM	Gallons per Minute
GPD	Gallons per Day
GPR	Ground Penetrating Radar
GV	Gate Valve
HCBD	Hernando County Building Department
HCBOCC	Hernando County Board of County Commissioners
HCDD	Hernando County Development Department
HCDPW	Hernando County Department of Public Works
HCHD	Hernando County Health Department
HCPD	Hernando County Purchasing Department
HCUD	Hernando County Utilities Department

HDD	Horizontal Directional Drilling
HDPE	High Density Polyethylene
HP	Horsepower
IN	Inch
IPS	Iron Pipe Size
J&B	Jack and Bore
LED	Light Emitting Diode
MJ	Maximum
MGS	Magnetic Guidance System
MIN	Minimum
MH	Manhole
MIP	Male Iron Pipe
MLT	Magnetic Locator Tape
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NELAP	National Environmental Laboratory Accreditation Program
NSF	National Sanitation Foundation
NTP	Notice to Proceed-Letter
OCS	Odor Control System
OS&Y	Outside Stem and Yoke
OSHA	Occupational Safety and Health Act
PCU	Pump Control Unit
PE	Polyethylene
PET	Polyethylene Tubing
PH	Degree of Acidity
PLC	Programmable Logic Controller
PLS	Professional Land Surveyor
PSF	Pounds per Square Foot
PSI	Pounds per Square Inch
PSIG	Pounds per Square Inch Gauge
PVB	Pressure Vacuum Breaker
PVC	Polyvinyl Chloride
PWS	Public Water System
RMS	Root Mean Square
ROW	Right of Way
RPDA	Reduced Pressure Detector Assembly
RPM	Revolutions per Minute
RPZ	Reduced Pressure Zone
RTU	Remote Terminal Unit
RW	Reclaimed Water
SBR	Styrene-Butadiene Rubber
SDR	Standard Dimension Ratio
SRC	Subdivision Review Committee
SS	Stainless Steel
STS	Service Tapping Saddles
SWFWMD	South West Florida Water Management District
TAC Pack	Combination of Back Pack Ratio and Pump Control Unit
TCU	Telemetry Control Unit
TDH	Total Dynamic Head
TFS	Transient Film Shield
TGV	Tapping Gate Valve
TV	Tapping Valve
UL	Underwriters Laboratory Testing
USC	University of Southern California
USDA	U.S. Department of Agriculture
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

SECTION 1

GENERAL INFORMATION

SECTION 1: GENERAL INFORMATION CONTENTS

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SECTION 1

GENERAL INFORMATION

1.1 INTRODUCTION

- 1.1.1 This technical manual has been prepared as a guide for use in the planning, design and construction of water, wastewater and reclaimed water systems, or systems extensions that shall be installed in the Hernando County Water and Sewer District area and administered by the Hernando County Utilities Department (HCUD).
- 1.1.2 The requirements, specifications and details contained within this technical manual shall provide minimum guidelines for uniformity, quality in design and construction. HCUD reserves the right to establish additional criteria for any project after plans review.
- 1.1.3 The developer, the Engineer of Record (EOR), and the contractor shall comply with all requirements of Federal, State and County and other laws, codes, ordinances and regulations that in any way affect those engaged or employed in the proposed construction, the materials or equipment used in or upon the site, or the conduct of the work. The developer or the EOR or the contractor shall obtain all permits and licenses, pay all charges and fees, and provide all notices necessary and incidental to the due and lawful prosecution of the work prior to the start of any construction.
- 1.1.4 All proposed water, wastewater, and reclaimed water facility project plans shall be signed and sealed by an EOR, a Professional Engineer registered in the State of Florida.
- 1.1.5 Final acceptance of the project by HCUD is outlined in sub-paragraph 1.23.
- 1.1.6 If at any time a conflict appears within the specifications, HCUD will make the final determination on which requirement shall govern; in most cases the more stringent requirement shall apply.

1.2 TERMINOLOGY

- 1.2.1 Developer - A person, company or corporation responsible for the construction, supervision and completion of a potable water, Reclaimed Water (RW) and/or wastewater system or facility, shall be subject to these standards.
- 1.2.2 Contractor - A person, company or corporation responsible for the construction of a potable water, RW and/or wastewater facility, shall be subject to these standards.
- 1.2.3 County - The County of Hernando, in the State of Florida, the Hernando County Utilities Department or the Hernando County Water and Sewer District, hereinafter referred to as "HCUD".
- 1.2.4 District - The Hernando County Water and Sewer District or Hernando County Utilities Department (HCUD).
- 1.2.5 Director - The Director of the HCUD or a designated representative.
- 1.2.6 Project Engineer - A Professional Engineer registered in the State of Florida, Engineer of Record (EOR), who shall be retained by the project owner or developer to design and guarantee that the project shall comply with the contents of this specifications manual.

- 1.2.7 Developer-installed project - Any project in which a private entity designs and constructs water, wastewater and/or reclaimed water facilities which will be owned, operated and maintained by the HCUD.
- 1.2.8 "As Builts" (Record Drawings) - Project Engineer (EOR) certified copies of project construction process, presenting to the owner, a record of the finished project as it is actually built.

1.3 WATER, SEWER AND/OR RECLAIMED WATER (RW) CONNECTION FEES AND AGREEMENTS

- 1.3.1 Developers involved in the construction of any residential, commercial or industrial future public utility system or systems within the unincorporated area of Hernando County must complete an application for "Water, Wastewater and/or Reclaimed Water Agreement" form. The agreement form is available in the customer service section of HCUD.
- 1.3.2 Developers shall then pay to HCUD, any applicable connection and/or other fee charges prior to the issuance of building construction permits.

1.4 USE OF EASEMENTS, RIGHTS-OF-WAY AND SODDING

- 1.4.1 The Developer or EOR shall take the initiative to notify, request and process agency applications involved in the project, requiring permits for right-of-way use from such agencies as Hernando County Department of Public Works (HCDPW), Florida Department of Transportation (FDOT) and the Southwest Florida Water Management District (SWFWMD).
- 1.4.2 Where rights-of-way usage shall be unobtainable or impractical, 15-foot wide easements shall be dedicated to HCUD for Utilities installation and maintenance; to include but not limited to pipe lines, ingress and egress to facilities, pump stations and well sites. These easements shall be granted and duly recorded prior to completion of the project. Copies of the recorded easements shall be provided to HCUD prior to acceptance by the Hernando County Water and Sewer District.
- 1.4.3 Sodding Requirements: After construction of potable water, reclaimed water and wastewater projects have been completed, the contractor shall supply and install a standard 2 ½ to 3-inch sod layer (full sod, not seed and mulch) over all surface areas disturbed during the construction activities. The contractor shall grade the site to accommodate the HCDPW and FDOT requirements that the top of the sod shall be 1-inch lower than the edge of pavement elevation. After sod installation, the contractor shall compact the sod layer with a sod roller/compactor machine, designed for such activity, rendering the freshly installed sod layer to be level and smooth in texture and appearance. The contractor shall obtain an HCUD hydrant meter and/or in some instances the contractor may need to provide a tanker truck in order to supply the necessary irrigation water for the project. The contractor shall furnish a written irrigation schedule to HCUD and immediately begin to apply irrigating water to the newly installed sod. The schedule shall cover twice a week water applications for six (6) weeks from the installation date of the new sod as a minimum. Dryer seasons may require additional watering. The construction areas for sodding shall be but are not limited to; public rights-of- way, dedicated utility easements and pump station sites. All sodding and grading in the county right-of-way shall require both HCDPW's and HCUD's approval.

1.5 AUTHORITY OF HCUD INSPECTORS

- 1.5.1 HCUD inspection personnel shall inspect all construction and materials, and may inspect preparation, fabrication or manufacture of supplies to be used on projects within HCUD franchise area. The HCUD inspector shall not revoke, alter or waive any requirements of the specifications, but shall alert the contractor and/or EOR of any failure of work or materials to conform to the plans or specifications.
- 1.5.2 The HCUD inspector shall have the authority to reject defective materials and may suspend work, if public health or personnel safety situations are involved.

- 1.5.3 The HCUD inspector shall not act as a foreman, perform other duties for the contractor, or interfere with the management of the project work.
- 1.5.4 Any advice the HCUD inspector may give shall in no way be construed as binding or releasing the contractor from carrying out the implied intent of approved plans and specifications.

1.6 USE OF CHEMICALS

- 1.6.1 Chemicals used during project construction or furnished for project operation, shall show approval of either the U.S. Environmental Protection Agency (EPA) or the U.S. Department of Agriculture (USDA).
- 1.6.2 Use of chemicals and disposal of residues and containers shall be in conformance with applicable Federal and State rules and regulations.

1.7 PROTECTION AND RESTORATION OF PROPERTY

- 1.7.1 The contractor shall not illegally enter upon or alter public or private property. After receiving proper permits or written permission, work shall be performed on private property, public rights-of-way or on dedicated easements. After receiving permits or written permission from property owners, ingress and/or construction shall begin after owners are notified 24 hours in advance of construction.
- 1.7.2 Should damage occur to public or private property, the contractor shall restore such property, at his expense, to a condition equal to or better than the existing state before such damage occurred.
- 1.7.3 HCUD shall require the contractor to video-tape the job site and pertinent offsite areas that are near or adjacent to the construction activities, providing a copy of the video records of pre-construction conditions to HCUD before construction begins.

1.8 PUBLIC CONVENIENCE AND SAFETY

- 1.8.1 Materials and equipment shall be stored on the project site, so as to allow minimal disruption to vehicular or pedestrian traffic. No public roadway shall be closed or opened without written permission from HCDPW or other authorizing public agencies.
- 1.8.2 The safety provisions of applicable laws, including the Occupational Safety Health Act (OSHA), and building and construction codes shall be observed for the protection of person(s) and property.
- 1.8.3 The contractor shall provide and maintain safety barricades, signals and/or signs on streets, highways or in other locations as required by the HCDPW or FDOT specifications for the protection of the work and safety to the public. Barricades which encroach on or are adjacent to public rights-of-way shall be provided with lights, which shall be kept burning at times between sunset and sunrise and during periods of low visibility. Traffic control or flag personnel shall be provided by the contractor where safety conditions require such.
- 1.8.4 Projects involving excavations in areas where the public safety may be an issue will be required to have a temporary safety fence installed during construction.
- 1.8.5 Access to public and private properties during stages of construction shall be provided by the contractor. There shall be no construction work causing service interruptions to "online" utilities customers, unless advance written approval is secured from the affected utility authority.

- 1.8.6 The contractor shall provide for the safe operation of traffic in streets where work shall be in progress. Work shall be planned and scheduled to result in the least interference with normal traffic flow and such operations shall be pre-approved in writing by the Traffic Operations Section of HCDPW.
- 1.8.7 Construction hours of operation shall occur between 7:00 a.m. and 7:00 p.m., Monday through Friday. Except for pre-approved abnormal times or in case of emergencies, unauthorized work shall not be allowed. The official Hernando County holiday schedule shall be observed when planning normal construction schedules.
- 1.9 DISRUPTION TO EXISTING SYSTEM OPERATION: The contractor shall request HCUD to schedule connection operations so as to keep customer service disruption to a minimum. The request to HCUD shall be made 5 business days prior to the proposed time of connection to existing utilities systems. The Utilities Department will require a Public Service Announcement (PSA) to be issued for all scheduled interruption of services lasting four (4) hours or longer and/or affects 250 customers or more. A scheduled PSA must be submitted by Utilities staff to the County's Community Relations Department no less than one (1) work week prior to the interruption of service.
- 1.10 SILTATION, EROSION AND WATER CONTROL: The contractor shall provide a means or methods for erosion prevention and silt migration. Such means or methods shall be approved by the EOR for silt and erosion control, de-watering, or other operations involving the use and disposal of water.
- 1.11 DISTURBED REFERENCE POINTS: Survey monuments, benchmarks or other reference points, which must be disturbed by construction operations, shall be witnessed, removed and replaced by a Professional Land Surveyor (PLS), registered in the State of Florida.
- 1.12 CONSTRUCTION STAKES AND SURVEY MONUMENTS
 - 1.12.1 The contractor shall provide, install and maintain construction stakes for grades and measurements necessary for execution and control of the work.
 - 1.12.2 The plans shall show or describe the reference points, bench marks or survey monuments from which the contractor shall lay out the work.
- 1.13 SANITARY PROVISIONS (PORTABLE TOILETS): The contractor shall provide and maintain sanitary accommodations (to include portable toilets) for employees and official site visitors, to comply with the requirements and regulations of the State of Florida, Hernando County Health Department (HCHD) or other regulatory agencies.
- 1.14 PLANS AND ALLOWABLE DEVIATIONS: (See Sub-paragraph 2.2 and 2.3)
 - 1.14.1 The project shall be constructed in accordance with the approved plans and HCUD specifications with requested deviations from the approved plans requiring the prior approval of the EOR and HCUD.
 - 1.14.2 If the plans and specifications do not conform to HCUD requirements, HCUD will notify the EOR or Developer of the changes, corrections or modifications required. Once the HCUD determines the plans are in general compliance with HCUD standards, the EOR and/or the Developer shall be notified in writing that the plans shall be stamped "Approved for Construction".
 - 1.14.3 For Hernando County projects, once "Approved for Construction" plans shall have been signed, sealed and delivered, there shall be no changes of project design, materials or construction allowed or compensated for. Should any changes become necessary, an official "Change Order" shall be submitted by the EOR/Contractor to HCUD for approval by the Hernando County Board of County Commissioners (HCC), prior to the initiation of any proposed or requested change.

- 1.15 **INSTALLATION OF "HCUD APPROVED EQUALS":** Materials or devices shall be specified for the purpose of establishing a minimum standard of quality acceptable to HCUD. Material or devices other than specified shall be considered equal and/or satisfactory when approved in writing by the EOR and HCUD.
- 1.16 **DEFECTIVE WORK AND MATERIALS:** Defective work or materials shall be repaired or removed from the project site at contractor expense. Failure to notice the defective work or materials during construction shall not prevent future rejection of such work or materials upon discovery, prior to final HCUD acceptance of project.
- 1.17 **CONSTRUCTION PLANS AND HCUD INSPECTIONS:** The contractor shall be required to work from a set of plans stamped "Approved for Construction" by the EOR. All project work shall be inspected by HCUD inspection personnel. For scheduling inspections, the contractor shall notify HCUD a minimum of 48-hours prior to the requested date. The approved set of plans shall be located on the construction site at all times.
- 1.18 **WARRANTIES**
- 1.18.1 **EIGHTEEN MONTHS WARRANTY PERIOD** - If, within 18-months after the date of acceptance by HCUD or by the terms of any special guarantee or provision of the contract documents, any work shall have been found defective, the contractor shall correct such defective work at no cost to the County. If the contractor does not promptly comply with these terms, HCUD shall have the defective work corrected and costs incurred shall be paid by the contractor or deducted from the contract retainage. If a particular item of equipment shall be placed into service before project completion, the warranty period for that item shall start from the earlier date and shall be covered by special written amendments as submitted by the EOR.
- 1.18.2 **EMERGENCY REPAIRS** - An emergency shall be defined as a situation which develops suddenly and demands immediate action to halt a worsening condition. During the time that a project shall be under construction or in a warranty period, emergencies shall be handled as to the following guidelines; upon notification of an emergency situation, HCUD shall contact the Contractor, who shall make repairs immediately. In the event the Contractor is unable to respond, HCUD shall make the repairs and submit a bill to the Contractor for labor and materials incurred to correct the emergency problem.
- 1.19 **PRE-CONSTRUCTION CONFERENCE**
- 1.19.1 A Pre-Construction Conference shall be held prior to construction activities, for the purpose of reviewing the plans and specifications of the project. The meeting shall include the developer, contractor, subcontractor(s), utility company representatives, the EOR, and HCUD representatives.
- 1.19.2 HCUD shall receive two sets of "Approved for Construction" plans, sized 24" x 36" (signed, sealed and dated by the EOR), with one project specification book, at least five work days prior to the Pre-Construction Conference meeting date.
- 1.19.3 HCUD shall be given a minimum of 48 hours notice prior to the pre-construction conference.
- 1.20 **COMMENCEMENT OF WORK ("NOTICE TO PROCEED"):** For HCUD projects, a "Notice to Proceed" (NTP) letter shall be issued during the pre-construction conference by the Hernando County Purchasing Department (HCPD) to establish the official contact commencement date for construction activities.
- 1.21 **INSPECTIONS BY OTHER AGENCIES:** Federal, State and County agencies shall have access to the project site for inspecting materials and work. Instructions or suggestions resulting from these inspections shall be given to the contractor through the EOR.

1.22 INTERMEDIATE INSPECTIONS: Intermediate inspections shall be conducted by HCUD to observe construction techniques and compliance with plans and specifications. The contractor shall keep HCUD informed of the project construction progress and/or changes in the construction schedule, insuring the opportunity for inspection of underground work prior to backfilling. Work results that have not been inspected shall be subject to rejection by HCUD.

1.23 HCUD REQUIREMENTS FOR PROJECT ACCEPTANCE

1.23.1 Final acceptance of a water distribution system, water main extension, reclaimed water distribution system, reclaimed water main extension, and/or wastewater collection/transmission system and release of the performance bond shall be made after all inspections have been made the improvements are certified by the EOR to be in accordance with the applicable regulations of HCUD, Florida Department of Environmental Protection (FDEP), SWFWMD, the Hernando County Health Department (HCHD), and other Federal, State, County, and City standards, ordinances, regulations and laws.

1.23.2 INSPECTIONS AND PUNCH LIST ITEMS: The Contractor shall request the EOR to schedule a "Pre-Final" inspection with HCUD, allowing 48-hours advance notification.

1.23.2.1 Should the "Pre-Final" inspection results be acceptable, the inspection shall be classified as a "Final Inspection", and the project advances to a "Close Out".

1.23.2.2 Should the results be unacceptable, upon agreement of the noted project deficiencies by representatives of HCUD and the EOR, a "Punch List" of items or deficiencies shall be forwarded to the contractor by the EOR for timely corrective action.

1.23.3 RE-INSPECTION PROCEDURES: After the "Punch List" items have been corrected, the contractor shall request the EOR to reschedule a "re-inspection" with HCUD, allowing another 48-hours advance notification.

1.23.3.1 Should the inspection results be acceptable, the inspection shall be classified as a "Final Inspection" and the project advances to "Close Out".

1.23.3.2 Should the results again be unacceptable, the process of re-inspection shall recur until all items on the "punch list" are corrected.

1.23.4 "CLOSE OUT" OF PROJECTS

1.23.4.1 The EOR shall provide to HCUD, two signed, sealed and dated, 24" x 36" sized copies of "As Builts" (Record Drawings) and for HCUD projects, two complete sets of computerized "As Builts" (Record Drawings), prepared in the appropriate ".dwg" and ".pdf" format. The "As Builts" (Record Drawings) shall include distances and dimensions between taps, gate valves, manholes, water and sewer service lines, mains from edges of pavement, street names and other necessary information for future item location purposes.

1.23.4.2 Water meter installation shall occur after acceptable bacteriological analysis results are received by HCUD and the project is "finalized" by the permitting agency and a "Letter of Acceptance" is issued.

1.24 NEW UTILITIES PRODUCT REVIEW

1.24.1 New utilities product review is an ongoing procedure conducted by HCUD Facilities Maintenance personnel (technical and/or management positions), through academic research and field evaluation. New and existing products are evaluated for efficient and economical utilization within the HCUD systems.

1.24.2 On a specific case basis, HCUD shall consider a one-time substitute approval of an alternate material or manufacturer through a detailed shop drawing submittal.

- 1.24.3 A manufacturer or manufacturer's representative may request a demonstration presentation for products not currently approved by HCUD. The manufacturer shall supply information requested and HCUD may approve the demonstration project with specific conditions and timelines. The manufacturer's presentation shall be provided to HCUD at no charge to the County.

1.25 SPECIFICATIONS MANUAL REVISION PROCEDURE

- 1.25.1 As material specifications and technical criteria change to meet changing needs and technology, it shall become necessary to revise and update this manual.
- 1.25.2 All approved manual revisions shall be available through e-mail in a timely manner to registered recipients of the previous edition of this technical manual. The effective date of such changes shall be 30-days from the date of approval.
- 1.25.3 This manual should be accurate, consistent, and free from errors and conflicts. In the unlikely event that a conflict and/or errors exist in this manual, HCUD shall send a written letter of clarification of the conflict and/or errors to all registered recipients of this manual. The effective date of "conflict and/or error revisions" will be the noted HCUD approval date. The resolution of design problems related to criteria conflicts in this manual will be handled on a case-by-case basis by HCUD.
- 1.25.4 Correction of any typographical errors contained herein that do not materially and/or significantly affect criteria shall not require immediate attention.

SECTION 2

PLANS PREPARATION

SECTION 2: PLANS PREPARATION CONTENT

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SECTION 2

PLANS PREPARATION

2.1 DESIGN CRITERIA: Design criteria, standards and specifications presented in this manual shall be used in the preparation of project plans and specifications packets. See section 12 for check list sheets.

2.2 PLANS FORMATTING

2.2.1 Computerized drawings created for HCUD projects shall be generated with digital file formats of Autodesk/AutoCAD drawing format file (.dwg) and Adobe (.pdf). Digital drawings shall be provided on a compact disc (CD) or other approved digital media, formatted for Windows 2000/XP personal computers. All utility infrastructure design for HCUD shall be drawn (horizontally and vertically, if applicable) in the NAD 83 state plan coordinate system.

2.2.2 GENERAL CONSTRUCTION PLANS:

2.2.2.1 Plans shall be prepared on 24-inch x 36-inch bond sheets, unless otherwise approved by HCUD.

2.2.2.2 The cover sheet shall include a project vicinity map and an index of all page contents.

2.2.2.3 A title block shall be located in the right hand edge of each sheet, identifying the EOR, Engineering Firm, address, telephone number, page number, page content and all Parcel Key Numbers (assigned by the Hernando County Property Appraiser's Office) associated with the proposed project.

2.2.2.4 All pages of blue-line or black-line construction plans submitted for review and approval shall be signed, sealed and dated by the EOR, a Professional Engineer registered in the state of Florida.

2.2.2.5 All submittals shall be accompanied by a letter of transmittal to include the project name, general description, and name, address, telephone number and fax number of the EOR and shall be approved by HCUD and the EOR prior to installation.

2.2.2.6 If a pressure system shall be constructed, a copy of the manufacturer's pump performance curve overlaid on the system response curve shall be included in the submittal.

2.2.3 SITE PLAN: A general layout plan (at a maximum of scale 1-inch = 200-feet) shall accompany the construction plans and depict existing improvements in detail as to intent of design. Schematic diagrams, designs or "shop drawing" details for equipment and structures not clearly indicated on the plans, shall also be provided for approval by HCUD before commencing construction.

2.2.4 Utilities Plan Sheet: The Utilities Plan Sheet shall include drawings primarily pertinent to potable water and sewer service utilities placement. Elevation point notations, contour lines and project information other than utilities shall be minimal on this plan sheet.

- 2.2.5 DRAWINGS: Construction plans on gravity sewer systems shall include both plan and profile views. Plans with only on-site water, RW, and wastewater pressure systems shall not require profile views, but shall require a plan view. The horizontal scale may be 1-inch = 50-feet, down to but no less than, 1-inch = 20-feet. The vertical scale shall be 1-inch = 5-feet. When proposed construction shall be within areas of existing infrastructure, e.g., road rights-of-way, plan and profile views are required. The horizontal scale shall be 1-inch = 20-feet and the vertical scale shall be 1-inch = 5-feet, unless otherwise approved by HCUD prior to plan submission. All underground utilities, storm drains or other structures, which may cross or be located close to the proposed pipelines and structures shall be shown on the drawings in both plan and profile views. Plans shall show cross section details of all conflicting crossings, as well as location and elevation of all air release valves.

2.3 STANDARD ITEMS FOR CONSTRUCTION PLANS

2.3.1 ALL CONSTRUCTION PLANS

- 2.3.1.1 Original and "As Built" (Record Drawings) plans shall be on 24-inch x 36-inch paper.
- 2.3.1.2 Plans shall be "to scale" and scale noted on each view.
- 2.3.1.3 Plans shall reflect the approved point of connection.
- 2.3.1.4 Plans shall show north arrow, abbreviations, notes, etc.
- 2.3.1.5 Plans shall be signed, sealed and dated by the EOR registered in the State of Florida (all sheets).
- 2.3.1.6 Plans shall show width and center line of each right-of-way indicated.
- 2.3.1.7 Plans shall show width of pavement and distance to property line shown for all streets.
- 2.3.1.8 Plans shall show street names or identifiers indicated (correct location on plan).
- 2.3.1.9 Plans shall show subdivision name, lot and block numbers.
- 2.3.1.10 Plans shall show, and locate with dimensioning, HCUD regulated utilities proximate to the design on the plan view.
- 2.3.1.11 Vertical and horizontal clearance for all for all wastewater, force mains, RW mains crossing under water lines shall follow criteria from Chapter 62-555, FDEP Regulations. See sub-section 3.5.
- 2.3.1.12 Plans shall show size, type, material, and length of pipes shown for all water, RW, and wastewater lines, for both on-site and off-site projects.
- 2.3.1.13 Where water, RW, or wastewater lines cross existing pavement, the plans shall specify the crossing method, i.e., "Open-Cut", "Jack and Bore" (J&B, see Section 8), or "Horizontal Directional Drill" (HDD, see Section 7).
- 2.3.1.14 Plans shall specify the invert of all intersecting utilities on the plan or profile views of the plans sheets.
- 2.3.1.15 Plans shall show minimum pipeline clearance from property line to be 5-feet.
- 2.3.1.16 Plans shall include a master plan of water, sewer and reclaimed water utilities for the entire project shown on one sheet.

- 2.3.1.17 Plans shall show all underground utilities, storm drains, or other structures which cross or are located close to the proposed pipelines on the plan or profile views.
- 2.3.1.18 Plans shall include on one page, a key map, showing the overall layout of the entire project with construction phases clearly marked.
- 2.3.1.19 When pipeline conflicts occur, HCUD shall require a special pre-cast pipeline conflict structure to be installed. See Detail 20.
- 2.3.2 PLANS FOR POTABLE WATER MAINS: (See Section 3)
 - 2.3.2.1 Joint restraints shall be specified at all water main bends, valves, fittings, Fire Hydrant Assembly (FHA), and tapping sleeves shall conform to HCUD standards. See Details 9 and 15.
 - 2.3.2.2 Valves shall have roadway boxes for all branch connections, loop ends, FHA “stub-outs” or other locations, are required to facilitate flow operation and control of the distribution system. Valves shall be placed so that the maximum allowable length of water main required to shut down for repair work shall not be more than 500-linear feet in commercial, industrial or multi-family residential districts, or 1,000-feet in other areas. If construction shall be phased, a valve followed by one full length of pipe with plug and Blow Off Assembly (BOA) where applicable shall be installed at the end of each line that is to be continued in the next phase. See Detail 10.
 - 2.3.2.3 Combination Air-vacuum Release Valves (ARV) shall be specified where the water, reclaimed or force main profile is such that air pockets or entrapment could occur resulting in flow blockage. See Details 24A, 24B, or 25.
 - 2.3.2.4 Plans shall show FHA spacing and installation shall be in accordance with specifications in Section 3.
 - 2.3.2.5 Plans shall show location of Polyvinyl Chloride (PVC) sleeve for use in connection with far side potable water service installation. See Detail 2.
 - 2.3.2.6 Water mains in residential subdivisions shall be PVC, Class 150, Dimension Ration (DR) 18, per American Water Works Association (AWWA) C900, or Ductile Iron Pipe (DIP), minimum Class 50, American National Standard Institute (ANSI) A21.51. Plans shall show size and type of pipe material.
 - 2.3.2.7 Plans shall have notes indicating PVC water mains shall have Electronic Locator Wire (ELW) attached to the top of the pipe and suitable magnetic locator tape buried 12-inches above the water main pipe. ELW shall be attached to pipe at 12 o'clock position with nylon cable ties or duct tape at 4-foot intervals and each side of each pipe joint. See Detail 21.
- 2.3.3 PLANS FOR GRAVITY SEWER MAINS: (See Section 4)
 - 2.3.3.1 Plans shall show for the size, type of pipe, slope, and distance between manholes on both plan and profile views for gravity sewer projects.
 - 2.3.3.2 Invert elevations and flow directions shall be specified for each pipe entering or exiting a Manhole (MH). Rim elevation(s) shall also be specified, identifying the lowest point in the gravity system.
 - 2.3.3.3 All MH stubs and connections shall be shown on both the plan and profile view. All service or end of line “stub-outs” shall include line plug caps with restrainers.

- 2.3.3.4 Plans shall show MH structure and MH connection details.
- 2.3.3.5 "Inside Drop" MH and detail shall be required for gravity sewer line drops of 24-inches or more. See Detail 32.
- 2.3.3.6 Minimum pipe size and material for gravity sewer main lines installed within county rights-of-way and dedicated easements shall be 8-inch PVC. All sewer service laterals shall be 6-inch PVC. Commercial and multifamily service wye connection fittings shall be 6 x 6-inch PVC. Residential service wye connection fittings shall be 6 x 4-inch PVC. The contractor shall furnish and install "clean-out" access fittings at finish grade and at property line. HCUD shall require a shallow "Collector Manhole" with cover, where three or more sewer service laterals converge. Where grade levels are uncertain at time of installation, lateral "cleanouts" may be temporarily installed at higher elevations. However, it shall be the responsibility of the building contractor to reinstall the lateral "clean-outs" to finished grade level before issuance of certificate of occupancy of residential units.
- 2.3.3.7 All installed manholes shall have water-tight MH cover inflow-protectors. See Detail 32.
- 2.3.4 PLANS FOR WASTEWATER FORCE MAINS (FM): (See Section 4)
 - 2.3.4.1 Joint restraints shall be specified at all Force Main (FM) bends, valves, fittings, and tapping sleeves. Joint restraint detail shall conform to HCUD standards. See Detail 15.
 - 2.3.4.2 Valves with roadway boxes shall be provided for all branch connections. In-line flow control or isolation valves shall be provided at intervals not to exceed 1,000-feet.
 - 2.3.4.3 Combination ARV shall be specified where the force main profile is such that air entrapment could occur resulting in flow blockage. See Detail 24A.
 - 2.3.4.4 Notes on the plan to indicate the FM shall have a suitable magnetic locator tape and Electronic Locator Wire (ELW) buried over the FM. ELW shall be attached to pipe at 12 o'clock position with nylon cable ties, at each joint and at 5-foot intervals.
 - 2.3.4.5 Plans shall provide detail of any FM connecting to a "Collector Manhole".
- 2.3.5 PLANS FOR RECLAIMED WATER (RW) MAINS: (See Section 5)
 - 2.3.5.1 Joint restraints shall be specified at all RW main bends, valves and tapping sleeves. Plans shall show detail illustrating joint restraint that conforms to HCUD standards. See Detail 15.
 - 2.3.5.2 Valves with roadway boxes for all branch connections or other locations shall be required to facilitate flow operation and control of the distribution system. Valves shall be placed so that the maximum allowable length of water main required to shut down for repair work shall not be more than 1,000-linear feet in commercial, industrial or multi-family residential districts; 2,000-feet on distribution systems in residential districts and 2,000-feet on transmission systems. If construction shall be phased, a valve followed by one full length of pipe shall be installed at the end of each line that is to be extended in the next phase.
 - 2.3.5.3 Combination ARV(s) shall be specified where the RW main profile is such that air entrapment could occur resulting in flow blockage.

- 2.3.5.4 RW distribution mains within residential subdivisions shall be PVC, Class C900, DR 18, per AWWA C900, or DIP, minimum Class 50, ANSI A21.51. Size and type of material shall be noted on plans.
- 2.3.5.5 A flow meter(s) shall be installed on each service line that shall be connected to a RW transmission main. Note location and anticipated size of meter on plans.
See Detail 6.

2.4 WASTEWATER PUMP STATIONS (TO BE PRIVATELY OWNED): (See Section 4)

- 2.4.1 Plans shall show location of pump station on private property.
- 2.4.2 Plans shall show design capacity (average daily/peak flows) and system response/curve calculations.
- 2.4.3 Plans shall show pump identification, all nameplate data and pump curve for selected pump.
- 2.4.4 Plans shall show wet well operating elevations, inverts, and slab elevations.
- 2.4.5 Plans shall show identification of fittings and valves on private property.

2.5 WASTEWATER PUMP STATIONS (TO BE OWNED AND MAINTAINED BY HCUD): (See Section 4).

- 2.5.1 Plans shall show dimensions of site, service driveway, location and materials, and fencing with double entry gates, location of wet well and valve vault. Fencing shall be grounded per National Electric Code (NEC) standards.
- 2.5.2 Plans shall show utilities required for operation and maintenance of the pump station.
- 2.5.3 Plans shall show valve vault with valves and piping identified.
- 2.5.4 Plans shall show Reduced Pressure Zone (RPZ) type of Backflow Prevention Assembly (BPA) for potable water protection. See Detail 8.
- 2.5.5 Plans shall show individual pump identification, all nameplate data and pump curve for selected pump(s).
- 2.5.6 Pump station design capacity (average daily/peak flows) and system response/curve calculations shall be included on plans.
- 2.5.7 Wet well design criteria and pump control level settings shall be noted on profile view on plans.
- 2.5.8 Plans shall show electrical load calculations included on electrical sheet and noted as same as provided on electrical sheet shop drawing submission.

SECTION 3

SPECIFICATIONS FOR POTABLE WATER DISTRIBUTIONS SYSTEMS DESIGN AND INSTALLATION

SECTION 3: SPECIFICATIONS FOR POTABLE WATER DISTRIBUTION

SYSTEMS DESIGN AND INSTALLATION CONTENTS

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SECTION 3

SPECIFICATIONS FOR POTABLE WATER

DISTRIBUTION SYSTEMS DESIGN AND INSTALLATION

3.1 GENERAL

- 3.1.1 SPECIFICATIONS: The following specifications shall cover the design, review of plans and specifications for the installation, inspection, testing, and acceptance of drinking (potable) water distribution systems, water main extensions, and all project appurtenant items which shall be constructed by private enterprise and shall be owned and maintained by HCUD upon project completion and acceptance.
- 3.1.2 DEVELOPMENT REVIEW COMMITTEE: All improvements and modifications made to the HCUD water system shall be done in accordance with plans approved by the HCUD section of the Code Compliance Review (CCR) in the Hernando County Development Department and the Hernando County Planning Department. Material and workmanship shall conform to the specifications that appear in this document. All pipeline and appurtenance materials in contact with potable water shall be certified by National Sanitation Foundation (NSF) standard # 61 and NSF/ANSI 372.
- 3.1.3 PIPE COLOR GUIDE: For standardized identification purposes, all pipelines and appurtenances installed within Hernando County shall meet the Color Marking Standards for Underground Utilities, as outlined in Detail 13.
- 3.1.4 It shall be the developer's responsibility to locate existing utilities for design and the contractor's responsibility to locate existing utilities for connection.

3.2 PLANS PREPARATION

- 3.2.1 DESIGN: All potable water distribution systems, water main extensions, and all appurtenant items shall be designed in accordance with the applicable regulations, standards and specifications of Hernando County, HCUD and the standards established herein.
- 3.2.2 LOCATION OF UTILITIES: HCUD shall own and maintain all portions of the water system up to and including the water meter installed within the HCUD franchise area. The water distribution system or water main extension or any portion thereof, which is to become the property and sole responsibility of HCUD, shall be designed to be constructed within any public Rights-Of-Way (ROW) and/or dedicated easements.

3.3 PLANS REVIEW AND "AS BUILTS" (RECORD DRAWINGS)

- 3.3.1 RESIDENTIAL DEVELOPMENT: For Residential Development, the standards, procedures and requirements are primarily set forth in the "Subdivision Regulations" policies, available through the Hernando County Development Department (HCDD). The developer or authorizer representative shall submit plans and associated documents to the HCDD for initial review and distribution to affected departments. Plans review concerning utilities shall be forwarded to and conducted by HCUD in close cooperation with the HCDD. See section 12 for check list sheets.
- 3.3.2 COMMERCIAL AND INDUSTRIAL DEVELOPMENT: For commercial and industrial development, the standards, procedures and requirements are primarily set forth in "Site Development Regulations" policies available through the Hernando County Building Department (HCBD). The developer or authorizer representative shall submit plans and associated documents to the CCR division of the HCBD for initial review and distribution to affected departments. Plans review concerning utilities shall be forwarded to and conducted by CCR

member of HCUD, in close cooperation with the HCBD. See section 12 for check list sheets.

3.3.3 CCR PLANS APPROVAL (COMMERCIAL OR INDUSTRIAL SYSTEMS): For Commercial or Industrial Development, the Developer or authorized representative shall submit plans and associated documentation to the CCR for review. The CCR member shall review the plans and make comments for required corrections.

3.3.4 After project construction is complete, the EOR shall mark up, sign, date and seal two sets of approved construction plans as "As Builts" (Record Drawings) and two complete sets of electronic "As Builts" (Record Drawings), prepared in ".dwg" format and ".pdf" format, for final submission to HCUD.

3.4 SYSTEM DESIGN, CONSTRUCTION STANDARDS AND FLOW CRITERIA

3.4.1 GENERAL REQUIREMENTS: The provisions of this sub-section set forth the general requirements for design of potable water distribution systems and facilities, and provide criteria for determining flow demands. The EOR shall comply with all the requirements of the HCHD in addition to the criteria contained herein.

3.4.2 SERVICE CONNECTION AVAILABILITY:

3.4.2.1 Connection to HCUD water and sewer systems shall be determined by Article VI, Section 28-210, sub-section (E) of the latest revision of the Hernando County Code. See Detail 12.

3.4.2.2 Any subdivision dedicating utilities to HCUD shall be required to have a minimum of two feeds into a subdivision. At least two of the connections shall be on opposing sides of the property or as determined by HCUD. If a second hook up location is not possible at the time of connection, the subdivision is to make provisions to allow for future hookup from at least one adjoining property (as determined by HCUD) for when water becomes available.

3.4.3 FLOW CRITERIA:

3.4.3.1 Residential Flow Demand: Flow demands for design shall be calculated based on full or projected ultimate development. The Average Daily Flow (ADF) for single family and master-metered residential developments shall be based on 390 gallons per day (GPD) per unit as determined in the latest HCUD Water Master Plan Study. A peak factor of 2 shall be applied for design purposes.

3.4.3.2 Commercial Flow Demand: Flow demands for design shall be based on 390 GPD per Equivalent Residential Unit (ERU). Peaking factors for design shall be based on total ERU's from the following Table 3-1.

TABLE 3-1

WATER FLOW PEAKING FACTORS

<u>Unit/ERU</u>	<u>Populations</u>	<u>Peak Factor</u>
1	2.7	4.46
10	27.0	4.36
100	270.0	4.10
200	540.00	3.96
300	810.00	3.86
500	1,350.0	3.71
1000	2,700.0	3.48
2000	5,400.0	3.21
5000	13,500.0	2.82

3.4.3.3 Fire Flow: Fire flows shall be calculated in accordance with the fire flow requirements outlined in FAC 62-555.320(15), based on population, density, and hazardous features of the proposed construction. See also sub-section 3.8 for FHA specifications.

3.4.3.4 All fire suppression sprinkler system lines serving commercial and industrial facilities shall be equipped with RPDA. Low flow detection meter type shall be as indicated in Table 3-4. Compound water meter is not necessary for dedicated fire suppression system mains. Installations shall be per HCUD specifications and inspected by HCUD after installation (See Detail 7).

3.4.4 PIPE SIZING

3.4.4.1 The EOR shall be responsible for properly sizing the water distribution system piping.

3.4.4.2 The pipe sizing design criteria for water distribution systems shall provide for at least 100% of the combined peak hour, maximum day demand rate, plus fire flow. The allowable minimum service residual pressure shall be 20 PSI in a transmission line. Design flows for fire suppression sprinkler systems demand and method of computation shall be submitted by the EOR to the HCUD for review.

3.4.4.3 The minimum pipe size for distribution mains shall be 4-inches, with the exception of the minimum size for distribution mains serving fire hydrants which shall be 8-inches. Dedicated fire hydrant branches shall be a minimum of 6-inches in diameter for mains less than 150-feet.

3.4.5 LINE ROUTING: The primary feed for the water distribution system of a residential or commercial subdivision shall be routed within County road ROW or dedicated utility easement, unless otherwise approved. HCUD may require the off-site infrastructure of a project to be extended beyond the development point(s) of connection.

3.4.6 DEPTH OF COVER: Cover depth is measured from finished grade to the top of the pipeline; it shall be a minimum of 36-inches to a maximum of 48-inches for water mains constructed along local streets and a minimum of 48-inches to a maximum of 60-inches for water mains constructed along arterial streets or roads, unless authorized by HCUD. There will be exceptions made for conflicts that the pipeline has to cross. Horizontal Directional Drilling (HDD) does not apply.

3.4.7 EMERGENCY POWER GENERATOR SYSTEM (EPGS): See Section 6.

3.5 SEPARATION AND CROSSINGS OF POTABLE WATER, RECLAIMED WATER AND SEWER LINES: See Chapter 62-555.314 of Florida Administrative Code (FAC), also see Detail 17.

3.5.1 SEPARATION

3.5.1.1 HORIZONTAL SEPARATION: A minimum horizontal separation of 6-feet, outside of pipe to outside of pipe, shall be maintained between water mains, RW, sanitary sewers, or sanitary force mains.

3.5.1.2 VERTICAL SEPARATION: A minimum vertical separation of 6-inches, outside of pipe to outside of pipe, shall be maintained between water mains, RW, sanitary sewers, or sanitary force mains.

3.5.1.3 Potable water, wastewater gravity/force, or RW lines shall not be placed in the same trench.

3.5.1.4 In cases where it is not practical to maintain a 6-foot separation, the pipe shall be laid in a separate trench or on an undisturbed earth shelf located on one side of the other main and at an elevation so that the bottom of the pipe is at least 6-inches above the top of the other main.

- 3.5.1.5 If it is impossible to obtain proper horizontal and vertical separation as described above, the water line shall be constructed of DIP and the wastewater line shall be C900 PVC. Both lines to be pressure tested to 150 PSI for 2-hours to insure water tightness.

3.5.2 PIPELINE CROSSINGS

- 3.5.2.1 At pipeline crossings, one full length of pipe shall be located so both pipe joints shall be equidistance as possible from the other main joints.
- 3.5.2.2 Where wastewater or RW mains shall cross a water main with less than 6- inches of vertical clearance, the RW and potable water main shall be constructed of ductile iron pipe at the crossing. A wastewater gravity or force main shall be constructed with C900 PVC at the crossing. HCUD shall consider one of the crossing mains to be enclosed within a 20-foot long steel or PVC casing centered on the crossing.
- 3.5.2.3 Water Mains: Typically water mains shall cross above wastewater or reclaimed water lines. Where a water main shall cross under a wastewater gravity main, adequate structural support shall be provided for the gravity main to maintain designed alignment and grade.
- 3.5.2.4 Reclaimed Water (RW) Mains: RW mains shall cross below water mains and above sanitary sewers or sanitary force mains.
- 3.5.2.5 Wastewater mains shall cross below all potable or RW water mains.

3.6 CROSS-CONNECTION CONTROL

- 3.6.1 There shall be no physical cross connection between a public and a private potable water supply or between a tested and non-tested system.
- 3.6.2 There shall be no physical cross connection or condition where sewage, wastewater or RW shall be allowed to enter a public or private water system.
- 3.6.3 All rules, regulations and procedures necessary to administer and enforce the provisions of cross connection control are established in the Hernando County Cross Connection and Backflow Prevention Control Ordinance.

3.7 CONNECTION TO EXISTING WATER MAINS

- 3.7.1 All connections to existing HCUD water mains shall be made after approval and under the direct observation of HCUD.
- 3.7.2 The developer shall submit a request to HCUD to schedule a waterline tap a minimum of 48-hours prior to proposed connection to the water main. Existing valves on existing mains shall be operated by or under direct supervision of HCUD personnel.
- 3.7.3 Existing water mains shall be tapped in such a manner as to avoid disturbance or disruption of service and to protect the potable water supply from contamination. When service shall be interrupted to existing customers during construction of a tap or addition of appurtenances the following conditions apply:
 - 3.7.3.1 The contractor shall request HCUD to schedule connection operations so as to keep customer service disruption to a minimum. The request to HCUD shall be made 5 business days prior to the proposed time of connection to existing utilities systems. The Utilities Department will require a Public Service Announcement (PSA) to be issued for all scheduled interruption of services lasting four (4) hours or longer and/or affects 250 customers or more. A scheduled PSA must be submitted by Utilities staff to the County's Community Relations Department no less than one (1) work week prior to the interruption of service.

- 3.7.3.2 The contractor shall be ready to proceed with as much material preassembled as possible at the site to minimize the length of time of service interruption. Typically such connections shall be made at night to minimize the negative effects of service disruption.
- 3.7.3.3 HCUD shall postpone a pre-arranged or scheduled wet tap procedure if the contractor is not prepared to proceed on schedule.
- 3.7.4 **WATERLINE CONNECTION PROCEDURES:** Prior to the tap, the contractor shall assemble all materials, tools, equipment, labor and supervision necessary to make the tap connection. The contractor shall excavate sufficiently to insure the proposed wet tap is not performed within 36-inches of a pipe joint or fitting. The contractor shall excavate and maintain a dry and safe working area pit of sufficient size to facilitate the wet tap procedure. The contractor shall pressure test the tapping saddle or sleeve and valve installation under the observation of the HCUD Inspector. The test pressure shall be 150 PSI for 15-minutes. The contractor shall be responsible for properly backfilling and compacting the work area pit after the work is completed. The HCUD Inspector shall witness the tapping saddle pressure test, the line tap and the bore plug ("Coupon") retrieval. See Detail 1.
- 3.7.5 **WATERLINE CONNECTION MATERIALS:** The contractor shall furnish and install approved tapping saddles or sleeves with valves and perform wet taps on existing water mains larger than 2-inches. HCUD shall furnish the tapping machine tools, fittings and shall perform the wet tap for 2-inch and smaller diameters.
- 3.7.5.1 Tapping saddles (TS) shall be an epoxy coated malleable iron body, with stainless steel (SS) nuts and bolts or a SS body with SS bolts and nuts. Tapping saddles for "size on size" wet taps shall be full circle SS sleeve type, similar to Romac SST/DI,JCM#432 or HCUD approved equal.
- 3.7.5.2 Tapping gate valves shall be epoxy coated iron body, resilient wedge or seat, non-rising stem, opening to the left, with a 2-inch operating nut on top. The tapping gate valve flange end shall be mechanical joint for use with cast iron pipe on one side and standard flanged (Class 125) on the other side. The tapping gate valve shall conform to AWWA C-500, for Type II Class A Valves.
- 3.8 **FIRE HYDRANT ASSEMBLIES (FHA) (See Detail 9) AND FIRE PROTECTION:**
- 3.8.1 **Spacing and location**
- 3.8.1.1 **MANUFACTURING AND INDUSTRIAL AREAS:** FHA(s) shall be placed as required by Hernando County Fire Marshall office. The required fire flow shall be determined by the Hernando County Fire Marshal Office. Fire hydrant locations shall be approved by HCUD.
- 3.8.1.2 **COMMERCIAL AND APARTMENT AREAS:** FHA(s) shall be placed as required by Hernando County Fire Marshall office. The required fire flow shall be determined by the Hernando County Fire Marshal Office.
- 3.8.1.3 **RESIDENTIAL AREAS:** FHA(s) shall be placed as required by the Florida Administrative Codes for fire prevention.
- 3.8.1.4 **OTHER AREAS:** FHA(s) shall be placed a maximum of 1000-feet apart, along the ROW of rural roads or other areas as approved by HCUD.

- 3.8.1.5 FHA(s) shall be located within 12-inches of the side lot lines, between adjacent properties and a minimum of 24-inches from edge of ROW in areas without sidewalks and at 12-inches from edge of ROW with sidewalks (see Detail 30). The pumper discharge nozzle shall face the nearest roadway unless approved plans show details of locations other than the above. No object(s) may be placed or constructed near a FHA that would obscure the hydrant from full view or would in any other manner hinder the Fire Department from gaining immediate access to a FHA.
- 3.8.1.6 FHA(s) shall be a minimum of 4-feet from back of valley gutter (Miami curb) and 2-feet from back of upright curb in urban sections. For rural sections, FDOT Index 700 Clear Zone Criteria shall be met. FHA(s) shall be a minimum of 10-feet from edge of pavement.
- 3.8.1.7 FHA(s) in paved areas shall be protected by four bollards; 4-inch diameter steel pipe, 3-feet above and below grade filled with concrete and set in concrete, placed as required. See Detail 9.
- 3.8.1.8 The location of a new FHA shall be identified with a blue reflective pavement marker installed on the roadway. The reflective marker shall be located perpendicular to the hydrant, in the center of the lane closest to the hydrant.

3.8.2 Fire Protection Service Lines

3.8.2.1 Systems installed within Public rights-of-Way:

3.8.2.1.1 Compound water meter not required by HCUD.

3.8.2.1.2 Reduced Pressure Zone-Backflow Prevention Assembly (RPZ-BPA) not required by HCUD.

3.8.2.2 Systems installed on Private Property:

3.8.2.2.1 HCUD requires an HCUD approved Reduced Pressure Zone-Backflow Prevention Assembly (RPZ-BPA) (See Section 10) to be installed at the Property Line, on Private Property.

3.8.2.2.2 Applicable Installations are the responsibility of the Developer and shall meet or exceed HCUD specifications.

3.8.2.2.3 On-site fire protection systems (lines and components) shall be installed, owned, maintained and tested by the property owner.

3.8.2.2.4 The RPZ-BPA shall be tested and approved annually by certified BPA tester.

3.8.2.2.5 In the event reclaimed water is available within 200 feet of the property line, this may be used, with authorization by HCUD, in lieu of potable water.

3.8.3 FIRE HYDRANT ASSEMBLIES (FHA): See Detail 9.

3.8.3.1 Fire hydrants shall be of the "Traffic Model", dry barrel, compression type closing with the line pressure and shall comply with AWWA Standard C502 "Standard for Dry-Barrel Fire Hydrants".

3.8.3.2 Fire hydrants shall open left with an arrow clearly cast on the top showing the direction of opening. Hydrants shall have a 1¼ -inch pentagonal operating nut with an anti-friction washer and bushing above the thrust collar. The operating nut, main stem, coupling and main valve assembly shall be capable of withstanding input torque of 200 ft.-lbs. in opening or closing directions.

- 3.8.3.3 Fire hydrants shall have two 2 ½ -inch hose nozzles and one 5 ¼ -inch with National Standard Hose Threads. Hose nozzles shall have a minimum 18-inch and a maximum of 24 – inch clearance from their center line to the bury line. Hose nozzle caps shall be securely chained to the hydrant barrel with heavy duty 3/0 twist link, non-kinking chain and shall have durable neoprene nozzle cap gaskets. Nozzle caps shall be cast with a 1¼-inch pentagonal nut for cap removal.
- 3.8.3.4 Fire hydrants shall have a traffic feature consisting of a breakable safety flange and steel or cast-iron stem coupling located below the break line of the hydrant and which allows 360-degree positioning. For vehicle collision protection, FHA(s) in paved areas shall be protected by a “bollard” system.
- 3.8.3.5 Fire hydrant shall have a 250 PSI working pressure and 400 PSI test pressure. Fire hydrants shall be AWWA Traffic Models meeting the above stipulations and as manufactured by AVK, American Flow (American Darling B-84-B) or HCUD approved equal.

3.9 PIPES AND FITTINGS: Water distribution mains for residential subdivisions and all transmission mains shall be constructed of DIP, PVC or HDPE. Pipe larger than 24-inches in diameter shall be approved on a case-by-case basis.

3.9.1 PIPE MATERIALS: The following Table 3-2 lists the allowable pipe materials for various sizes of potable water main pipe:

TABLE 3-2

WATER MAIN PIPE OPTIONS

<u>Material</u>	<u>Diameter</u>	<u>General Specification</u>
DIP	4" to 24"	ANSI/AWWA C151/A 21, CL 50
PVC	4" to 12"	AWWA C900, Class 150, DR 18
PVC	14" to 24"	AWWA C905, DR 25, 165 psi
PVC	6" to 12"	AWWA C-909, Class 150, “Ultra-Blue”
Horizontal Directional Drill (HDD) Pipe		SEE SECTION 7
JACK AND BORE		SEE SECTION 8

3.9.2 DUCTILE IRON PIPE (DIP) AND FITTINGS

3.9.2.1 DIP shall conform to the requirements of ANSI A21.51, minimum Class 50, unless otherwise specified by the EOR. Pipe joints for DIP shall be mechanical or push-on joints. Pipe shall have an exterior bituminous coating in accordance with ANSI A21.51. Pipe interior shall have a cement mortar lining with an asphaltic seal coat conforming to ANSI/AWWA C104/A21.4. The weight and class designation shall be painted in white paint on the exterior surface of each pipe section. Manufacturer code or serial number shall be provided on the bell of each pipe joint. DIP shall be spirally wrapped by blue tape with adhesive backing. DIP will be furnished in 20-foot lengths or as specified by HCUD.

- 3.9.2.2 Fittings: All DIP fittings shall be mechanical joint, shall meet the requirements of ANSI/AWWA C110/A21.10, shall have a pressure rating of 250 PSI, and shall be full-radius fittings. All fittings shall be coated and lined as specified above for ductile iron pipe.
- 3.9.2.3 Mechanical Joints: Mechanical joints consisting of bell, socket, gland, gasket, bolts and nuts shall conform to ANSI Standard A21.11. Bolts shall be high strength low alloy steel, such as "Corten," or "U.S. Alloy," T-head type having hexagonal nuts. Bolts and nuts shall be machined true and nuts shall be tapped at right angles to a smooth bearing surface.
- 3.9.2.4 Push-on Joints: Single seal gasket push-on type joints shall conform to the requirements of ANSI A21.11 and shall be U.S. Pipe "Tyton," American Cast Iron Pipe Company "Fastite," CLOW Corporation "Super Bell Tite," or HCUD approved equal.
- 3.9.2.5 Restrained Joints: Restrained joints shall be installed where water main pipe alignment changes direction. Restrained joints shall not be of the type that requires field welding or grooves cut into the pipe barrel for restraint. The length of pipe sections to be restrained shall be determined by the EOR and noted on the drawings. Shop drawings from the manufacture shall be submitted to and approved by the EOR and HCUD prior to construction. The restraining joints for mechanical joint fittings and valves shall be ROMAC Industries Grip Ring, EBAA Iron MEGALUG, or HCUD approved equal. See Detail 15.
- 3.9.2.6 Gaskets: Pipe and fitting gaskets, conforming to ANSI A21.11, shall be made of viton (fluorocarbon elastomer), EPDM (Ethylene Propylene Diene Monomer) or SBR (Styrene-Butadiene Rubber).
- 3.9.2.7 Encasement: All DIP and fittings shall be encased in polyethylene in accordance with ANSI/AWWA C105/A21.5 when installed in hostile soil conditions.

3.9.3 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

- 3.9.3.1 All PVC pipe shall bear the approval seal of the National Sanitation Foundation (NSF) that will remain legible during normal handling, storage, and installation.
- 3.9.3.2 Pipe color shall be blue for potable water mains.
- 3.9.3.3 PVC pressure pipe 4-inches through and including 12-inches in diameter, shall meet the requirements of AWWA C900, shall have the same outside diameter (OD) as DIP and be compatible for use with ductile iron fittings. PVC pipe water mains less than 4-inches in diameter shall not be accepted by HCUD.
- 3.9.3.4 The pressure class and dimension ratio (DR) of PVC pressure pipe shall be 150 PSI, DR 18 and laying length of 20-feet.
- 3.9.3.5 Fittings for PVC Pressure Pipe (4-inches through 12-inches) shall be ductile iron with mechanical joints, with a minimum pressure rating of 250 PSI and shall conform to the requirements of ANSI A21.10 and A21.4.
- 3.9.3.6 Joints for PVC pressure pipe shall be of the compression rubber gasket type and the pipe line installation shall be as recommended by the pipe manufacturer.
- 3.9.3.7 Restrained Joints for PVC pipe shall be Uni-Flange Series 1350 for PVC-PVC joints and Uni-Flange Series 1300 or EBBA PV2000 fittings for PVC-DIP joints, or HCUD approved equal. The length of PVC pipe to be restrained shall be determined by the EOR and noted on the drawings. Shop drawings from the manufacturer shall be submitted to and approved by the EOR and HCUD prior to actual construction. See Detail 15. For watermain installations, Certainteed's Certa-Lok systems DR18 may be used in lieu of PVC with restrainers.

3.9.3.8 HCUD may require pre-cast 500 pound concrete Thrust Blocks in addition to restrained joints.
(See Detail 14)

3.10 VALVES AND APPURTANCES: All valves shall be the manufacturer's standard design for the service intended and shall bear the maker's name, pressure rating, size and flow direction arrow cast on the body. Valves shall open left (counter clockwise) with an arrow cast in the metal of operating hand wheels or nuts indicating the direction of opening.

3.10.1 Gate Valves (GV): See Detail 23.

- 3.10.1.1 A GV 2-inches in size shall have a full port opening, non-rising stem with hand wheel, thread to thread, and resilient wedge. Example is AVK, No. 03-063-43 with hand wheel.
- 3.10.1.2 GV 4-inch, up to and including 12-inch for in-ground applications, shall be of the resilient seat type (meeting the requirements of AWWA C515/C509) non-rising stems, with a 2-inch square AWWA style operating nut, and shall open when the nut is turned counterclockwise when viewed from above the activator nut. Valves shall have mechanical joint ends and shall be furnished complete with joint accessories. Exposed or above-ground GV(s) shall be Outside Stem and Yoke (OS&Y) flanged joint type. GV(s) shall be American Flow Control Series 2500, Kennedy KS-RW AWWA C 515, AVK, or HCUD approved equal.
- 3.10.1.3 The GV activator nut shall be protected by an adjustable cast iron valve case (similar or equal to Tyler, 2 piece, No. 461-S for short applications or 562-S for long applications) with a cast iron lid marked "WATER" on top. Valve cases shall be secured by a concrete pad; 24-inches by 24-inches by 6-inches thick, with #4 rebar inside the pad perimeter and shall conform to final grade and slope. If the GV activator nut is installed lower than 36-inches below grade, the contractor shall install a valve operation nut extension device, such as Pentek Roadway Valve Box (see section 3.10.10) or HCUD approved equal, the contractor shall modify the valve case to ensure soil does not enter the operating nut area, causing GV operational difficulties.

3.10.2 Butterfly Valves (BV): See Detail 22.

- 3.10.2.1 Valves 14-inches in size or larger shall be "Butterfly Valves" (BV), meeting AWWA C504 standards and shall be of the tight closing, resilient disk or seat type. BV disks shall rotate 90 degrees from the full open position to the tight shut position.
- 3.10.2.2 The BV shall open counterclockwise when viewed from above the activator stem nut. Manual BV operators shall be of the worm gear or traveling nut type and fully enclosed. Operators shall have adjustable mechanical stop limiting devices to prevent over-travel of disks. Underground applications shall be gasketed, grease packed and all BV(s) shall be furnished with 2-inch square operating nuts.
- 3.10.2.3 The BV activator nut shall be protected by an adjustable cast iron valve case (similar or equal to Tyler, 2 piece, No. 461-S for short applications or 562-S for long applications) with a cast iron lid marked "WATER" on top. Valve cases shall be secured by a concrete pad; 24-inches by 24-inches by 6-inches thick with #4 rebar inside the pad perimeter, and shall conform to final grade and slope. If the valve activating nut is installed lower than 36-inches below grade, the contractor shall install a valve operation nut extension device, such as Pentek Roadway Valve Box (see section 3.10.10) or HCUD approved equal, the contractor shall modify the valve case to ensure soil does not enter the operating nut area, causing BV operational difficulties.

- 3.10.3 Tapping Valves: The Tapping Valve shall be mechanical joint outlet, non-rising stem, and resilient seat meeting the applicable requirements of AWWA C515 or C509. The Tapping Valve shall be designed for pressure tapping with sufficient seat opening to allow full diameter taps to be made and shall be manufactured with an integral tapping flange having a raised lip design. See Detail 1.
- 3.10.4 Tapping Sleeves: Tapping sleeves for size-on-size connections shall be full circle stainless steel tapping sleeve and rated for 150 PSI working pressure. For less than size-on-size connections, tapping sleeve shall be fabricated steel units with a fusion-bonded epoxy coating or Stainless Steel and shall be pressure rated at 150 PSI. The contractor shall verify the outside diameter of the existing water main before ordering the tapping sleeve.
- 3.10.5 Service Tapping Saddles: Service tapping Saddles shall be malleable iron, ductile iron, stainless steel, or bronze bodies and secured with corrosion resistant coated double straps and nuts. The sealing gasket shall be the O-ring type suitable for the applicable service. Outlet flange shall be ANSI B16.1, 125 lbs. standard. Service saddles shall be Power Seal No. 3413 or HCUD approved equal. Outlet threads shall conform to AWWA Standard Corporation Stop or iron pipe threads and range in size from $\frac{3}{4}$ up to 2-inch. The diameter of the Service Tapping Saddles shall conform to the type and size of the pipe being tapped. Epoxy coated saddles will be required iron type saddles and in highly corrosive areas as determined by HCUD.
- 3.10.6 Combination Air-Vacuum Release Valve (ARV) Assembly (See Detail 25 B):
- 3.10.6.1 All potable water lines shall have air and vacuum release valves installed as they are indicated on the plans. The body/base of these valves shall be made from high strength lightweight non-corroding fiberglass reinforced nylon, with total weight of no more than 3 pounds, and all operating parts are to be made of engineered corrosion resistance plastic materials. The rolling resilient seal shall provide smooth positive opening, closing, and leak free sealing over the fluctuation of pressure differentials. The valve shall be designed to allow larger than normal automatic orifice providing efficient air release and minimize potential debris build up and clogging. The working pressure shall be 200 psi and shall have a $\frac{3}{4}$ -inch, 1-inch, or 2 -inch threaded connection. All air and vacuum release valves shall be model ARI D-040 or approved HCUD equal. An isolation valve is required. All ARV valves must be ISO-9000 and NSF 61 certified. All components in contact with potable water must be NSF/ANSI 61 AND NSF/ANSI372 certified.
- 3.10.6.2 ARV Housing: All air release valves shall be enclosed above ground in Water Plus Model ARV-H-30 or HCUD approved equal. Enclosures shall be colored blue. For ARV's that are of a size larger than can be installed in the standard enclosure referenced above, other Water Plus or HCUD approved equal enclosure shall be used. All enclosures shall be constructed of quality, UV resistant poly-plastic with a galvanized stable bar in back; for aerial crossings, the stabilizing bar may removed. All enclosures shall be colored blue and be equipped with a locking device approved by HCUD. The Standard enclosures (H-30) shall be equipped with a Pin Allen lock and keys (Pin Allen) shall be provided with each installation.
- 3.10.7 Pressure Reducing Valves: Pressure Reducing Valves shall be manufactured by CLA-VAL Company or HCUD approved equal and be certified by the EOR and shall be reviewed and approved by HCUD.
- 3.10.8 Pressure Sustaining Valves: Pressure Sustaining Valves shall be manufactured by CLA-VAL Company or HCUD approved equal and be certified by the EOR and shall be reviewed and approved by HCUD.

3.10.9 Blow-Off Assemblies (BOA)

- 3.10.9.1 A BOA shall be installed on all dead-end mains and at the end of cul-de-sac distribution mains. Construction plan and "As Built" (Record Drawings) shall include blow-off assembly stationing on both the plan and profile views.
- 3.10.9.2 "Blow-off Hydrants" shall be maintenance free, traffic/tamper proof, and be of a 2-inch design, with brass ball valve, female connection (NSFT threads) operated with standard 2-inch operator's key. Hydrant installation shall be below ground level, inside a 5 1/4-inch valve box secured in place with concrete valve pad. A non-draining 1/4-inch brass ball valve that opens to the left and a pre-cast concrete thrust block that is accessible within the hydrant assembly valve box. The valve box riser section shall be 2-inch galvanized pipe. The outlet shall be brass 2 1/2-inch diameter, hydrant threads with brass cap and brass chain. The assembly shall include one Diffuser Fitting and one Sampling Adapter Fitting (with individual storage cases), adaptable to the hydrant threaded outlet. One sampling rod shall be furnished with every 50 hydrants installed. The "Blow-off Hydrant" assembly and accessories shall be manufactured by Kupperle Foundry model number TF550, Valve Box manufactured by Tyler, Diffuser Fitting (Model No. 2BDIF1B), Sample Adaptor Fitting (Model No. 2BSA150), one Sampling Probe Rod (Model No. 150G) or HCUD approved equals. See Detail 10.

3.10.10 Valve Boxes: See Detail 23.

- 3.10.10.1 Valve box for valve operating nut 36 inches or less to finished grade:
Valve boxes for all valves installed below ground shall be made of cast iron. Valve boxes shall be adjustable to fit the depth of earth cover over the valve and shall be designed so as to prevent the transmission of surface loads directly to the valve or piping. Valve boxes shall have a minimum interior diameter of 5 1/4 -inches. Valve box extension shall be installed to reserve a minimum of 50% of the adjustment for a future extension. Valve boxes shall be supplied by Tyler MFG., two pieces, with cast iron lid, No. 461-S for short applications or 562-S for long applications. No ductile iron or pvc pipe allowed as part of the finished valve box assembly.
- 3.10.10.2 Valve box for valve operating nut 36 inches or greater to finished grade:
Highline 5 1/4" ROADWAY VALVE BOX: Valve Box shall be injection molded and commercially manufactured utilizing a proprietary Highline® compound known as SUPERFLEXON per ASTM D-2853-70, Class 1212. Material shall be a rigid combination of polyolefin with fibrous inorganic component reinforcing and U.V. stabilizer additives to assure resistance to material degradation from ultraviolet light. The entire upper section of the box shall be made of a POLYIRON® magnetically locatable material. The use of magnets will not be permitted. Box shall have a cast iron ring and a cast iron 4-pronged traffic lid. Cast iron shall have a minimum weight of 18 lbs. and must conform to ASTM-A-48, Class 20 specifications. Box shall be a Buffalo type (screw) and have a shaft diameter of 5 1/4". The bottom part of the box shall have a bell measuring 7 5/8" high by 10 1/16" wide and have a knock out as standard equipment.
- 3.10.10.3 The cast iron cover of the valve box shall be marked "WATER", painted blue, and shall be secured with a concrete pad to prevent tipping or moving.

3.10.11 ISOLATION VALVES AND LOCATIONS

- 3.10.11.1 ISOLATION VALVES: All isolation valves up to and including 12 inches shall be resilient seat gate valves. Isolation valves including 14 inches and larger shall be butter fly type.

- 3.10.11.2 Valves shall be placed so that the maximum allowable length of water main required to be shut down for repair work shall be no more than 1,000-feet.
- 3.10.11.3 The designer shall consider and incorporate maintenance considerations when placing isolation valve location. HCUD reserves the right to require additional isolation valves for efficient operation and maintenance.
- 3.10.11.4 Valves and valve boxes shall be provided for all branch connections (typically two valves on a tee, three valves on a cross or as determined by HCUD), FHA stub-outs or other locations as required to facilitate operation of the water distribution system.
- 3.10.11.5 Water main extensions or mains extending at a project phase line shall include a valve and one additional standard length of pipe with a cap and a temporary Blow-Off Assembly (BOA). See Detail 10.
- 3.10.12 Concrete Valve Pad and Brass Tag: Valve boxes located outside of paved areas shall be cast in a 24-inch x 24-inch x 6-inch thick 3000 PSI concrete slab. See Detail 23 for Standard Pad installation specifications. Brass tags shall read "WATER" for water mains, year of installation, diameter of pipe, and the number of turns to open or close the valve.
- 3.11 WATER SERVICE CONNECTIONS: Connections to existing water systems shall be made after written approval is obtained from the utility owner. The connections to existing HCUD water systems shall conform to approved plans and be witnessed by an HCUD representative. Water service connections shall be included as part of the distribution system and consist of: the service line, the corporation stop, the curb stop, and (for dual near-side connections) a dual service branch (U48-43-6.5 Ford 1" C.T.S. P.JX (2) ¾-inch Male Iron Pipe (MIP) outlets). The builder shall furnish and install water service connections as shown in Details 2, 3, 4 and 5.
 - 3.11.1 GENERAL REQUIREMENTS:
 - 3.11.1.1 Water service lines 2-inches and less in diameter shall be blue colored polyethylene tubing (PET) and conform to ASTM Standards D 1248 and 2239, DR 9, 200 PSI, with NSF approval for potable water service.
 - 3.11.1.2 All near-side residential services shall be 1-inch PET for both single and dual services.
 - 3.11.1.3 All far-side services shall be single 1-inch PET for both single and dual services.
 - 3.11.1.4 Far-side service pipe (1-inch PET) crossing under pavement shall be installed in a 2-inch Schedule 40 PVC sleeve at a minimum depth of 30-inches and a maximum depth of 42-inches below pavement.
 - 3.11.1.5 Services 2-inches or larger in diameter shall also meet the same requirements of the pipe, pipe fittings, and valve sections of this specification manual.
 - 3.11.1.6 Water service lines ("Whips") shall be staked to ensure that when the curb stop valve is installed it shall be within 2-feet from property line or edge of sidewalk.
 - 3.11.1.7 Where water service lines conflict with fire hydrants and/or storm drainage structures, two single 1-inch service taps shall be installed 5-feet on each side of the obstruction.
 - 3.11.2 POLYETHYLENE EXTRUSION TUBING (PET)
 - 3.11.2.1 PET compound shall comply with the applicable requirements for the Type III, Grade P34, Class C, PE 3408, very high molecular weight polyethylene plastic material, as specified in ASTM D1248, a cell classification of 345434C or 355434C as specified in ASTM D3350.

3.11.2.2 PET shall be DR 9-200 PSI, type CTSVOD (copper tubing size) or HCUD approved equal.

3.11.2.3 PET shall have endured environmental stress cracking resistance testing, performed in by the manufacturer accordance with ASTM D1693, Condition C, and shall have no failures during 5000-hours test period.

3.11.2.4 PET service pipe or tubing shall be blue and identified with black lettering.

3.11.2.5 PET service lines and components shall be sized based on the following Table 3-3:

TABLE 3-3

POLYETHYLENE TUBING SERVICE LINES AND COMPONENTS SIZING

<u>Service</u>	<u>Meter Size</u>	<u>Corporation Valve Size</u>	<u>PET Service Line Size(s)</u>	<u>Curb Stop Size</u>
Double	5/8" X 3/4"	1"	1"	1" X 3/4" X 3/4"
Single	5/8" X 3/4"	1"	1"	1" X 3/4"
Single	1"	1"	1"	1" X 1"
Single	1 1/2"	2"	2"	2" X 2"
Single	2"	2"	2"	2" X 2"

3.11.3 CORPORATION STOP VALVES: Corporation Stop Valve (Corp. Stop Valve) bodies shall be bronze, with inlet connection to be 1-inch male NPT pipe thread. The outlet PET service line shall be secured by a compression fitting. Where PET inserts are required, the inserts shall be solid SS tube body type (not split). An acceptable Corp. Stop Valve example is; Ford F-1100-4, with SS insert examples being 3/4-inch Mueller #504281 and 1-inch Mueller #504385.

3.11.4 DUAL SERVICES: The dual service branch piece shall be bronze body with a 1-inch C.T.S. P.J. X (2) 3/4 "MIP" with 6 1/2-inch outlet spacing, supplied by Ford MFG. No. UAV43-42W-65, with meter swivel nut.

3.11.5 SERVICE BOX LOCATION: In residential subdivisions HCUD shall install the individual service meter and meter box in response to the residential customer's application for service. The developer shall clearly identify the location of future service connections by the following:

3.11.5.1 Temporary identification: During construction, the location may be temporarily identified with a pressure treated 2" x 4" x 96" wood stake with the top 6-inches painted blue.

3.11.5.2 Permanent identification: When the service roadway is complete, the contractor shall mark the roadway curb with blue paint indicating the location of the service connection. The marking procedure shall be subject to approval by HCUD.

3.11.6 Upon completion of the installation of sub-division potable water service lines, the contractor shall supply and install individual curb stop valve lock seals tapered 93210121 and lock seal stud 93210141 manufactured by Highfield Manufacturing Company (or HCUD approved equal) for each of the potable water service line "Whips". Potable Water Service "Whips" installed by HCUD shall have lock seal and stud installed by HCUD.

3.11.7 METERS (See Table 3-4)

- 3.11.7.1 All new residential, irrigation and commercial accounts up to and including a 2" meter will require a Neptune T10 R900i radio read meter (Pit Version) supplied and installed by HCUD.
- 3.11.7.2 Commercial accounts requiring meters greater than two inch shall require a Neptune TRU/FLO R900i compound radio read meter with an E-Coder R900i Pit Version MIU or HCUD approved equal. The compound meter shall be supplied and installed by the developer. All meters three (3) inches and larger shall have a Neptune Meter Strainer installed directly before the meter assembly and the meter assembly shall be installed above ground.
- 3.11.7.3 All Neptune radio read meters, regardless of size, shall have an E-Coder R900i Pit Version MIU Register.
- 3.11.7.4 In instances where commercial developments, condos and apartments greater than four units are proposed, a compound master meter and BPA will be installed. The developer and/or association has the option to sub-meter these properties if they so choose. However, for billing purposes, HCUD will read only the master meter. A compound master meter will be installed in the right-of-way adjoining the property line. A backflow prevention assembly (BPA) will be installed on the property adjoining the property line. The offsite water infrastructure up to and including the meter will be owned and maintained by HCUD; the onsite water system including the BPA will be maintained privately.

Table 3-4
Water Meter Applications

<u>Meter Type</u> ¹	<u>Meter Size</u> ^{2, 3}	<u>Meter Application</u> Not Limited To
Displacement Type Neptune T-10	5/8" to and including 2"	Residential, Irrigation, and Some Commercial
Neptune TRU/FLO Compound (High/Low Flow)	2" HP, 3", 4", 6", and 6"x8"	Commercial – ALF, Apartment Complex, Schools, Hospitals, Shopping Center, etc.
Neptune Turbine (High Flow w/ Little Low Flow)	1.5" to and including 20"	Commercial – Irrigation, Truck Washes, Water Plants, etc.
Neptune HP Protectus III (High/Low Flow & Fire Protection)	4", 6", 8", and 10" (No strainer needed – included)	Commercial – When Fire and Potable Water are the same lines

¹ All Neptune Radio Read Meters require an E-Coder R900i Pit Version MIU Register.

² Neptune Strainers are required on all 3" and larger meter assembly installations.

³ All meter assemblies 3" and larger require above ground installation.

3.12 PIPE HANDLING AND CUTTING, INSTALLATION OPTIONS AND PRESSURE TESTING

PROCEDURES: The provisions set forth herein shall be applicable to all underground piping installations. It shall be the developer's responsibility to verify all existing conditions and to locate all structures and utilities along the proposed utility alignment in order to avoid conflicts. Where conflicts exist, work shall be coordinated with the facility owner and performed so as to cause minimum interference with the service rendered by the facility disturbed. Facilities or structures damaged during construction shall be repaired and/or replaced immediately at the developer's expense, in conformance with current standard industry practices, according to the direction of the owner of such facility, and approved by HCUD.

3.12.1 PIPE HANDLING, CUTTING AND LAYING: See Detail 16.

- 3.12.1.1 Care shall be taken in handling and laying pipe and fittings to avoid damaging the pipe, scratching or marring machined surfaces, and abrasion of the pipe coating. Any fitting showing a crack and any fitting or pipe which has received a severe blow that shall have caused an incipient fracture, even though such fracture cannot be seen, shall be marked, rejected and removed at once from the work area.
- 3.12.1.2 In any pipe showing a distinct crack and in which it is believed by the EOR that there is no incipient fracture beyond the limits of the visible crack, the cracked portion, if so approved, shall be cut off and discarded before the remaining pipe section is used. The cut shall be made in the sound area of the pipe barrel, at a point of at least 12-inches from the visible limits of the crack and after the cutting process; all cut ends shall be examined for possible further cracks caused by cutting. All cutting shall be done with a machine adapted to the purpose.
- 3.12.1.3 Pipe shall be constructed of the materials specified and as shown on the drawings. Each section of the pipe shall rest upon the pipe bed for the full length barrel, with recesses excavated to accommodate bells and joints. Any pipe which has its grade or joint disturbed after laying shall be taken up and re-laid. No pipe shall be laid when the trench conditions or the weather is unsuitable for such work, except by permission of the EOR. Any section of pipe already laid which is found to be defective or damaged shall be replaced with new pipe without additional cost to HCUD. Excavation, trenching and backfilling shall be in accordance with the requirements of the applicable portions of these specifications.

3.12.2 PIPE INSTALLATION OPTIONS

3.12.2.1 Open Cutting

- 3.12.2.1.1 Trench Excavations that shall be "open cut", shall have trench banks kept as near vertical as possible and wide enough to allow approximately 8-inches clearance on each side of the pipe. The trench floor shall provide a uniform bearing for each full length of pipe section. Excavate bell recesses after trench has been graded. Perform all excavations to the depths shown or indicated on plans. In the event unsuitable or unstable soil shall be encountered, it shall be removed and replaced with clean sand, gravel, crushed stone, crushed slag, or combination thereof, or other material as approved by the EOR. Trench excavations in excess of 8-feet deep shall have trench box safety structures used during construction. Any pipe which has its grade or joint disturbed after lying shall be taken up and re-installed. No pipe shall be laid when the trench conditions or weather is unsuitable for such work, unless approval is given by the EOR or HCUD. Any section of pipe already installed and found to be defective or damaged shall be replaced immediately with new pipe without additional cost to HCUD. The contractor shall use precautions during construction to protect the installed pipe from contamination from vermin or foreign materials.

- 3.12.2.1.1.1 Dewatering: The Contractor shall remove all water from excavations and maintain the excavations free of water while construction is in progress, by providing dewatering equipment as necessary to conform to this requirement. Dewatering procedure must meet all regulatory agencies rules, regulations and requirements.

- 3.12.2.1.1.2 Pipe trenching across roadways and driveways shall be backfilled and compacted as soon as pipe is installed. Open trenches near traffic shall have the proper protective barricades, signage and traffic control personnel provided by the contractor.
- 3.12.2.1.1.3 No more than 200-linear feet of pipe shall remain uncovered during the installation procedure.
- 3.12.2.1.1.4 Protection of Trees: Trenching shall not take place within the root zone of trees with a trunk diameter of 6-inches or larger. The root zone shall be defined as either; the drip-line of the tree canopy or a circular zone extending outward from the base of the tree for a distance equivalent to 1/2-foot for every inch of trunk diameter (as measured 4 1/2-feet above natural grade). Questionable exotic nuisance plant species shall be identified by proper authorities and classified as exempt from this protection. Some examples are Brazilian Pepper and Melaleuca.
- 3.12.2.1.1.5 Backfill, Bedding and Compaction: Backfilling and compaction shall be conducted in a manner to preclude subsequent settlement and shall provide adequate support for the surface treatment, pavement, pipelines, or structures to be placed thereon. See Detail 16.
- 3.12.2.1.1.6 Backfill material shall be common fill material, free from organic matter, muck or marl, and rocks exceeding 2 1/2-inches in diameter. Common fill shall not contain broken concrete, masonry, rubble or other similar materials.
- 3.12.2.1.1.7 Backfilling and Compacting Procedures: The backfilling procedures outlined below shall be for pipe mains and related structures. The backfilling shall be done in three stages as follows:
- First Stage: The contractor shall provide adequate suitable material fill to be compacted beneath the haunches of the pipe, using mechanical tampers. This compaction also applies to the bedding material placed in layers above the pipe.
- Second stage: The contractor shall obtain a well-compacted bed and fill and compact along the sides of the pipe and then to a point of at least 1-foot above the top of the pipe. The width of backfill and compaction to be done under this second stage shall be the width of the portion of the trench having vertical sides, or when no portion of the trench has vertical sides, it shall be to a width at least equal to three times the outside diameter of the pipe. Fill material shall be placed in 12-inch compacted thickness layers.
- Third stage: The remainder of the trench up to grade shall be backfilled with suitable material fill in layers not to exceed 1-foot in thickness and compacted.
- 3.12.2.1.1.8 Method of Compaction: The contractor shall adopt compaction methods which will produce the degree of compaction specified herein without damage to the new or existing facilities. The degree of compaction specified below shall be considered the minimum allowable.

- 3.12.2.1.1.9 Compaction Density: For paved and unpaved roadways and traffic areas, from right-of-way line to right-of-way line, including all structures and railroad crossings, shall be 98% of the maximum density as determined by American Association of State Highway and Transportation Officials (AASHTO) T-180 (ASTM D1557 - Modified Proctor) with a minus 3% tolerance. For outside of the right-of-way, but within dedicated utility maintenance easements, shall be 95% of the maximum density as determined by AASHTO T-180 (ASTM D1557 - Modified Proctor) with a minus 3% tolerance.
- 3.12.2.1.1.10 Compaction Test Requirements: Compaction test results shall be submitted for all work in ROW(s) and dedicated easements. Results of compaction tests shall meet minimum requirements prior to proceeding with the next stage of the work. One complete set of all test reports shall be submitted with the "As Builts" (Record Drawings) package to HCUD upon project completion.
- 3.12.2.1.1.10.1 The contractor shall employ a certified independent testing laboratory and shall pay for all required density tests.
- 3.12.2.1.1.10.2 The laboratory shall submit one copy of the certified test reports, after testing in each phase, to the EOR for approval.
- 3.12.2.1.1.10.3 HCUD shall require density tests to be made every 24-inches vertically, staggered every 500-feet horizontally. There shall be a minimum of one test between structures.

3.12.2.2 Horizontal Directional Drilling (HDD) Pipe Installation Option: See Detail 19 and Section 7.

3.12.2.3 Jack and Bore (J&B): See Detail 18 and Section 8.

3.12.3 Hydrostatic and Leakage Testing for PVC Pressure Mains:

- 3.12.3.1 All sections of the buried pipe main shall be completely backfilled before testing. All pressure and leakage testing procedures shall be done in the presence of the HCUD Inspector and the EOR or his designated representative.
- 3.12.3.2 PVC water mains shall be tested as a whole or in sections between valves. The mains shall be tested in accordance with Section 4, Hydrostatic Testing, AWWA C600-87 under an average hydrostatic pressure of not less than 150 PSI, using a 200 PSI gauge, for a minimum of 2-hours. The following Table 3-4 shall be used when pressure testing PVC potable water mains. ANSI/AWWA C600-87 is a copyrighted document. Contact American Water Works Association, 6666 West Quincy Avenue, Denver, Colorado 80235, or www.awwa.org.

Table 3-5

HYDROSTATIC TEST FORMULA FOR PVC PRESSURIZED WATERMAINS

$$L = [S \times D \times \text{SQ. RT. of } P \div 133,200] \times 2 \text{ Hrs.}$$

"L" = the allowable leakage (in gallons);

"S" = the length of pipe tested (in feet);

"D" = the nominal diameter of the pipe (in inches);

"P" = the required test pressure

SQ. RT. of P = square root of the required test pressure:

Potable Water Mains: SQ. RT. of P = square root of 150 = 12.25;

Reclaimed Water Mains: SQ. RT. of P = square root of 150 = 12.25;

Sewer Force Mains: SQ. RT. of P = square root of 125 = 11.18;

- 3.12.3.3 All pumps, gauges and measuring devices shall be furnished, installed and operated by the Contractor and all such equipment and devices and their installation, shall be approved by the HCUD Inspector. All water for testing and flushing shall be potable water provided by the Contractor, at the developer's expense, from a source approved by HCUD. The quantity of water used for testing, which shall be compared to the allowable loss quantity, shall be measured by pumping from a calibrated container, approved by the HCUD Inspector. All restrained sections of the buried main shall be completely backfilled before such sections are tested. All pressure and leakage testing shall be done in the presence of the HCUD Inspector and the EOR or his designated representative.
- 3.12.3.4 When leakage occurs in excess of the specified amount, defective pipe, pipe joints or other appurtenances causing the loss shall be located and repaired at the expense of the contractor. If the defective portions cannot be located, the contractor, at his own expense, shall remove and reconstruct as much of the original work as necessary to obtain a pipe main within the allowable leakage limits upon retesting.
- 3.13 **DISINFECTING WATER SYSTEMS:** After completion of the water main pressure test, the contractor shall disinfect all pipe sections and fittings installed in the system. The contractor shall pay for and schedule with HCHD or a National Environmental Laboratory Accreditation Program (NELAP) authority for the applicable collection and bacteriological testing of samples from the project. The disinfection shall be accomplished in accordance with the applicable provisions of AWWA C 651-99, "Disinfecting Water Mains," and all appropriate approval agencies. Care should be taken to provide disinfection to the entire system, with at least one set of samples shall be collected from every 1,200 feet of the new water main, plus one set from the end of the line and at least one set from each branch after which the lines shall be thoroughly flushed until water samples show a chlorine residual value equal to or less than the existing line. The disinfection process shall be completed and acceptable bacteriological samples test results received prior to HCUD accepting and placing the system into service.
- 3.14 **TEMPORARY WATER SERVICE FOR CONSTRUCTION:** Temporary water service for construction and testing shall be supplied by HCUD after the contractor has applied for and paid applicable fees for the service. In order to obtain water for construction one of the following shall be done (See Detail 44):
- 3.14.1 For service lines 2-inches and less (in certain instances 3 inch or less): HCUD shall attach a hydrant meter assembly, including a proper BPA, to a convenient FHA on the existing HCUD water distribution system. The contractor shall be billed monthly for the water usage as recorded by the in-line meter in the assembly. Temporary Construction meters shall be installed for no longer than 180 days. The meter will be removed after the time limit has expired unless authorization has been obtained from the Director of Utilities or the Assistant Director of Water and Sewer Operations. When the project shall be completed or at the request from the contractor, the temporary service shall be terminated and HCUD shall retrieve the temporary meter assembly.
- 3.14.2 For service lines greater than 2-inches: The Contractor shall install a Water Meter / Reduced Pressure Zone - Backflow Prevention Assembly at the connection point to any existing HCUD water system. The Assembly shall be removed after the newly constructed water system has passed the required HCUD inspections, pressure tests and bacteriological sample tests. The Assembly shall be supplied and installed at the developer's expense and upon removal shall remain the property of the developer. (Temporary blow-off assemblies shall be installed at the remaining connection points in order to properly flush and test the lines). The contractor shall be responsible for all bacteriological testing.
- 3.15 **PIPELINE LOCATORS**
- 3.15.1 Magnetic Locator Tape (MLT): Water mains shall have suitable MLT installed 18-

inches above the waterline. The tape shall be continuous between and secured to each inline flow control valve. Where other waterlines join the mainline, the MLT used to locate these lines shall be secured to the mainline. The MLT shall be a minimum of 5 ½-mil thick, 2-inches wide material, sandwiched between two layers of polyethylene, blue in color (denoting water), with black 1-inch warning letters stating "Caution – Waterline Buried Below."

- 3.15.2 Electronic Locating Wire (ELW): Water mains shall have ELW. The ELW shall be Direct Burial #10 AWG Solid (.1019" diameter), 21% conductivity copper-clad annealed high carbon steel high strength tracer wire, 600# average tensile break load, 30 mil. high molecular weight-high density Blue polyethylene jacket complying with ASTM-D-1248, 30 volt rating. The ELW shall be Copperhead Industries, LLC (part # 1030B-HS) or HCUD approved equal. The ELW shall be securely installed on top of the pipe at the 12 o'clock position. The ELW shall be held in place with nylon cable ties (or equal means of attachment as approved by HCUD), at each end and 48-inches on center of the pipe sections. The ELW shall be of sufficient length as to be extendable to the surface at each valve box, allowing a current to be induced through the wire to detect the location of the pipeline. The ELW shall be brought to the surface inside each valve pad, through a length of 3-inch PVC pipe, with a threaded cap to protect the wire and terminate with a tinned waterproof wire connector. See Detail 23. The ELW on service lines shall be connected to the main ELW and end 24-inches past the curb stop valve with a tinned waterproof wire connector. The cost of the ELW shall be included with the line items for pipe. ELW "stub-out" access points shall not exceed 1000-foot intervals and shall be noted on the final "As Builts" (Record Drawings) set of plans. See Detail 21. Instances where the ELW requires splicing, the two ends of the ELW shall be joined together with a silicon injected wire nut of the proper size. After installation, the contractor shall perform a wire continuity test in the presence of a HCUD inspector.
- 3.16 FINAL ACCEPTANCE OF PROJECT BY HCUD (See Subparagraph 1.23): Final acceptance of the project water distribution system(s) and release of the performance bond by HCUD shall occur when the following conditions shall be met:
- 3.16.1 Pressure tests, preliminary and final inspections shall have been made and the results are presented to and acceptable to HCUD.
- 3.16.2 Improvements are found to be in accordance with the applicable regulations of HCUD, Hernando County, State and Federal regulatory agencies.
- 3.16.3 Acceptable bacteriological clearance result forms have been obtained from HCHD or a National Environmental Laboratory Accreditation Program (NELAP) authority and the EOR has certified the work is in compliance with project specifications. Water samples shall be collected by a certified lab technician (samples collected by the contractor are not acceptable). Threadless hose bibs shall be used for sampling per FAC 62-555 and removed prior to HCUD acceptance.
- 3.16.4 Documents requesting to place water system(s) into service shall have been obtained and acceptance awarded from the appropriate regulatory agencies.
- 3.16.5 HCUD receives from the EOR, two sets of signed, sealed and dated "blue-line" "As Builts" (Record Drawings) and for specific HCUD projects, an additional two complete sets of electronic "As Builts" (Record Drawings), prepared in ".dwg" format and ".pdf" format.
- 3.16.6 The contractor shall ensure that all above ground valves, piping and mechanical joint fittings are protected from the elements by painting the exposed valves and fittings with an approved oil based enamel paint. The paint used to protect potable water

system valves, piping and fittings shall be blue in color.

- 3.16.7 All applicable utility easements have been acquired, recorded and documents received by HCUD.
- 3.16.8 The HCUD contributed Asset Donation Form has been submitted and accepted by HCUD.

SECTION 4

SPECIFICATIONS FOR WASTEWATER COLLECTION/ TRANSMISSION SYSTEMS DESIGN AND INSTALLATION

THIS SECTION IS DIVIDED INTO THE FOLLOWING FOUR SUB-SECTIONS:

- 4A GENERAL WASTEWATER SPECIFICATIONS
- 4B GRAVITY SYSTEMS
- 4C FORCE MAIN SYSTEMS
- 4D PUMP STATIONS

SUB-SECTION 4A

GENERAL SPECIFICATIONS FOR WASTEWATER COLLECTION / TRANSMISSION SYSTEMS DESIGN AND INSTALLATION

**SUB-SECTION 4A: GENERAL SPECIFICATIONS FOR WASTEWATER
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DESIGN AND INSTALLATION CONTENTS**

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SUB-SECTION 4A

GENERAL SPECIFICATIONS FOR WASTEWATER COLLECTION/TRANSMISSION SYSTEMS DESIGN AND INSTALLATION

4A.1 GENERAL

- 4A.1.1 SPECIFICATIONS: The following specifications cover the design, review of plans and specifications, installation, inspection, testing, and acceptance of wastewater collection systems, wastewater pumping stations, wastewater transmission force mains, wastewater line extensions, and all appurtenant items which shall be owned and maintained by HCUD.
- 4A.1.2 DEVELOPMENT REVIEW COMMITTEE: All improvements and/or modifications that shall be made to the HCUD wastewater system shall be done in accordance with plans approved by the CCR of the HCBD and the SRC of the HCPD. Plans, materials and workmanship shall conform to the specifications that appear in this manual.
- 4A.1.3 PIPE COLOR GUIDE: For standardized identification purposes, all pipelines and appurtenances installed within Hernando County shall meet the Color Marking Standards for Underground Utilities, as outlined in Detail 13.
- 4A.1.4 It shall be the contractor's responsibility to locate existing utilities for connection.

4A.2 PLANS PREPARATION

- 4A.2.1 DESIGN: All sanitary wastewater collection systems, wastewater pumping stations and wastewater transmission force mains shall be designed by the EOR in accordance with the applicable regulations of the Florida Department of Environmental Protection (FDEP) and the standards established herein. See section 12 for check list sheets.
- 4A.2.2 LOCATION OF UTILITIES: No wastewater collection system or wastewater transmission system or any part thereof, which shall become the property and sole responsibility of the HCUD shall be designed or constructed outside of any public right-of-way and/or dedicated easement which may be used for said purpose. The recommended location for utility placement is shown on Detail 17.

4A.3 PLANS REVIEW AND "AS BUILTS" (RECORD DRAWINGS): See Section 3.3.

4A.4 SYSTEM DESIGN, CONSTRUCTION STANDARDS AND FLOW CRITERIA

- 4A.4.1 GENERAL REQUIREMENTS: The standards of this section are required by HCUD for design and installation of wastewater collection/transmission systems and facilities.
- 4A.4.2 SERVICE CONNECTION AVAILABILITY: Connection to HCUD water and sewer systems shall be determined by Article VI, Section 28-210, sub-section (E) of the latest revision of the Hernando County Code. See Detail 12.

4A.4.3 FLOW CRITERIA

- 4A.4.3.1 Residential Flow Demand: Flow demands for design shall be calculated based on full or projected ultimate development. The Average Daily Flow (ADF) for single family and master-metered residential developments shall be based on 200 gallons per day (GPD) per unit as determined in the latest HCUD Water Master Plan Study. A Peak factor of 3 shall be

applied for design purposes.

- 4A.4.3.2 Commercial Flow Demand: Flow demands for design shall be based on 200 GPD per Equivalent Residential Unit (ERU). A Peaking factor a 3 shall be applied for design purposes.
- 4A.4.4 DEPTH OF COVER: Cover depth as measured from finished grade to top of the pipeline shall be a minimum of 48-inches.
- 4A.4.5 GRAVITY SEWER COLLECTION SYSTEM: See subsection 4B.
- 4A.4.6 FORCE MAIN SYSTEMS: See subsection 4C.
- 4A.4.7 WASTEWATER PUMP STATIONS: See subsection 4D and Detail 37.
- 4A.5 SEPARATION AND CROSSINGS OF POTABLE WATER, RECLAIMED WATER AND SEWER LINES: See section 3.5 and Detail 17.
- 4A.6 CROSS-CONNECTION CONTROL: See section 3.6.
- 4A.7 PIPE HANDLING AND CUTTING, INSTALLATION OPTIONS AND PRESSURE TESTING PROCEDURES: See subsection 3.12.
- 4A.8 INTERCEPTOR STRUCTURES: ("Grease Traps") Grease, oil and Sand Interceptor Structures (traps) shall be installed for the proper handling of non-liquid wastes, such as grease, sand or other detrimental ingredients that could enter existing HCUD wastewater collection systems. Interceptor shop drawings shall be approved by HCUD and shall be designed for easy accessibility for cleaning and inspection. The developer (owner) shall incur all costs to include the purchase, installation and regular maintenance procedures of the interceptor. Inspections shall be performed by HCUD personnel after installation and as future flow problems occur. See Hernando County ordinance for additional requirements.
- 4A.9 HCUD vs Developer responsibly for any new non-single family developments exceeding four units per development: all offsite infrastructure will be owned and maintained by HCUD. All onsite wastewater infrastructure including collection/transmission systems and pump stations will be owned and maintained privately.
- 4A.10 DUMPSTER DRAINS: Dumpster pad drains shall not be connected to the wastewater collection system. In rare instances where connection is required, the dumpster shall be housed in a structure as to ensure rain water does not enter the dumpster. The dumpster drain shall lead to an interceptor structure (grease trap) where the liquid will be separated from the non-liquid waste prior to entering the wastewater collection system.
- 4A.11 FINAL ACCEPTANCE BY HCUD: (See sub-paragraph 1.23). Final acceptance of the completed gravity sewer collection system, sewer force main transmission systems, and/or wastewater pump station facilities and release of the performance bond shall be recommended by HCUD when the following conditions are met:
 - 4A.11.1 Pressure tests, preliminary and final inspections shall have been made and the results are acceptable to HCUD.
 - 4A.11.2 Improvements are found to be in accordance with the applicable regulations of HCUD, Hernando County, State and Federal regulatory agencies.
 - 4A.11.3 Documents to place sewer system(s) in service are issued to the EOR from the appropriate regulatory agencies.
 - 4A.11.4 Dedicated Easements for ingress and egress to the lift station and for the lift station shall be

granted and recorded before the lift station shall be accepted by the HCUD for operation and maintenance.

- 4A.11.5 The contractor shall ensure that all above ground valves, piping and mechanical joint fittings are protected from the elements by painting the exposed valves and fittings with an approved oil based enamel paint. The paint used to protect sewer force main valves, piping and fittings shall be brown in color.
- 4A.11.6 HCUD receives from the EOR, two sets of signed, sealed and dated "blue-line" "As Builts" (Record Drawings) and for specific HCUD projects, an additional two complete sets of electronic "As Builts" (Record Drawings), prepared in the ".dwg" format and ".pdf" format.

SUB-SECTION 4B

GRAVITY SYSTEMS

SUB-SECTION 4B: GRAVITY SYSTEMS

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4B GRAVITY SEWER COLLECTION SYSTEMS

4B.1 GENERAL: Proposed gravity sewer mains shall be sized to accommodate peak flow when flowing ½ full (see sub-section 4A), but never less than 8-inches in diameter. Gravity sewer mains and laterals within county rights-of-way or dedicated easements shall have 48-inches of cover, unless otherwise approved by HCUD.

4B.2 PVC GRAVITY SEWER PIPE AND FITTINGS

4B.2.1 Pipe Materials: The following Table 4B-1 lists the allowable pipe materials for various sizes of wastewater gravity main lines:

TABLE 4B-1

GRAVITY MAIN PIPE OPTIONS

<u>Diameter</u>	<u>Material</u>	<u>General Specs.</u>
4" to 18"	PVC	ASTM D3034, DR 26
8" to 18"	DIP	ANSI/AWWA C151/A 21, CL 50

4B.2.2 Alternative piping materials shall be considered by HCUD if proper test documentation, performed by recognized pipe industry authorities is submitted prior to commencement of design. Tests on alternative piping materials should be at least as rigorous as testing conducted by ASTM, AWWA or ANSI. A letter of acceptance shall be issued by HCUD prior to commencement of design incorporating any alternative pipe material.

4B.2.3 PVC pipe and fittings used in the gravity system shall be green in color and meet requirements of ASTM D3034. Provisions shall be made for contraction and expansion at each joint with a rubber ring. The bell shall consist of an integral wall section with solid cross-section elastomeric gasket ring, factory assembled and securely locked in place to prevent displacement and meeting requirements of ASTM D3212. Standard minimum laying lengths for gravity sewer mains shall be 13-feet ±1-inch. Pipe shall conform to UNI-Bell Plastic Pipe Association Standard UNI-B-4. Jointing of PVC pipe using solvent cementing is not acceptable by HCUD.

4B.2.4 PVC gravity sewer pipe and fittings shall be installed with straight alignment between manholes, in accordance with the manufacturer's requirements and ASTM D2321. Where PVC enters a manhole, a suitable manhole coupling or flexible manhole connector designed to produce a positive watertight connection shall be installed in the wall section of the manhole equal to A-Lok manufactured by A-Lok Products, Inc., or HCUD approved equal.

4B.2.5 Gravity sewer mains shall be designed with the minimum grades as shown in Table 4B-2:

TABLE 4B-2

MINIMUM GRADIENTS FOR GRAVITY MAINS

8" Gravity Sewer Mains.....	0.40%
10" Gravity Sewer Mains.....	0.28%
12" Gravity Sewer Mains.....	0.22%

- 4B.2.6 Gravity sewer mains with diameters greater than 12-inches shall be designed to have mean velocities of not less than 2-Feet per Second (FPS) when flowing half full. For velocity determinations use Manning's Formula where "N" value shall be 0.010 for PVC pipe.
- 4B.2.7 Each length of PVC pipe shall be marked with the following information: size, manufacturer, PVC gravity pipe, ASTM designation, manufacturer's code, cell classification and approval seal of the National Sanitation Foundation (NSF) that will remain legible during normal handling, storage, and installation.
- 4B.2.8 Conflict Structures: Where existing utility pipelines shall conflict proposed gravity sewer lines, a pipeline conflict structure installation shall be approved by HCUD on an individual basis. See Detail 20.
- 4B.3 GRAVITY SEWER LATERALS: See Detail 28.
- 4B.3.1 Proposed gravity sewer laterals shall be 6-inches in diameter from the gravity sewer main line up to the customer connection point at the right-of-way/property line. The terminal end of the sewer lateral at the customer property line shall be no less than 36-inches and no deeper than 48-inches from final grade. At the point where a proposed 6-inch sewer service line shall connect to an existing 4-inch sewer service lateral, HCUD shall require the owner to install a shallow pre-cast "Collector Manhole" in order to facilitate the additional flow volume from the customer. The purpose of the manhole is to furnish a reservoir, which shall allow the restricted sewer lateral additional time to drain to the sewer main line, preventing a back-flow up to the customer. The "Collector Manhole" base shall have a similar flow trough installed as shown in Detail 31.
- 4B.3.2 Installation of standard single or double 6-inch laterals shall be PVC. Each lateral shall be supplied with a WYE fitting and $\frac{1}{8}$ -bend at the main and laid at a minimum slope of $\frac{1}{8}$ -inch per foot to the property line where a "clean-out" shall be installed. The depth of the lateral invert at the property line shall be a minimum of 3-feet and a maximum of 4-feet below design grade. Open ends of laterals shall be securely sealed with appropriate plugs as recommended by the pipe manufacturer, and shall be marked with pressure treated wood 2"x 4"x 96" stake with top 6-inches painted green. See Detail 28.
- 4B.3.3 Sewer service connections shall be installed on existing gravity sewer lines upon approval of HCUD. See Detail 28 for connection fittings.
- 4B.3.4 Wherever possible (typically within 50-feet of a manhole), laterals are to be connected directly into the manhole.
- 4B.3.5 Gravity mains and manholes shall be placed in such a manor as to not allow sewer lateral services (installed within right-of-way or easements) to exceed 50 feet in length.
- 4B.4 MAGNETIC LOCATOR TAPE (MLT): Sewer mains shall have MLT installed 18-inches above the pipeline. The tape shall be continuous between and secured to each inline flow control valve. Where other pipelines join the mainline, the MLT used to locate these lines shall be secured to the mainline tape. The MLT shall be a minimum of 5 $\frac{1}{2}$ -mil thick, 2-inch wide material, sandwiched between 2-layers of polyethylene, green in color (denoting sewer), with black 1-inch high warning letters stating "Caution – Gravity Sewer Buried Below".

4B.5 MANHOLES: See Detail 32.

4B.5.1 General

- 4B.5.1.1 Manholes shall be installed at the end of each gravity sewer line, at all changes in pipe, size or alignment and at all gravity main collection intersections. The standard distance between manholes shall not be greater than 350-feet, unless prior approval is obtained from HCUD.
- 4B.5.1.2 The minimum inside diameter of manholes shall be 48-inches, with a minimum access inside diameter of 23 $\frac{3}{4}$ -inches. Materials of construction and installation shall be in accordance with the applicable provisions of these specifications.
- 4B.5.1.3 Manholes shall be minimum 48-inches inside diameter where incoming lines are 16-inches or less in diameter, or 60-inches minimum inside diameter where incoming lines are larger than 16-inches diameter.
- 4B.5.1.4 All manholes shall have inflow-protector accessories (without vents) installed between the ring and cover.
- 4B.5.1.5 Manhole depths are not to exceed 12-feet unless approved in advance by HCUD. Manholes greater than 30-feet in depth are not permitted.
- 4B.5.1.6 All manholes 12-feet and greater shall require either an IET coating installed by Paints and Coatings Inc. or be a monolithic fiberglass reinforced plastic (RFP) structure. FRP to be supplied by Mike Thompson Sales, Inc. Seffner, Florida, representing LFM Fiberglass Specialists, Giddings, Texas or approved equal.
- 4B.5.1.7 All manholes 20-feet and greater shall be a monolithic fiberglass reinforced plastic (RFP) structure. FRP to be supplied by Mike Thompson Sales, Inc. Seffner, Florida, representing LFM Fiberglass Specialists, Giddings, Texas or approved equal.
- 4B.5.1.8 In certain instances where the water table is exceptionally high, HCUD shall determine if the manhole shall be required to be a monolithic fiberglass reinforced plastic structure as defined in subparagraph 4B.5.2.

4B.5.2 Manhole Options: Structures approved by HCUD shall be either a monolithically fabricated Fiberglass Reinforced Plastic (FRP) single barrel structure or a pre-cast, reinforced concrete sectional structure with special protective interior polymer coating.

4B.5.2.1 The Fiberglass Reinforced Plastic (FRP) Manhole Structure Option

- 4B.5.2.1.1 Manhole shall consist of a single structure unit made of FRP, and shall be monolithically constructed with an integral top and bottom. The minimum shell thickness shall be $\frac{3}{4}$ -inch. ASTM D3753 rated for H-20 load. FRP to be supplied by Mike Thompson Sales, Inc. Seffner, Florida, representing LFM Fiberglass Specialists, Giddings, Texas or approved equal.
- 4B.5.2.1.2 All pipe connections, hatch openings, anti-floatation bottom and lifting rings shall be installed during the FRP construction process. All manhole wall penetrations shall be either Kor-N-Seal Boots, sleeves for mechanical link seals or PVC pipe stub-outs.

- 4B.5.2.1.3 The exterior wall surface shall be relatively smooth, eliminating fiber show, free of blisters larger than ½-inch in diameter and finished with a gray color gel coat coating.
- 4B.5.2.1.4 The interior wall surface shall be resin rich, smooth texture, free of fiber show, free of blisters larger than ½-inch in diameter, and wrinkles 1/8-inch or larger in depth. Surface pits are acceptable if no larger than 3/4-inch in diameter and less than 1/8-inch in depth.
 - 4B.5.2.1.4.1 The FRP manhole surfaces shall be free of exposed fibers, resin runs, dry resin void areas, laminate separations, large blisters, cracks caused by carelessness, unsafe sharp projections, pits, or air pockets.
 - 4B.5.2.1.4.2 The FRP manhole shall be constructed with an integral reinforced fiberglass top, containing a round 24-inch opening, designed to accommodate the standard manhole cover assembly.
 - 4B.5.2.1.4.3 The FRP manhole shall be constructed with an integral reinforced solid, minimum 3/8-inch thick, fiberglass bottom containing sufficient reinforced stiffening ribs. The bottom shall have a 3-inch (minimum) wide anti-flotation ring or collar.
 - 4B.5.2.1.4.4 The contractor shall furnish FRP manhole manufacturer Shop Drawings to the EOR and HCUD for approval.
 - 4B.5.2.1.4.5 The contractor shall coordinate with the manufacturer to have a representative onsite during installation of the FRP manhole.

4B.5.2.2 The Pre-cast, Reinforced Concrete Manhole Structure Option

- 4B.5.2.2.1 Pre-cast Manhole structures shall consist of a base section, vertical barrel sections, concentric top section, concrete adjustment rings and a cast iron frame, inflow- protector and cover. The structure components shall be cylindrical, composed of pre-cast reinforced concrete sections that conform to the requirements of ASTM C478, minimum 4,000 PSI strength concrete, using Type II Portland Cement. Steps and ladders shall not be installed inside manholes. Minimum wall thickness shall be 5-inches. See Detail 32.
- 4B.5.2.2.2. The base section shall be pre-cast monolithically with the bottom barrel section and shall be installed on a leveling course of crushed stone. Subsequent sections shall be placed in accordance with manufacturer's requirements for water tightness and vertical alignment. Pre-cast holes or blank outs shall be provided in each section to conform with entry pipe or conduit sizes, location, and elevations as shown on the drawings.

- 4B.5.2.2.3 Section joints shall receive an application for recommended manufactures sealant, Asphalt Mastic, O-Ring, or Gasket with seal wrap on the exterior. A combination of sealants may be required for wet areas as specified by an HCUD inspector. Lift holes shall be plugged with waterproof non-shrink grout.
- 4B.5.2.2.4 The manhole interior and all exposed concrete shall be coated with a special coal tar epoxy finish which is resistant to the chemical corrosive environment, normally found in wastewater transmission systems. Coating shall be Koppers 3 M or equal. HCUD shall not accept fiberglass linings for pre-cast concrete manhole structures.
- 4B.5.2.2.5 Special "inside drop" manholes shall be provided for gravity sewer mains entering at a vertical drop distance of 24-inches or more above the outgoing channel invert. In cases where the vertical distance is less than 24-inches, a drop pipe shall not be required, but a channel shall be constructed to guide the flow into the outgoing channel. See Detail 32.
- 4B.5.2.2.6 Flexible manhole connector material shall be used to join new pipes and/or laterals to manholes and shall consist of a connector compounded from a blend material meeting the requirement of ASTM C923 "Resilient Connectors Between Concrete Manhole Structures and Pipes". The connectors shall be integrally attached to cast into the manhole and shall be equivalent to "A-Lok" as manufactured by A-Lok Products, Inc., or as approved. Connector components shall meet the requirements of ASTM C923 and equivalent to "A-Lok XP" as manufactured by A-Lok Products, Inc., "Kor-N-Seal" as manufactured by NPC, or HCUD approved equal.
- 4B.5.2.2.7 Flow channel(s) in manhole base shall be formed of 4,000 PSI concrete, Type II Portland cement. Cut off pipe excess at inside face of the manhole and construct flow channel(s) to invert of the pipe entering the manholes. Changes in direction of the gravity main and entering branch(es) shall be laid out in smooth curves of the longest possible radius which is tangent to the centerlines of adjoining pipelines. See Detail 31.

4B.6 MANHOLE FRAMES AND COVERS: See Detail 33.

- 4B.6.1 Manhole frames and covers, for structures and for manholes, shall be heavy duty cast iron, designed to withstand traffic loads (AASHTO specifications HS20-44) and meet the requirements of ASTM A-48. Frames embedded in top slabs of structures or frames for structures with riser stacks shall be pressure-tight base flange type. Covers shall be Style Number 170, Type CE, made by U.S. Foundry or HCUD approved equal.
- 4B.6.2 Setting Manhole Frames: Manhole frames and covers shall be set to conform accurately to the finished pavement or grade surface. Frames on manhole cones shall be set concentric with the masonry and in a full bed of mortar so that the space between the top of the manhole masonry and the bottom flanges of the frame shall be completely filled and made watertight. A ring of mortar at least 1-inch thick and pitched to shed water away from the frame shall be placed around the outside of the bottom flange. Mortar shall extend up to the outer edge of the masonry and shall be finished smooth and flush with the top of the flange.

4B.6.3 The adjustment section for new construction shall be a minimum of 3-inches and shall not exceed 18-inches in height. Adjusting rings for lifting existing manhole covers to new grade shall be pre-cast concrete. Brick adjustments are not acceptable to HCUD. See Detail 32.

4B.6.4 The words "HERNANDO COUNTY", "SEWER", contents, and YEAR of casting shall be cast on the top of all covers. All sanitary sewer manholes not owned or maintained by HCUD must only have "Sanitary Sewer" cast on the lid. No reference to HCUD or Hernando County will be accepted.

4B.7 GRAVITY SEWER MAIN TESTING

4B.7.1 All pipelines shall be cleaned and tested (visually and by video inspection) upon completion of installation. HCUD shall designate the locations of tests, extent of the system to be tested, methods of testing for leakage, alignment and deflection and the requirements for recording test results. Sections of the gravity main which fail to pass the tests shall have defects located and repaired or replaced and be retested until test results are within specified allowances.

4B.7.2 Lamp Test: Lamp testing shall be performed by one of the following methods as specified by the HCUD inspector.

4B.7.2.1 Video Lamp Test: All gravity sewer lines shall be lamped by video camera and with a high intensity light source to verify accuracy of alignment, fullness of diameter and freedom from debris and obstruction. The height of the high intensity light source shall be varied during recording. The full diameter of the pipe should be visible when video recorded between consecutive manholes.

4B.7.2.2 Visual Lamp Test: All gravity sewer lines shall be visually inspected using a mirror and high intensity light source to verify accuracy of alignment, fullness of diameter and freedom from debris and obstruction. The full diameter of the pipe should be visible when viewed between consecutive manholes.

4B.7.3 Video Inspection:

4B.7.3.1 HCUD requires completed wastewater gravity mains to be video inspected prior to final acceptance. This inspection shall be performed by the contractor and monitored by the HCUD inspector. Copies of video reports and DVD's or CD's (No VHS tapes accepted) of each test shall be supplied to the HCUD by the contractor or developer.

4B.7.3.2 Procedures for Video Inspection for Sanitary Sewer Mains

4B.7.3.2.1 All sanitary sewer mains shall be televised utilizing a 360-degree pan and tilt color camera. The camera shall be of the self-propelled tractor type, with a pool depth 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 1-inch. The camera shall produce a video with an audio track to narrate each taped test run. A linear footage reload shall be visual as the camera progresses through the test run. A pull type camera may be used only as a system backup.

- 4B.7.3.2.2 All sanitary sewer mains shall be televised in an upstream direction wherever possible.
 - 4B.7.3.2.3 Inverts shall be constructed in manholes prior to televising.
 - 4B.7.3.2.4 Preliminary video inspections for the contractor's own use may be done at any time; however, the HCUD inspector shall be present during all video inspections for project final acceptance and the procedures listed herein shall be followed.
 - 4B.7.3.2.5 At least 24-hours prior to, and no more than 48-hours prior to televising, sufficient water shall be run through each section of main until water runs through each downstream manhole. No lines shall be televised which are dry or that enough water has not run through to reach the end of each section.
 - 4B.7.3.2.6 Any pipeline dips in the mains found shall be reviewed and HCUD shall decide to accept the main as is, or to have the dip removed. Pipelines with depressions of 1-inch or greater in depth shall not be acceptable. Unacceptable pipelines shall be removed and replaced.
 - 4B.7.3.2.7 The contractor shall be entitled to a second inspection on lines requiring repairs. Second inspections for dirty lines and additional inspections for repairs after the second free inspection shall be billed for time factor by HCUD for each section of main video inspected.
 - 4B.7.3.2.8 The HCUD inspector shall initial each original DVD or CD as completed and that tape shall be submitted to the HCUD. Copies of the original DVD shall not be accepted. The original DVD and the televised reports shall be submitted to HCUD prior to the inspector signing off on the project.
- 4B.7.4 Air Test: Gravity sewer main testing for line and joint leakage shall be determined by conducting a Low Pressure Air Test, ASTM C828 Standard. Each end of a gravity sewer line shall be plugged and air introduced until a gauge pressure reading of 3.5 PSI is achieved. The elapsed time for a pressure drop of 1 PSI (from 3.5 to 2.5 PSI) shall be recorded and compared to the acceptable values in the "Low Pressure Air Test Table" (See Detail 27) Established elapsed time values shall be the determining factor for accepting the installed pipe. A pressure surge control device ("Snubber") shall connect a liquid filled, 20 PSI rated (in 1 PSI increments) pressure gauge to the system to be tested. The gauge shall read "zero" under no pressure situations and installed at an angle to facilitate easy recording.

SUB-SECTION 4C

FORCE MAIN SYSTEMS

SUB-SECTION 4C: FORCE MAIN SYSTEMS

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4C SEWAGE FORCE MAIN SYSTEMS

4C.1 GENERAL

- 4C.1.1 All wastewater Force Mains (FM) shall be designed to accommodate full development peak flow from all connected pumping stations within the designated stations service area. (See flow criteria set forth in subsection 4A). Each FM system should be capable of transporting the peak flow from each pump station operating simultaneously without producing excessive pressure, i.e., not to exceed 100-feet Total Dynamic Head (TDH) anywhere in the system unless approved by HCUD.
- 4C.1.2 The Developer shall install the largest size FM that shall maintain a minimum velocity of 2-FPS. The minimum size FM constructed within Hernando County road Rights-of-Way or dedicated easements shall not be less than 4-inches in diameter, unless specifically approved by the HCUD.
- 4C.1.3 Pipe Materials: The following Table 4C-1 lists the allowable pipe materials for various sizes of wastewater FM pipe:

TABLE 4C-1

FORCE MAIN PIPE OPTIONS

<u>Material</u>	<u>Diameter</u>	<u>General Specification</u>
DIP	4" to 24"	ANSI/AWWA C151/A 21, CL 50
PVC	4" to 12"	AWWA C900, Class 150, DR 18
	14" to 20"	AWWA C905, Rated 165, DR 25
Horizontal Directional Drill (HDD)		SEE SECTION 7

- 4C.1.4 Alternative piping materials and sizes will be considered if proper testing documentation, performed by recognized piping industry authorities is submitted. Tests on alternative piping materials should be at least as rigorous as testing conducted by ASTM, AWWA and ANSI. A Letter of Approval shall be issued by HCUD prior to commencement of design, of any alternative material.
- 4C.1.5 DEPTH OF COVER: Cover depth is measured from finished grade to the top of the pipeline; it shall be a minimum of 48-inches to a maximum of 60-inches for sewer force mains, unless authorized by HCUD. There will be exceptions made for conflicts that the pipeline has to cross; Horizontal Directional Drilling (HDD) does not apply.

4C.2 POLYVINYL CHLORIDE (PVC) SEWAGE FORCE MAIN (FM) PIPE

- 4C.2.1 Pipe color shall be green for force mains. At the discretion of HCUD white PVC C-900 spirally wrapped by green tape may be substituted.
- 4C.2.2 PVC pipe 4-inches to 12-inches in diameter shall conform to the requirements of AWWA C900. PVC resin compound shall conform to the requirements of ASTM D1784. The pipe shall conform to these standards: dimension ratio (DR) of 18, working pressure of 150 PSI, and laying length of 20-feet.

- 4C.2.3 PVC pipe 14-inches and up in diameter shall conform to the requirements of AWWA C905. PVC resin compound shall conform to the requirements of ASTM D1784. The pipe shall conform to these standards: DR 18, working pressure of 165 PSI, and laying length of 20-feet.
- 4C.2.4 Fittings for PVC pipe 4-inches through 20-inches shall be ductile iron fittings. Ductile iron fittings shall be mechanical joint with a minimum pressure rating of 250 PSI, shall have an interior coating of Protecto 401 or HCUD approved equal, and shall conform to the requirements of ANSI/AWWA Standard C110/A21.10 and A21.4.
- 4C.2.5 JOINTS: PVC pipe 4-inches through 20-inches shall have provisions for expansion and contraction provided in the joints. All joints shall be designed for push-on makeup connection. A push-on joint may be an elastomeric gasket bell end coupling manufactured as an integral part of the pipe barrel consisting of a thickened section with an expanded bell with a groove to retain a rubber sealing ring of uniform cross-section similar and equal to Johns-Manville Ring-Tite and Ethyl Bell Ring.
- 4C.2.6 Restrained joints for PVC pipe shall be Uni-Flange Series 1350 for PVC-PVC joints and Uni-Flange Series 1300 or EBBA PV2000 fittings for PVC-DIP joints, or HCUD approved equal. See Detail 15. The length of pipe to be restrained shall be noted on the drawings. Shop drawings from the manufacturer shall be submitted to and approved by the EOR and HCUD prior to construction. HCUD may require pre-cast 500 pound concrete Thrust Blocks in addition to restrained joints. (See Detail 14)
- 4C.3 DUCTILE IRON SEWAGE FORCE MAIN (FM) PIPE
- 4C.3.1 Ductile Iron Pipe (DIP) to be furnished in 20-foot lengths or as specified by HCUD, and shall be spirally wrapped by green tape with adhesive backing.
- 4C.3.2 DIP shall conform to the requirements of ANSI A21.51, minimum Class 50, unless otherwise specified by the EOR. The weight and class designation shall be painted in white paint on the exterior surface of each pipe section.
- 4C.3.3 Coatings: Pipe interior shall have protective ceramic epoxy lining of Protecto 401 by Vulcan Paintings. Pipe shall have an exterior bituminous coating in accordance with ANSI A21.51.
- 4C.3.4 Joints: Pipe joints for DIP shall be mechanical or push-on joints. Manufacturer code or serial number shall be provided on the bell of each pipe joint.
- 4C.3.4.1 MECHANICAL JOINTS: Mechanical joints consisting of pipe bell socket, gland, gasket, bolts and nuts shall conform to ANSI Standard A21.11. Bolts shall be high strength low alloy steel, such as "Corten," or "U.S. Alloy," T-head type having hexagonal nuts. Bolts and nuts shall be machined true and nuts shall be tapped at right angles to a smooth bearing surface.
- 4C.3.4.2 PUSH-ON JOINTS: Single seal gasket push-on type joints shall conform to the requirements of ANSI A21.11 and shall be U.S. Pipe "Tyton," American Cast Iron Pipe Company "Fastite," CLOW Corporation "Super Bell Tite," or HCUD approved equal.

- 4C.3.5 **RESTRAINED JOINTS:** Restrained joints shall be installed where force main pipe alignment changes direction or elevation. Restrained joints shall not be of the type that requires field welding or grooves cut into the pipe barrel for restraint. The number of pipe sections or linear pipe footage to be restrained shall be determined and noted on the drawings by the EOR and approved by HCUD. Shop drawings from the manufacture shall be submitted to and approved by the EOR and HCUD prior to construction. The restraining joints for mechanical joint fittings and valves shall be ROMAC Industries Grip Ring, EBAA Iron MEGALUG, All Grip or HCUD approved equal. See Detail 15.
- 4C.3.6 **GASKETS:** Pipe and fitting gaskets, conforming to ANSI A21.11, shall be made of viton (fluorocarbon elastomer), EPDM (Ethylene Propylene Diene Monomer) or SBR (Styrene-Butadiene Rubber).
- 4C.3.7 **FITTINGS:** All DIP fittings shall be mechanical joint, shall meet the requirements of ANSI/AWWA C110/A21.10, shall have a pressure rating of 250 PSI, and shall be full-radius fittings. All fittings shall be coated and lined as specified above for ductile iron pipe.

4C.4 PIPELINE LOCATORS

- 4C.4.1 **Magnetic Locator Tape (MLT):** Force mains shall have MLT installed 18-inches above the FM line. The tape shall be continuous between and secured to each inline flow control valve. Where FM lines join the mainline, the MLT used to locate these lines shall be secured to the mainline. The MLT shall be a minimum of 5 ½ mil thick, 2-inches wide material, sandwiched between two layers of polyethylene, green in color (denoting force main), with black 1-inch warning letters stating "Caution – Sewer Force Main Buried Below"
- 4C.4.2 **Electronic Locating Wire (ELW):** Force mains shall have ELW. The ELW shall be Direct Burial #10 AWG Solid (.1019" diameter), 21% conductivity copper-clad annealed high carbon steel high strength tracer wire, 600# average tensile break load, 30 mil. high molecular weight-high density Green polyethylene jacket complying with ASTM-D-1248, 30 volt rating. The ELW shall be Copperhead Industries, LLC (part # 1030G-HS) or HCUD approved equal. The ELW shall be securely installed on top of the pipe at the 12 o'clock position. The ELW shall be held in place with nylon cable ties (or equal means of attachment as approved by HCUD), at each end and 48-inches on center of the pipe sections. The ELW shall be of sufficient length as to be extendable to the surface at each valve box, allowing a current to be induced through the wire to detect the location of the pipeline. The ELW shall be brought to the surface inside each valve pad, through a length of 3-inch PVC pipe, with a threaded cap to protect the wire and terminate with a tinned waterproof wire connector. See Detail 23. The cost of the ELW shall be included with the line items for pipe. ELW "stub-out" access points shall not exceed 1000-foot intervals and shall be noted on the final "As Builts" (Record Drawings) set of plans. See Detail 21. Instances where the ELW requires splicing, the two ends of the ELW shall be joined together with a silicon injected wire nut of the proper size.
- 4C.5 **VALVES AND APPURTANCES:** All valves shall be the manufacturer's standard design for the service intended and shall bear the maker's name and pressure rating cast on the body, also the valve type, size, flow direction arrow, if applicable. Valves shall open to left (counter clockwise-CCW) with an arrow cast in the metal of operating hand wheel or nuts indicating the direction of opening.
- 4C.5.1 **Gate Valves (GV):** Underground gate valves, 4-inch to 20-inch, shall be of the resilient seat type meeting the requirements of AWWA C500 and C509. These GVs shall have non-rising stems, shall be furnished with 2-inch square AWWA operating nuts, and shall open when the nut is turned counterclockwise. GVs shall have mechanical joint ends and shall be furnished complete with joint accessories. Exposed or above-ground GVs shall be outside stem and yoke (OS&Y) flanged joint type. GVs shall be AVK, Kennedy KS-RW AWWA C515, American Flow Control Series 2500, or HCUD approved equal. See Detail 23.

- 4C.5.2 Tapping Valves (TV): TVs shall be mechanical joint outlet, non-rising stem, resilient seat gate valves meeting the applicable requirements of AWWA C509. TVs shall be specifically designed for pressure tapping with sufficient seat opening to allow full diameter taps to be made. TVs shall be manufactured with an integral tapping flange having a raised lip design.
- 4C.5.3 Tapping Sleeves: Tapping Sleeves for all force main connections shall be full Circle, Stainless Steel tapping sleeves and rated for 150 PSI working pressure in accordance with AWWA C110. TS shall have an outlet flange per ANSI B16.1, 125 lb. standard. The contractor shall confirm the outside diameter of the existing main before ordering the TS.
- 4C.5.4 Combination Air-Vacuum Release Valve Assembly (ARV): Combination Air Valves shall conform to the following: Automatic Air and Vacuum Valves shall be infinitely variable automatic air and vacuum valves designed to allow escape of air for an operating range starting from pressure range: 0,0 through 250 psi (0 – 17,2 bar), close watertight when liquid enters the valve even when the fluid is rising without pressure (no minimum operating pressure required), allow air to enter in the event of a vacuum, and soft working behavior as water hammer inhibition realized by roll-on diaphragm and spring mechanism. When the sealing device of the valve is closed an air cushion is trapped between the fluid and sealing area, a mud deflector made of PE allows no contact between fluid and sealing area. The spindle spring shall be stainless steel, grade 316Ti, the body shall be steel epoxy powder coated (min. thickness of coating: 10 mil) designed to facilitate disassembly for cleaning and maintenance. The float shall be Delrin (Polyoximethylene, POM); the valve seat and all working parts shall be of corrosion-resistant materials. Valves shall be equipped with the necessary attachments, including ball valve, to permit back flushing after installation without dismantling the valve. Valves shall be recommended by the manufacturer for wastewater service. The ARV shall be a H-TEC Model # 986 manufactured by Hawle or HCUD approved equal.
- 4C.5.4.1 Inline ARV Manhole Option (Detail 24A): ARV(s) shall be located at high elevation points on the pipeline and operate automatically. The ARV shall have a 2-inch inlet, 316 SS ball valve, SS bands, and epoxy coated saddle (Ford service saddle, FC 202 or HCUD approved equal) and 316 SS pipe and fittings. ARV(s), fittings, and piping shall be rated for a minimum working pressure of 250 PSI. The ARV shall be installed in a shallow manhole. The words "HERNANDO COUNTY", "ARV" and YEAR of casting shall be cast on the top of all the manhole covers. Rings shall be Style Number 667 and covers shall be Type CE with non-penetrating pick holes, made by U.S. Foundry or HCUD approved equal. Manhole sections and top shall be pre-cast 4000 psi concrete, ASTM C-478 and C-76; base section shall be monolithically cast. Construction plans and "As Builts" (Record Drawings) shall include ARV stationing locations on the plan and profile view sheets.
- 4C.5.4.2 Offset ARV Manhole Option (Detail 24B): This option shall only be used in certain situations where the Inline ARV Manhole Option is not constructible due to elevations or limited ROW, etc. The ARV shall have a HCUD spec MJ tee (coated with Protecto 401) installed at high elevation points on the pipeline. The branch side of the tee shall be installed facing up with a MJ plug with a two (2) inch threaded hole, 2" brass corporation stop, 2" SS PET insert, and 2" DR9 PET (length will vary). A 2" CTS X FIP coupling shall be used to transition from the 2" poly tubing to the 2" stainless steel pipe before it enters the manhole. The ARV shall have a 2-inch inlet, 316 SS ball valve, 316 SS pipe and fittings. ARV(s), fittings, and piping shall be rated for a minimum working pressure of 250 PSI. The ARV shall be installed in a shallow manhole. The words "HERNANDO COUNTY", "ARV" and YEAR of casting shall be cast on the top of all the manhole covers. Rings shall be Style Number 667 and covers shall be Type CE with non-penetrating pick holes, made by U.S. Foundry or HCUD approved equal. Manhole sections and top shall be pre-cast 4000 psi concrete, ASTM C-478 and C-76; base section shall be monolithically cast. Construction plans and "As Builts" (Record Drawings) shall include ARV stationing locations on the plan and profile view sheets.

4C.5.5 Valve Boxes: See Detail 23.

- 4C.5.5.1 Valve box for valve operating nut 36 inches or less to finished grade:
Valve boxes for all valves installed below ground shall be made of cast iron. Valve boxes shall be adjustable to fit the depth of earth cover over the valve and shall be designed so as to prevent the transmission of surface loads directly to the valve or piping. Valve boxes shall have a minimum interior diameter of 5 ¼ - inches. Valve box extension shall be installed to reserve a minimum of 50% of the adjustment for a future extension. Valve boxes shall be supplied by Tyler MFG., two pieces, with cast iron lid, No. 461-S for short applications or 562-S for long applications. No ductile iron or PVC pipe allowed as part of the finished valve box assembly.
- 4C.5.5.2 Valve box for valve operating nut 36 inches or greater to finished grade:
Pentek 5¼" ROADWAY VALVE BOX: Valve Box shall be injection molded and commercially manufactured utilizing a proprietary PENTEK® compound known as SUPERFLEXON per ASTM D-2853-70, Class 1212. Material shall be a rigid combination of polyolefin with fibrous inorganic component reinforcing and U.V. stabilizer additives to assure resistance to material degradation from ultraviolet light. The entire upper section of the box shall be made of a POLYIRON® magnetically locatable material. The use of magnets will not be permitted. Box shall have a cast iron ring and a cast iron 4-pronged traffic lid. Cast iron shall have a minimum weight of 18 lbs. and must conform to ASTM-A-48, Class 20 specifications. Box shall be a Buffalo type (screw) and have a shaft diameter of 5¼". The bottom part of the box shall have a bell measuring 7⅝" high by 10 1/16" wide and have a knock out as standard equipment.
- 4C.5.5.3 The cast iron cover of the valve box shall be marked "SEWER", painted green, and shall be secured with a concrete pad to prevent tipping or moving.
- 4C.5.6 Concrete Valve Pad and Brass Tag: Valve boxes located outside of paved areas shall be cast in a 24-inch x 24-inch x 6-inch thick 3000 PSI concrete slab. See Detail 23 for Standard Pad installations. Brass tags shall read "SEWER" for force mains, diameter of pipe and the number of turns to open and close the valve.

4C.6 FORCE MAIN CONNECTONS TO EXISTING FORCE MAIN SYSTEMS

- 4C.6.1 General: The contractor shall be responsible for the scheduling and coordination of the work for each tap. The contractor shall furnish and install the approved tapping sleeve and valves for each scheduled main tap. The contractor shall excavate a dry and safe working area pit of sufficient size to perform the necessary work. Prior to performing the tap, the contractor shall pressure test the tapping sleeve and valve installation under supervision of HCUD. The contractor shall be responsible for properly backfilling and compacting the work area after work is completed. HCUD shall be given 48 hours notice prior to work.
- 4C.6.2 The contractor shall make the connection by using an approved tapping sleeve or tapping saddle as appropriate. The tapping of the main shall be done using standard tapping techniques as approved by HCUD.
- 4C.6.3 The contractor shall assemble all materials, tools, equipment, labor and supervision necessary to make the in an expeditious manner. A gate valve shall be installed on the branch side of the connection.

4C.7 FORCE MAIN CONNECTIONS TO HCUD GRAVITY SYSTEMS

4C.7.1 FM connections to existing gravity sewer manholes shall be considered by HCUD when absolutely necessary and the following proper precautions are taken to protect the existing infrastructure components and to control odors:

4C.7.1.1 All interior surfaces of the receiving pre-cast concrete manhole shall be completely sprayed with a special polyester resin coating ("IET Coating Systems," applied by Paints and Coating Inc. (See Section 9) to protect the manhole interior from the corrosive effects of hydrogen sulfide gases.

4C.7.1.2 An Odor Control System shall be installed at the wastewater pump station receiving the FM (directly or through gravity) flow or shall be installed in the pump station where the FM flow began.

4C.7.2 Connecting To Existing Systems

4C.7.2.1 Where a new FM shall be connected into an existing manhole, construction plans shall include the connection on the plan and profile views.

4C.7.2.2 The manhole shall be properly prepared to receive the new FM by carefully core boring the wall of the existing manhole through the use of mechanical drilling equipment. The perimeter of the penetration shall not be closer than 12-inches to a barrel section joint. A flexible resilient water-tight connector shall be installed prior to pipe insertion into the manhole. The flexible connector shall be equivalent to Z-LOK XP manufactured by A-LOK Products, Inc., Kor-N-Seal by NPC Inc., or HCUD approved equal. Any penetration to a manhole liner shall be properly sealed to restore the integrity of the liner. Manhole inverts shall be reshaped as required by the new connection to provide a smooth flowing channel of the exact shape of the gravity main to which it connects. See Detail 31.

4C.7.2.3 Manhole Frames and covers shall be machined or ground at touching surfaces so as to seat firmly and prevent rocking. Any set where mating faces do not match shall be removed and replaced. "Wastewater", "Hernando County" and year shall be embossed in the cover. See Detail 33.

4C.7.3 "Collector Manholes" shall be installed within 50-feet of all pump station wet well points of entry. The pre-cast concrete sectional "Collector Manhole" shall be lined with a special polyester resin coating which is resistant to the chemical corrosive environment, normally found in wastewater transmission systems. Coating shall be "IET coating system" installed by Paints and Coatings, Inc. FM and gravity sewer line direct connections to pumping station wet wells shall not be allowed. HCUD requires the installation of a special IET coated "Collector Manhole" (CMH) to deliver sewerage to pump station wet wells.

4C.8 FORCE MAIN ISOLATION VALVES AND LOCATIONS

4C.8.1 ISOLATION VALVES: All isolation valves shall be resilient seat gate valves.

4C.8.2 Valves shall be placed so that the maximum allowable length of force main required to be shut down for repair work shall be no more than 1000-feet on off-site transmission mains, distribution systems in residential subdivisions, and commercial, industrial, or multi-family residential districts.

4C.8.3 The designer shall consider and incorporate maintenance considerations when placing isolation valve location. HCUD reserves the right to require additional isolation valves for efficient operation and maintenance.

4C.8.4 Valve boxes shall be provided for all control valve installations.

SUB-SECTION 4D

WASTEWATER PUMP STATIONS

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SUB-SECTION 4D: WASTEWATER PUMP STATIONS

4D.1 GENERAL

- 4D.1.1 Pump Stations shall be installed when conditions exclude the utilization of gravity sewer lines.
- 4D.1.2 Where materials and/or equipment are specified by brand name or manufacturer, the intent shall be to establish a minimum standard of quality acceptable to HCUD.
- 4D.1.3 The codes, specifications, standards, etc., referenced herein, shall be of the issue in effect on the date of the invitation to bid.
- 4D.1.4 Pump Stations shall be complete with duplex or triplex submersible pumps located within a wet well, piping, valves, pre-cast special coated "Collector Manhole" structure, companion valve vault with access frame and locking covers, pump rail guides and supports, pump mounting plates or bases with hydraulic sealing flanges, heavy-duty 316 SS lifting chains, electric cable and conduit, sealed mercury switches for level and alarm control, pump controls and starters with enclosure, and other accessories as shown on the drawings and specified herein. See Detail 37.
- 4D.1.5 Each master pump station shall be equipped with an Emergency Power Generator System (EPGS), permanently installed on the pump station site. The EPGS shall be capable of providing sufficient electrical power to simultaneously operate all the sewerage pumps during periods of power outages. EPGS's shall be required on all pump stations that are expected to pump more than 20,000 GPD (expected flow based on average daily flow per unit as found in the latest HCUD Sewer Master Plan Study) and in areas where during a power outage a spill could occur and reach a body of water (lakes, ponds, rivers, etc.) within 30 minutes. The EPGS's approved by HCUD are noted in Section 6.
- 4D.1.6 Tracts dedicated for pump stations shall be dimensioned no less than 50-feet by 50-feet for Duplex Pumping Station and 75-feet by 75-feet for Triplex Pumping Stations. See Detail 39.
- 4D.1.7 See SECTION 11 for Pump Station Electrical Specifications.

4D.2 DESIGN

- 4D.2.1 Wastewater pump stations shall be designed to accommodate the full development flow from all contributing areas at peak flow computed in accordance with the "Flow Criteria" set forth in sub-section 4A General Wastewater Specifications.
- 4D.2.2 Pump Stations shall have a minimum of two submersible pumps, and each shall have a capability of pumping 250-percent of the average design flow.
- 4D.2.3 Each pump shall have the capability of pumping the design peak flow at the maximum computed TDH with pipe friction loss calculated by the "Hazen-Williams" formula with normal friction factors for the pipeline material and such factors shall not exceed "C=150" for PVC Pipe, "C=140" for DIP. Static head pressures shall be calculated by utilizing the low wet well water elevation for the lead pump.
- 4D.2.4 Each pump station shall have a minimum of two pumps for peak flows of 750 Gallons per Minute (GPM) or less. When the flow exceeds 750-GPM then three or more pumps will be required. Standby pumping capability shall be provided such that if any one pump is out of service the remaining pumps shall be capable of pumping out estimated peak flows.

- 4D.2.5 System head versus pump capacity curves shall be prepared by the pump manufacturer's representative and analyzed to determine the system operating capability at the following conditions:
- 4D.2.5.1 Non-manifolded Pumping Station
 - 4D.2.5.1.1 One pump running, if duplex pumping station.
 - 4D.2.5.1.2 One pump and two pumps running if triplex pumping stations, etc.
 - 4D.2.5.1.3 If FM profile results in siphon, curves shall show operation at start-up (to high point only) as well as full flow conditions.
 - 4D.2.5.2 Manifolded Pumping Stations: All conditions outlined in subsection 4C Force Main Systems and in addition, operation while all remaining stations are on.
 - 4D.2.5.3 Variable Speed Pump Stations: All applicable conditions in subsection 4C Force Main Systems, and in addition, operating point, specifying Revolutions per Minute (RPM) at peak, average and minimum flows.
- 4D.3 THE ODOR CONTROL SYSTEM (OCS): The OCS shall be designed and installed to remove the hydrogen sulfide odors and other mercaptans (sulfur containing compounds), commonly present in "on line" pump station facilities, using a hydration process. Acceptable OCS Manufacturer options are: "Bio-Sponge" Odor Control Systems, by Jacobs Air Water Systems for wastewater treatment plants or "Zabocs" Biological Odor Control Systems, by US Filter for pump stations.
- 4D.3.1 Odor Control Systems shall be required for any lift station located adjacent to a golf course, store, residence, pool, etc. or a lift station receiving flows from other lift stations which shall cause high levels of hydrogen sulfide gas.
 - 4D.3.2 The OCS shall be designed for continuous outdoor operation (temperatures up to 120-degrees Fahrenheit), with components being constructed from materials resistant to the hostile compounds being absorbed. All hardware shall be 316 SS. The equipment shall comply with the latest editions of the following code and standards: NEC (National Electrical Code), NEMA (National Electrical Manufacturers Association) and ASTM (American Society for Testing and Materials).
 - 4D.3.3 The contractor shall install the OCS in accordance with the manufacturer's instructions.
 - 4D.3.4 All piping to and from the OCS, including electrical conduit, shall be installed through the OCS support slab and routed underground so they will not cause a trip hazard for personnel working around the lift station. The OCS drain and suction piping shall be installed in the side of the lift station wet well, not through the top; they both shall enough fall to drain into the wet well. The OCS piping shall be the same size through out the installation, no reducers.
 - 4D.3.4.1 CONCRETE WET WELL: The penetration into the wet well shall be a core bore, not hammered out with a chisel or jack hammer. Both the drain and suction piping can be installed into the same core bore; or two smaller core bores can be utilized for each pipe. After installation of the OCS piping, the bore hole shall be grouted closed with non-shrink grout; the grout shall be the full wall thickness of the wet well. The exterior and interior coating of the wet well shall be replaced, either coal tar epoxy or IET, where the OCS piping penetrated the wet well.

4D.3.4.2 FIBERGLASS REINFORCED PLASTIC (FRP) WET WELL: The wet well wall penetrations shall be with either Kor-N-Seal Boots, sleeves for mechanical link seals or PVC pipe stub-outs.

4D.3.5 The external wet well vent shall be capped off with a removable type cap or plug to prevent outside air from entering the wet well during OCS operation.

4D.3.6 The piping for the water service that is above the OCS support slab shall be either galvanized or SCH. 80 PVC.

4D.3.7 A manufacturer's representative shall be present and perform a test run of the OCS following installation. Upon satisfactory results from the performance test, HCUD shall accept the OCS as installed.

4D.4 PUMP STATION SITE LOCATION AND PAVING

4D.4.1 The distance requirements from the master pump station (concrete pad) are 20- feet to the edge of the lot. In no case shall the front of the pump station be closer than 28-feet from the edge of pavement or back of curb.

4D.4.2 The pump station detail sheets of the construction plan submission shall include a to-scale site plan of the pump station slab with all lot grading details and elevations. The slab elevation shall be set based on adjacent lot pad elevations. In the absence of adjacent lot pads, the slab elevation shall be set based on a minimum rise of 2 percent from the edge of pavement or minimum 1-foot above the crown of the road, whichever is greater. All driveway and site drainage shall be directed away from the station slab, allowing for no standing or ponding of water on the pump station site.

4D.4.3 Upon completion of construction, site plan "As Builts" (Record Drawings) of the pump station shall be submitted by the EOR. Information on the site plan shall locate the constructed pumping facility in relation to the lot corners and property lines, and note the finished pad elevation and spot elevations of finished grades around the pumping station. The site to be owned by HCUD shall be finish graded and sodded prior to final inspection.

4D.4.4 Pump station site paving shall be 6-inches minimum of 4,000 PSI concrete after 28-days. All areas will be reinforced with 6 X 6 – W2.9 X W2.9 W.W.F. and conduits shall be located in the slab as indicated on plan sheets.

4D.4.5 The pump station shall have a concrete or asphalt paved access driveway to the site from the street, constructed per HCUD requirements. The driveway shall be at least 14-feet wide, 28-feet long and 2-inches thick type S-1 asphalt over 10-inch lime-rock base and compacted sub-grade. Driveways in excess of 30-feet may be approved for construction. HCUD shall consider proposed alternative driveway and site configurations.

4D.4.6 Base and sub-base density tests shall be taken prior to asphalt paving and concrete slab. Densities shall be compacted to no less than 98 percent of a modified proctor.

4D.5 FENCING: Pump station sites shall be secured with 6-feet high galvanized interwoven fence enclosure, with a 3-strand barbed wire top security zone and 2-lockable gates. See Section 11 for fence grounding and Detail 40. Materials and installation shall be in accordance with HCUD pump station fencing requirements, as follows:

4D.5.1 Fence fabric shall be interlocking 6-feet high with galvanized coating to resist corrosion.

4D.5.2 Fence corner posts shall be 3-inch diameter posts with 2-feet in the ground. Fence posts shall be installed on 6-foot centers, maximum. Gate posts shall be 4-feet in the ground.

- 4D.5.3 Double gates construction, 7-feet wide for a 14-foot opening, shall be provided. Gates shall have three 1 ½-inch steel tubing horizontal runners and two 1 ½-inch steel tubing vertical runners (all steel tubing shall be 18-gauge hot dipped galvanized). Steel tubing is to be welded at all corners and mid-points (six total welds). All welds and drilled holes in steel tubing are to be coated with "Cold Galvanizing" to resist oxidation.
- 4D.5.4 Each gate shall be provided with two hook style hinges, with the top hook turned down and the bottom hook turned up. Gate hardware shall be as listed or heavier. All fence hardware is to be zinc electroplated steel.
- 4D.5.5 Each gate shall be provided with a ½-inch diameter x 34-inch long rod with a 90 degree bend 4-inches long on the end for the gate drop rod. Rods are to be mounted with three 316L SS eye bolts, nuts and washers to allow rod to drop 12-inches below bottom of gated to hold in the open position. Rods shall drop into a 1 ¼-inch diameter pipe that extends 18-inches below grade. Rods are to be installed on vertical 1 ½-inch steel tubing of the gate. Stainless steel (316L) carriage bolts, nuts and washers shall be installed on each gate to hold drop rods in the up position. A 1-inch diameter hole, 9-inches deep shall be bored into concrete to hold the right hand gate in the closed position.
- 4D.5.6 Special fencing (i.e. PVC) may be acceptable by HCUD. If approved, a three-foot wide walk through gate and a letter stating the Homeowners Association will be responsible for fence maintenance shall be required.

4D.6 PRIVATELY OWNED PUMP STATIONS

- 4D.6.1 The Developer shall submit pump and system response curves for all privately owned pump stations at the time of construction plan submittal to HCUD.
- 4D.6.2 The control panel for private lift stations shall have an emergency telephone number of a representative of the owner. This person must be available for emergency calls at all times, days, nights, weekends and holidays. The telephone number is to be prominently displayed on the panel cover in order to assist HCUD Wastewater Division Personnel during emergency events.

4D.7 PUMP STATION VALVE VAULTS: (See Detail 38).

- 4D.7.1 The Pump Station Valve Vault shall be a rectangular pre-cast reinforced concrete structure with a top. The valve vault concrete top slab shall be integrally cast with lockable aluminum access doors, frame and lifting rings. Manufacturer to supply Shop Drawings for HCUD approval.
- 4D.7.2 Hatch Assembly:
 - 4D.7.2.1 Access hatch assemblies shall be manufactured by Halliday Products or HCUD approved equal.
 - 4D.7.2.2 The doors and frames are to be made of aluminum, have a 150 PSF load rating, be easily removable for replacement of existing valves and/or plumbing fixtures, and be capable of being secured in the open position.
 - 4D.7.2.3 Doors are to have retractable lifting handles
 - 4D.7.2.4 The lifting rings cast into the lid are to be removed (flush with the top surface of the lid) after installation of the lid onto the top of the valve vault structure.
 - 4D.7.2.5 All access hatch hardware shall be 316 SS.

- 4D.7.2.6 Duplex Stations: The valve vault hatch assembly shall have a minimum opening of 48-inches by 48-inches with two lockable double doors for a duplex
- 4D.7.2.7 Triplex Stations: The valve vault hatch assembly shall have a total minimum opening of 60-inches by 120-inches with four lockable doors.
- 4D.7.3 Pre-cast holes or blank outs shall be provided to conform with entry pipe sizes, location and elevation as shown on the drawings. The drain pipe opening shall be sealed with water proof non-shrink grout on both sides. Other pipe openings shall receive a flexible, adjustable seal by LINK-SEAL, or HCUD approved equal, installed on the interior side.
- 4D.7.4 Interior and exterior surfaces shall have a protective coal tar epoxy coating with a minimum dry film thickness of 18-mils. Coal tar epoxy shall be Koppers 300-M, or an HCUD approved equal.
- 4D.8 PUMP STATION WET WELLS
 - 4D.8.1 General
 - 4D.8.1.1 Wet well shall have sufficient capacity for a holding period of 5-minutes at the maximum rate of the largest pump.
 - 4D.8.1.2 The high water alarm level shall not exceed the wet well invert elevation of the lower inflow pipe.
 - 4D.8.1.3 Control float elevations shall be set to ensure the Low Water Level (pump off) setting will be at least 3-inches above the top of the pumps, allowing the pumps to remain submersed at all times. The top of the pump is defined as the highest point such as the housing or the electrical cable connector.
 - 4D.8.1.4 The wet well shall be designed to prevent fluid vortexing and/or air binding.
 - 4D.8.1.5 The wet well floor shall have a minimum slope of 1 to 1 toward a "hopper" bottom with the horizontal area of the bottom being no greater than necessary for proper installation and function of the pump suction.
 - 4D.8.1.6 Wet wells greater than 30-feet in depth are not permitted.
 - 4D.8.1.7 Wet wells greater than 20-feet in depth are required to be a monolithic fiberglass reinforced plastic structure.
 - 4D.8.1.8 All wet wells shall require either an IET coating installed by Paints and Coatings inc. or be a monolithic fiberglass reinforced plastic structure. (See Section 9)
 - 4D.8.1.9 In certain instances where the water table is exceptionally high, HCUD shall determine if the wet well shall be required to be a monolithic fiberglass reinforced plastic structure.
 - 4D.8.1.10 Prior to application of interior wall protective coating, the contractor shall provide a grout fillet around the inside of the bottom of the wet well. Grout shall be 4000 PSI concrete, with the maximum aggregate size to be $\frac{3}{8}$ -inch.
 - 4D.8.2 Pump Station Wet Well Options: Structures approved by HCUD shall be either a monolithically fabricated Fiberglass Reinforced Plastic (FRP) single barrel structure or a pre-cast, reinforced concrete sectional structure with special protective interior polymer coating.

- 4D.8.2.1 Safety Netting: All pump station wet wells shall have safety netting permanently installed at the access opening. The netting shall be made of a high strength polyester material that has been tested and certified to meet OSHA standard 1926.502. (c) (4) (i) drop test. All hardware, hooks and anchors shall be 316 stainless steel. Acceptable safety netting options are "Hatch Safety Net" as manufactured by U.S.F. Fabrication, Inc. or HCUD approved equal.
- 4D.8.2.2 The Fiberglass Reinforced Plastic (FRP) Wet Well Structure Option: See Detail 39
- 4D.8.2.2.1 Shall consist of a single structure unit made of FRP, and shall be monolithically constructed with an integral top and bottom. Minimum shell thickness to be $\frac{3}{4}$ -inch. ASTM D3753 rated for H-20 load. FRP to be supplied by Mike Thompson Sales, Inc. Seffner, Florida, representing LFM Fiberglass Specialists, Giddings, Texas or equal. A separate fiberglass top to be installed with SS bolts, washers and nuts.
- 4D.8.2.2.2 All pipe connections, vents, OCS piping, hatch openings, anti-floatation bottom and lifting rings shall be installed during the FRP construction process. All wet well wall penetrations shall be with either Kor-N-Seal Boots, sleeves for mechanical link seals or PVC pipe stub-outs.
- 4D.8.2.2.3 The exterior wall surface shall be relatively smooth, eliminating fiber show, free of blisters larger than $\frac{1}{2}$ -inch in diameter and finished with a gray color gel coat coating.
- 4D.8.2.2.4 The interior wall surface shall be resin rich, smooth texture, free of fiber show, free of blisters larger than $\frac{1}{2}$ -inch in diameter, and wrinkles $\frac{1}{8}$ -inch or larger in depth. Surface pits are acceptable if no larger than $\frac{3}{4}$ -inch in diameter and less than $\frac{1}{8}$ -inch in depth.
- 4D.8.2.2.5 The FRP wet well surfaces shall be free of exposed fibers, resin runs, dry resin void areas, laminate separations, large blisters, cracks caused by carelessness, unsafe sharp projections, pits, or air pockets.
- 4D.8.2.2.6 The FRP wet well top shall be constructed as a reinforced fiberglass unit, with predrilled installation holes containing a square or rectangular opening that has been fashioned to accommodate the lockable hatch cover assembly. Larger systems shall have a vent pipe shaft hole shall be placed in the top section for ventilation.
- 4D.8.2.2.7 The FRP wet well shall be constructed with an integral reinforced solid, minimum $\frac{3}{8}$ -inch thick, fiberglass bottom containing sufficient reinforced stiffening ribs. The bottom shall have a 3-inch (minimum) wide anti-flotation ring or collar. The manufacturer shall "glass in" pump mounting bolts or brackets as required.
- 4D.8.2.2.8 The manufacturer shall furnish FRP wet well Shop Drawings to the EOR and HCUD for approval.
- 4D.8.2.2.9 The contractor shall install the FRP wet well in accordance with the manufacturer's instructions. A manufacturer's representative shall be onsite during installation and accessible if installation issues occur.

- 4D.8.2.3 The Pre-cast Reinforced Concrete Sectional Wet Well Structure Option: See Detail 38.
- 4D.8.2.3.1 Shall be cylindrical, composed of pre-cast reinforced concrete sections that conform to the requirements of ASTM C478, minimum 4,000 PSI strength concrete, using Type II Portland Cement.
 - 4D.8.2.3.2 The base section shall be pre-cast monolithically with the bottom barrel section. Subsequent sections shall be placed in accordance with manufacturer's requirements for water tightness and vertical alignment. Pre-cast holes or blank outs shall be provided in each section to conform with entry pipe or conduit sizes, location, and elevations as shown on the drawings. Section joints shall receive an application for recommended manufacture sealant, around the full circumference for water tightness. Lift holes shall be plugged with waterproof non-shrink grout. Wet well concrete base section shall be set upon 6-inch to 12-inches of gravel leveling course approved by the EOR.
 - 4D.8.2.3.3 The wet well shall be coated with a special polyester resin finish which is resistant to the chemical corrosive environment, normally found in wastewater transmission systems. Coating shall be IET coating system installed by Paints and Coatings, Inc. HCUD shall not accept fiberglass lined pre-cast concrete wet well structures. (See Section 9)
 - 4D.8.2.3.4 Prior to application of interior wall protective coating, the contractor shall provide a grout fillet around the inside of the bottom of the wet well. Grout shall be 4000 PSI concrete, with the maximum aggregate size to be $\frac{3}{8}$ -inch.
 - 4D.8.2.3.5 The wet well top concrete slab shall be integrally cast with a lockable aluminum access cover frame Shop Drawings to be submitted for approval by HCUD.
 - 4D.8.2.3.6 The wet well top concrete slab shall be integrally cast with a lockable aluminum access cover frame (shop drawings to be approved by HCUD).
- 4D.8.2.4 Wet well access hatch assemblies shall have a minimum opening of 36-inches by 48-inches with double doors for a duplex and 36-inches by 107-inches with triple doors for the triplex. The doors and frames to be made of aluminum, have 150 pounds per square foot (PSF) load rating, suitable for easy removal and replacement of the pumps, with the hinges located on discharge piping side, and capable of being secured in the open position. All doors are to have retractable lifting handles and padlocking security hasps.

4D.9 PUMP STATION PUMPS

4D.9.1 General

- 4D.9.1.1 Each pump shall be of a heavy-duty submersible type, capable of handling raw, unscreened sewage, and capable of passing a minimum of 3-inch diameter spherical solids. The pump shall be constructed with a minimum 4-inch discharge, cast iron pump case, SS shaft, heavy-duty upper and lower permanently lubricated ball bearings, and tandem double mechanical seals in an air filled chamber with moisture sensors. Impellers shall be of cast iron and of a non-clog design and dynamically balanced.

- 4D.9.1.2 Each pump shall be constructed with a discharge disconnect coupling and installed on 316 SS guide rails, diameter to be recommended by the pump manufacturer. The system shall include the necessary discharge base with 316 SS mounting hardware, heavy-duty 316 SS connectors and SS 316 retrieval chain with SS lift rings at 10-foot intervals and other components for a complete pump retrieval and reinstallation system without entering the wet well. Pump discharge shall be provided with standard 125 pound ANSI flanges. Each pump shall have a minimum 1-year warranty by the manufacturer.
- 4D.9.1.3 Each pump shall be capable of pumping raw sewage at design flows and total dynamic head pressures as shown on drawings. Pumps with efficiencies less than 40 percent at design point shall be unacceptable.
- 4D.9.1.4 The HCUD shall be furnished with three copies of complete, descriptive data of the motors and pumps proposed for installation with the completed data sheets and standard Performance Curves for each set of pumps marked with impeller size, horsepower, performance points, and efficiencies. The manufacturer shall also include Electrical Detail Sheet(s), which shall include an Electrical Load Summary and a Short Circuit Analysis completed, signed and sealed by an Electrical Engineer registered in the State of Florida.
- 4D.9.1.5 The HCUD shall be furnished three copies of detailed instructions for proper pump installation, wiring diagrams, schematics, operation and maintenance manuals, including parts list and availability.

4D.9.2 Pumps and Accessories

- 4D.9.2.1 Pumps and accessories shall be carefully handled and protected during transferring and installation. The contractor shall be responsible for the reporting and replacement of any damaged equipment upon delivery to job site.
- 4D.9.2.2 Pumps and accessories shall be installed in conformance with manufacturer's drawings, diagrams and instructions.
- 4D.9.2.3 Each pump model number shall be confirmed by the EOR prior to installation and the serial number recorded. Each pump shall have a stainless steel name plate indicating the Horsepower (HP), TDH, capacity in GPM, impeller number or size, rpm, voltage, full load amperage, date of manufacture, and model and serial number. The same data shall be recorded on the inside the control panel.
- 4D.9.2.4 All guide rail carrier assemblies shall be provided by manufacturer for size of pump to be installed. Clearance of 8-inches in height between the carrier assembly and the top of the pump motor conduit box shall be provided. The carrier assembly shall be attached securely to the pump in such a way that the weight of the pump is evenly distributed and will not cause the carrier assembly to misalign or bind on the guide rails. The pump guide rails, guide rail brackets, cable holder, and all support bolts and hardware shall be 316 SS. Intermediate pump guide rail brackets shall be located at mid-length of guide rail as a minimum, with a maximum spacing of 10-feet. All welded SS components in the wet well shall be fabricated of 316 SS materials.
- 4D.9.2.5 All control cable suspension hooks and pump lift chains shall be made of 316 SS. The inside hook diameter of the suspension hooks shall be a minimum of 2-inch diameter. Lift chains shall be SS with link diameter sized according to the weight (size) of the pump, with 4-inch diameter 316 SS rings located every 10-feet.
- 4D.9.2.6 HCUD pump stations require pump manufacturer to be Ebara International Corporation, Homa, or Barnes.

4D.10 PUMP MOTORS

- 4D.10.1 Pump motors shall be housed in a watertight casing, designed and manufactured for 60-cycle service with the required voltage and phase (as shown on the approved drawings), and for continuous submersible service under either 30-feet of sewage or dry conditions. Pump motors shall be overload protected and manufactured in compliance with NEMA standards. Pump motors shall have Class F insulation and be capable of sustaining a minimum 10 starts per hour. Upper and lower ball bearings shall be permanently lubricated.
- 4D.10.2 The cable entry seal design shall be such as to ensure a watertight and submersible installation.
- 4D.10.3 The electric motor cable shall be sized in conformance with NEC specifications and suitable for submersible service and be continuous (un-spliced) from pump to junction box.
- 4D.10.4 Pump motors shall have a seal probe in the housing to detect the presence of water, coupled to the warning light in the control panel.
- 4D.10.5 Pump motors shall have a self-resetting temperature monitor in each phase coupled to the control circuit for pump shutdown at high temperature.
- 4D.10.6 Pump motors shall not run above the Full Load Amps (FLA) rating. The service factor amp rating shall not be an acceptable performance condition.
- 4D.10.7 Pump motors, 3-horsepower or larger, shall be 3-phase. Phase converters or "add a phases" are not acceptable.
- 4D.10.8 All pump motors less than 25-hp shall be 230-VOLT. All pump motors 25-hp or more shall be 460-VOLT where available by the local power company.

4D.11 LIQUID LEVEL SENSORS

- 4D.11.1 Hermetically sealed mercury switches, externally weighted, shall be furnished and installed with appropriate length cable to reach the control panel. SENSORS shall be NEMA 6 rated with #18-2 STD cable, normally open, polypropylene casing, for suspended operation. Sensors shall be installed at the elevations shown on the drawings, appropriately spaced to avoid interference, and firmly attached to maintain elevation.
- 4D.11.2 A 316 SS hanger system with 316 SS attachment anchor bolts, washers and nuts shall be installed with individual hooks for each sensor cable and each pump with a 12-foot long SS lifting chain.
- 4D.11.3 Each float shall have extra cable (minimum 36-inches), coiled and taped for future adjustment of control elevations.
- 4D.11.4 Pump "off" elevation shall not be lower than top of pump elevation in the wet well. Pumps shall remain submerged at all times.

4D.12 CONDUIT SYSTEMS: All conduits shall be arranged to present a neat mechanical appearance.

- 4D.12.1 Conduit: Unless otherwise noted in the drawings or in this document, all conduit and fitting installations above grade shall be corrosion resistant PVC Sch. 40 pipe. Waterproof fittings and hubs shall be installed at all equipment interfaces.
- 4D.12.2 Conduit installations extending from above grade to below grade shall be PVC Sch. 40 conduit.

- 4D.12.3 All conduits shall be arranged to present a neat mechanical appearance. Sealing compound shall be provided and poured in all conduit sealing fittings installed or indicated in the drawings. The wires for each pump shall be in a separate conduit from junction box "JB1" to the control panel. A sealing fitting shall be installed for each conduit.

4D.13 PIPING

- 4D.13.1 Piping shall be PVC C900, minimum 4-inch.
- 4D.13.2 One flanged adaptor to PVC force main shall be installed outside of valve vault.
- 4D.13.3 A minimum of one length of PVC C900 pipe shall be laid into the wet well on the gravity influent line, projecting 4-inches into wet well.
- 4D.13.4 Vent shall be a minimum of 4-inch PVC pipe, installed in the wet well concrete top. Placement shall allow the aluminum hatch to be folded back for pump removal. Vent pipe shall extend straight up then turned down with two PVC 90 fittings and opening fitted with a screen to prevent vermin entry. Vents shall not be higher than 24-inches above concrete top.
- 4D.13.5 Potable water service pipe shall be 1-inch polyethylene tubing with brass fittings where installed under ground. The continuing above ground installation shall be ¾-inch galvanized pipe, flow controlled by a "female by female" ball valve with lockable padwings, pressure transducer (see section 11 subsection 8) freeze protection valve (see subsection 4D.16). Backflow prevention shall be accomplished by installing a Reduced Pressure Zone (RPZ) Backflow Prevention Assembly (BPA) and a ¾-inch standard brass hose bib. The hose bib shall be affixed to control panel support post with a galvanized pipe strap and installed a minimum of 18-inches above the 4-inch thick concrete slab.
- 4D.13.6 All pump discharge piping and fittings shall be PVC C900. The discharge pipe shall be supported from the wet well wall at mid-length with a 316 SS bracket, with spacing shall not exceed 10-feet. All valves shall be located above ground, a minimum of 18-inches above pad and supported on each side of valve assemblies with supports. All ductile iron piping and fittings, above ground and within the wet well, shall have the exterior coated with Tnemec 1074 or HCUD approved equal. All ductile iron pipe and fittings utilized in the construction of wastewater discharge shall have an interior coating of "Protecto 401". An "isolation" valve shall be installed in the discharge force main outside of the pump station valve vault.

4D.14 VALVES AND FITTINGS (See Detail 38).

- 4D.14.1 Piping, valves and fittings for above ground installation shall be flanged and shall follow the general requirements as shown in the drawings.
- 4D.14.2 "Swing" check valves shall be AVK only. Where FM exceed 70-feet TDH, "Soft Shut" style AVK check valves shall be required. See Detail 12.
- 4D.14.3 Resilient Seated Wedge Gate Valves (RSWGV) shall be flanged and constructed of ASTM, A126-61 Class B, close-grained nickel chromium alloy iron.
- 4D.14.4 Metal ball valves shall be non-lubricated, free floating ball type. Port areas shall be full-bore (free area through valve shall not be less than the inside area of a pipe of the nominal valve size). Valves shall be manufactured by Stockham, ACT Industries, Jamesbury Corporation, William Powell Company, or HCUD approved equal.
- 4D.14.5 Stainless steel adjustable stands shall be installed for support. Valves shall not be cast in concrete or mortar.
- 4D.14.6 Emergency "pump-out" connection shall be installed as in valve vault Detail 38.
- 4D.14.7 A pressure gauge with SS isolation ball valve and SS nipple shall be installed in force main piping near wye.

4D.15 PRESSURE TAPS AND GAUGE

- 4D.15.1 Pressure taps shall be installed on each pump discharge line near the inlet of the check valve and on the line from the discharge header. Each tap shall include a 2-inch long, ½-inch SS nipple and a ½-inch SS ball valve.
- 4D.15.2 Provide one SS, glycerin filled, compound pressure gauge. The gauge shall be an Ashcroft model 63-1008AL-02L or equal, with a pressure range of 0 to 60 PSI and a vacuum range of 0 to 30-inches of mercury.
- 4D.15.3 The gauge shall be mounted on a silicone filled diaphragm seal with SS bottom. The seal shall be an Ashcroft model 50-310SS-02T-CK or equal. The gauge and diaphragm seal shall be assembled by a factory authorized representative only. A ½-inch, 2-inch long, Schedule 40, SS nipple shall be provided to connect the diaphragm seal to the ball valve.

4D.16 POTABLE WATER FAUCETS: Faucets (hose bibs) for potable water use shall be similar to Grinnell Company, Catalog No. 918-17, or HCUD approved equal. The potable water service line shall have a BPA-RPZ (see subsection 4D.18.3 and Section 10) with a freeze protection valve (see subsection 4D.18.5 and Section 10) located and sized as indicated on the Design Drawings.

4D.17 ACCESSORIES

- 4D.17.1 Pump guide rails shall be 316L SS, Schedule 40, rail size to be determined by manufacturer, supported at the top by stainless steel holders and anchors and rubber bushings. Intermediate SS 316 guide rail brackets shall be installed as per manufacturer's recommendations.
- 4D.17.2 Lifting chains, SS 316L, shall be capable of lifting 2,500-pounds.
- 4D.17.3 Lifting rings, SS 316, shall be installed at the top end of the chain and at 10-foot intervals down the length of the chain.
- 4D.17.4 Fasteners and hardware inside the wet well and valve vault shall be 316 SS.

4D.18 APPROVED PARTS LIST FOR STANDARD PUMPING STATION DESIGN

- 4D.18.1 Diaphragm Seal
Ashcroft type 310, threaded female ½-inch NPT, capsule, 316L SS, ¼-inch NPT instrument connection.
- 4D.18.2 SS Ball Valve
Stockham S-2120 SSMO-R.T. (1/2")
- 4D.18.3 BPA-RPZ
Conbraco 40204T2
Wilkens/Zurn 975 XL
Ames 4000 SS
- 4D.18.4 Faucet (Hose Bib)
Grinnell – 918-17
- 4D.18.5 Freeze Protection Valve
Dole Specialty Products – FP35

4D.19 EXCAVATION AND BACKFILL

- 4D.19.1 Site shall be cleared of trees, brush, and similar material, and the material disposed of in accordance with applicable laws and regulations.

- 4D.19.2 Top soil shall be salvaged and stored temporarily for replacement around structures after completion of construction.
 - 4D.19.3 Excavation shall comply with currently accepted trench and site safety rules, laws and regulations.
 - 4D.19.4 Excavations shall be kept dry at all times. No attempts shall be made to set wet well bases in wet conditions.
 - 4D.19.5 Pump station site shall be accessible by an asphalt paved road for maintenance purposes.
 - 4D.19.6 A leveling course of crushed stone shall be provided for the wet well hole base as directed by the EOR.
 - 4D.19.7 Ballast concrete to prevent wet well flotation shall be installed when required by EOR.
 - 4D.19.8 Backfilling shall be accomplished in 18-inch lifts with soil, free of rocks, roots, limbs, or similar material, and mechanically compacted. Backfilling shall proceed to pipe or conduit elevations where additional compaction shall precede pipe or conduit installation.
 - 4D.19.8 Subsequent compacted backfill lifts and spreading of any stored topsoil shall bring the surrounding soils to grade. The finished grade shall provide for surface water drainage away from the structures.
 - 4D.19.9 When construction shall be finished, the new Pump Station site shall be completely sodded, excluding areas of asphalt driveways and concrete surfaces.
 - 4D.19.10 Settling in the area surrounding the pump station, occurring during the warranty period shall be corrected by the Contractor at no charge to HCUD.
 - 4D.19.11 The finish slab elevation of the top of the wet well and valve vault, shall be at or above the 100-year flood elevation.
- 4D.20 PUMP DATA SHEET: Data sheets shall be prepared for each set of pumps and submitted to HCUD and the EOR in three copies. Attach catalog illustrations, cuts, pump curves, etc. and specify the following information:
- 4D.20.1 Project Name, Project Number and Proposed Location.
 - 4D.20.2 Data sheets shall be prepared for each set of pumps and submitted to HCUD and the EOR in three copies and shall include the following information:
 - 4D.20.2.1 Submersible Pump Manufacturer:
 - Model
 - Speed, RPM
 - Maximum Solid Size Passage (Minimum 3-inches diameter)
 - Pump Casing Material
 - Impeller Material, Type and size
 - Shaft Material
 - Type Seal
 - Type Lubrication
 - Suction Size
 - Minimum Spacing between pumps

4D.20.2.2 Pump Motor Manufacturer:
Speed, RPM
Efficiency at Design Point
Guaranteed Field Efficiency at Design Point
Type
Brake Horsepower
Full Load Efficiency
Service Factor
Full Load Amps
Voltage/Cycle/Phase
Insulation Rating
Enclosure
Capacitor Sizes and Type if Applicable

4D.21 MISCELLANEOUS: In addition to submittals previously described for the pumps, the Contractor shall further furnish:

- 4D.21.1 Three sets of shop drawings on other equipment.
- 4D.21.2 Three sets of "As Builts" (Record Drawings) wiring diagrams of the control panel.
- 4D.21.3 Three sets of manufacturer's warranty.
- 4D.21.4 Four sets of operation, maintenance, and repair manuals, to include complete parts listing, reference drawings and lubrication identification for the major equipment.
- 4D.21.5 Spare parts or lubricants recommended by the manufacturer for routine maintenance during the warranty period shall be furnished with the lift station.

4D. 22 LOW-FLOW WASTEWATER ("GRINDER") PUMP STATIONS (see section 11 for electrical specifications)

- 4D.22.1 General: Peak flows that are less than 80-GPM may require either a submersible type low-flow "Grinder" pump or a non-clog pump as defined in sub-paragraphs 4D.2 and 4D.9. Both instances shall be required to meet the following conditions:
 - 4D.22.1.1 Force mains leaving the pump station which are installed in the County right-of-way shall be a minimum of 4-inches in diameter.
 - 4D.22.1.2 Velocities within the force main shall maintain a minimum of 2-fps.
 - 4D.22.1.3 Grinder pump stations shall be constructed in the same manner as defined for non-clog pump stations. See Detail 38.
- 4D.22.2 "GRINDER" PUMP STATION SHOP DRAWINGS, ELECTRIC SHEETS AND "AS BUILTS" (RECORD DRAWINGS)
 - 4D.22.2.1 Shop drawings shall be submitted and must be approved by HCUD prior to construction. Shop drawings shall include pumps, wet well and mechanical and electrical components.
 - 4D.22.2.2 The electrical detail sheets include an electrical load summary and a short circuit analysis which shall be completed, signed and sealed by an Electrical Engineer registered in the State of Florida.

- 4D.22.2.3 A set of "As BUILTs" (Record Drawings) shall be maintained during construction, showing any deviations from the original design drawings. All changes and dimensions for structural, mechanical and electrical installations shall, at the completion of the project, be transferred to a set of mylar sepia reproducible media for a permanent set of "As BUILTs" (Record Drawings). One set of mylar reproducible and four sets of prints of the "As BUILTs" (Record Drawings) shall be submitted to HCUD. Each print of the "As BUILTs" (Record Drawings) set shall be signed, sealed and dated by a professional engineer, registered in the State of Florida.
- 4D.22.3 "GRINDER" PUMP STATION WET WELL OPTIONS: See sub-paragraph 4D.8. The minimum inside diameter of the wet well shall be 4-feet. The wet well diameter shall be a minimum of 6-feet for wet wells in excess of 12-feet deep. Wet Well access hatch assemblies shall have a minimum opening of 24-inches by 36-inches and shall meet the requirements stated in subparagraph 4D.7.2.
- 4D.22.4 "GRINDER" PUMP STATION PUMPS
- 4D.22.4.1 Pumps shall be the submersible grinder type and located within a FRP or pre-cast concrete wet well. Pumps and motors shall meet the applicable discharge, head, horsepower and RPM requirements. The pumps shall be capable of handling raw, unscreened sewage. They shall have a cast iron, brass or stainless steel impeller. The pumps shall be Ebara, or HCUD approved equal grinder pumps with double mechanical seals.
- 4D.22.4.2 The motors shall be NEMA Design B, 230-VOLT, 3-phase, 60-Hertz with a 1.2 service factor, NEMA Class F-155°C insulation. All low-flow wastewater pumping stations shall be sized to the available electric service, single or 3-phase.
- 4D.22.4.3 Each pump shall have a stainless steel nameplate indicating the HP, AMPS, VOLTS, phase, RPM, service factor, insulation Class, serial number, model number, GPM, TDH, and impeller number or size. A self-adhesive aluminum tag or laminated label shall be mounted inside the outer door of the control panel for each pump installed and shall contain the same nameplate information.
- 4D.22.4.4 The following spare parts and tools shall be furnished for each pump: one set of mechanical seals, special impeller pullers, and special wrenches needed for breakdown of pump.
- 4D.22.4.5 The following items shall be furnished with each station: one stainless steel glycerin-filled pressure gauge and diaphragm seal unit, one spare check valve flapper, flapper bolt, and hinge pin. Provide four spare lamps and fuses for each size and type used in the control panel.
- 4D.22.4.6 When an over-temperature condition occurs, the affected motor shall be shut off and the associated over-temperature alarm light shall be activated. The over-temperature alarm light shall be a "latching" type alarm and shall remain latched until a control panel alarm reset is initiated. However, the affected motor shall be automatically restored to operation when the bi-metallic thermal switch automatically resets after the motor temperature falls below the switch reset temperature. Over-temperature conditions of the motor stator windings shall be sensed by two bi-metallic thermal switches contained in the motor. The leads for these switches shall be brought out through a waterproof connection such that the switches may be connected into the motor control circuit shown in the drawings.

- 4D.22.4.7 A seal sensor module and a seal failure alarm light shall be furnished in the control panel. When a seal failure occurs, the seal failure alarm light shall be activated but the affected pump shall not be shut off. A seal failure in the pump shall be sensed by a moisture sensor contained in the oil chamber of the pump. The leads for this sensor shall be brought out through a waterproof connection such that the sensor may be connected to the sensor module located in the control panel.
- 4D.22.4.8 Pump motor shall be capable of continuous operation without damage, submerged or dry. Pump motors shall be class "F" insulation or better and certified as such by the vendor. The service factor of the motor shall not be used to achieve the operating performance of the pump. Additionally, the rated horsepower of the motor listed in the motor nameplate data shall not include horsepower available from the service factor rating of the motor. Motor shall be non-overloading for the full range of its operating curve.

4D.23 TESTING: "PUMP STATION START UP"

- 4D.23.1 Upon pump station completion, the EOR shall arrange with HCUD at least 48-hours in advance for final inspection of the facility and testing of the pumps. A trained representative of the pump manufacturer shall supervise start-up and observe tests.
- 4D.23.2 The Contractor shall provide ladders, measuring rules, water and such equipment as required to conduct the tests.
- 4D.23.3 Pump "drawdown" shall be measured against time and pumping rate calculated for each pump.
- 4D.23.4 Pump motor amperage and voltage shall be measured and recorded for each pump during "drawdown" test.
- 4D.23.5 Controls shall be tested for satisfactory performance. All pumps shall be tested to and through complete "drawdown" to check for vortexing and dry operation.
- 4D.23.6 Pumps shall be raised from the base to top of wet well and re-seated to check rail system and general alignment and operation. Contractor shall provide means for raising pumps.
- 4D.23.7 The Contractor shall repair and/or correct any deficiencies or make adjustments or replacements as directed by the EOR to bring the pump station into contract compliance and proper operation.
- 4D.23.8 Copies of the completed pump station final inspection and testing forms shall be forwarded to the HCUD and the Contractor, with a list of deficiencies noted.
- 4D.23.9 The Surveyor shall verify final invert and manhole elevations.
- 4D.24 WARRANTY: Workmanship, materials, and equipment shall be guaranteed against defects for a period of 1-year from the date of issuance of certificate of substantial completion and defects shall be promptly repaired by the Contractor at the Contractor's expense, exclusive of the pumps which shall be warranted for 1-year by manufacturer.

4D.25 PUMP STATION FINAL INSPECTION AND TESTING

- 4D.25.1 The pump station shall be thoroughly tested to demonstrate that the entire system is in proper working order and is installed in accordance with the approved plans and specifications. Each pump with its control circuit shall be run as nearly as possible under operating conditions for a sufficient length of time to demonstrate correct alignment, wiring capacity, speed and satisfactory operation. All isolation and check valves shall be tested for proper operation. During the final inspection and test, the Contractor shall furnish the test instruments. Readings shall be made of line voltage and current at the main disconnect during starting and operating conditions, as well as pump discharge pressure and flows. Such results must meet pump manufacturer's specifications.
- 4D.25.2 Only the EOR or his representative shall be allowed to schedule a pump station inspection. The EOR shall be responsible for verifying that the following conditions have been met prior to scheduling the inspection:
 - 4D.25.2.1 Power shall be supplied through the electrical meter serving the pump station. Generator power is not an acceptable power source for the final inspection, however, the contractor may use generator power for conducting preliminary tests during construction.
 - 4D.25.2.2 BPA inspection shall have been performed by HCUD and the certifications available at the final inspection.
- 4D.25.3 The following parties or representatives shall be present at the final inspection: EOR, Contractor, subcontractor, pump manufacturer, HCUD Inspector and HCUD Systems Operation Division personnel.
- 4D.25.4 The contractor shall supply sufficient water to the wet well for pump pressure and flow testing.
- 4D.25.5 Each pump shall be hoisted and removed from wet well, inspected and replaced, then operated to test for leaks at the discharge seal. The contractor shall provide the equipment to remove and reinstall the pumps in the wet well.
- 4D.25.6 The Contractor shall perform additional tests requested by HCUD Operations Division during the inspection. The cost of the tests shall be borne by the Contractor, including expenses incident to retest caused by defects and/or failure of the equipment to meet the specifications.
- 4D.25.7 Three copies of all applicable operating and maintenance manuals for mechanical and electrical equipment are to be supplied to the HCUD inspector at the final pump station inspection.

SECTION 5

SPECIFICATIONS FOR RECLAIMED WATER DISTRIBUTIONS SYSTEMS DESIGN AND INSTALLATION

SECTION 5: SPECIFICATIONS FOR RECLAIMED WATER (RW)
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SECTION 5

SPECIFICATIONS FOR RECLAIMED WATER (RW)

DISTRIBUTION SYSTEMS DESIGN AND INSTALLATION

5.1 GENERAL

- 5.1.1 SPECIFICATIONS: The following specifications shall cover the design, review of plans and specifications for the installation, inspection, testing, and acceptance of Reclaimed Water (RW) distribution systems, transmission main extensions, and all appurtenant items which shall be constructed by private enterprise and shall be owned and maintained by HCUD when the projects are completed.
- 5.1.2 DEVELOPMENT REVIEW COMMITTEE: All improvements and modifications made to the HCUD RW system shall be done in accordance with plans approved by the HCUD section of the Code Compliance Review (CCR) in the Hernando County Planning Department. Material and workmanship shall conform to the specifications that appear in this document. All pipeline and appurtenance materials in contact with RW shall be National Sanitation Foundation (NSF) - 61certified.
- 5.1.3 PIPE COLOR GUIDE: For standardized identification purposes, all pipelines and appurtenances installed within Hernando County shall meet the Color Marking Standards for Underground Utilities, as outlined in Detail 13.

5.2 PLANS PREPARATION

- 5.2.1 DESIGN: All RW distribution (on-site) systems, transmission main (off-site) extensions, and all appurtenant items shall be designed in accordance with the applicable regulations, standards and specifications of Hernando County, the Hernando County Health Department (HCHD), the Florida Department of Environmental Protection (FDEP) and the standards established herein.
- 5.2.2 LOCATION OF UTILITIES: The RW distribution system or RW main extension or any portion thereof, which is to become the property and sole responsibility of HCUD, shall be designed to be constructed within any public rights-of-way (ROW) and/or dedicated easements. When a RW distribution main shall serve existing or future developments beyond the borders of the proposed site, the HCUD may request over-sizing. The recommended location for utility placement is shown on Detail 17.

5.3 PLANS REVIEW AND "AS BUILTS" (RECORD DRAWINGS): See Section 3.3.

5.4 SYSTEM DESIGN AND CONSTRUCTION STANDARDS

- 5.4.1 GENERAL REQUIREMENTS: The provisions of this Section set forth the general requirements for design of RW distribution systems and provide criteria for determining flow demands. The EOR shall comply with all the requirements of the HCHD in addition to the criteria contained herein.
- 5.4.2 SERVICE CONNECTION FEASIBILITY: Connection to HCUD RW systems shall be determined by HCUD following individual project case presentation by developers.
- 5.4.3 PIPE SIZING
 - 5.4.3.1 The EOR shall be responsible for sizing the RW distribution system piping. Design flows and method of computation shall be submitted to the HCUD for review.
 - 5.4.3.2 The pipe sizing design criteria for RW distribution systems shall be sized to maintain a minimum RW distribution main pressure of 20 PSI during peak conditions. The minimum pipe size for RW distribution mains shall be 4-inches in diameter.

- 5.4.4 **LINE ROUTING:** The primary main for the RW distribution system of a residential or commercial subdivision shall be routed within County road ROW or dedicated utility easement, unless otherwise approved by HCUD.
- 5.4.5 **DEPTH OF COVER:** Cover depth is measured from finished grade to the top of the pipeline; it shall be a minimum of 48-inches to a maximum of 60-inches for reclaimed water mains, unless authorized by HCUD. There will be exceptions made for conflicts that the pipeline has to cross; Horizontal Directional Drilling (HDD) does not apply.
- 5.5 **SEPARATION AND CROSSINGS OF POTABLE WATER, RECLAIMED WATER AND SEWER LINES:** See Section 3.5 and Detail 17.
- 5.6 **CROSS-CONNECTION CONTROL:** See section 3.6.
- 5.7 **ISOLATION VALVES AND LOCATIONS**
- 5.7.1 The designer shall consider and incorporate maintenance considerations when placing isolation valve location. HCUD reserves the right to require additional isolation valves for efficient operation and maintenance.
- 5.7.2 All isolation valves shall be resilient seat gate valves and shall be placed so that the maximum allowable length of RW main required to be shut down for repair work shall be no more than 1,000-feet nor less than 500-feet on off-site transmission mains or commercial or industrial districts
- 5.7.3 RW main extensions or mains extending at a project phase line shall include a valve and one additional standard length of pipe with a cap and a temporary Blow-Off Assembly (BOA). (detail 10)
- 5.8 **PIPES, FITTINGS, VALVES, AND APPURTENANCES:** RW distribution mains shall be PVC, DIP or HDPE. Pipe larger than 24-inches in diameter shall be approved by HCUD on a case-by-case basis.
- 5.8.1 **PIPE MATERIALS:** The following Table 5-1 lists the allowable pipe materials for various sizes of RW main pipe:

Table 5-1

RW MAIN PIPE OPTIONS

Material	Diameter	General Specification
DIP	4" to 24"	ANSI/AWWA C151/A 21, CL 50
PVC	4" to 12"	AWWA C900, Class 150, DR 18
PVC	14" to 24"	AWWA C905, DR 25, 165 psi
Horizontal Directional Drill (HDD)		SEE SECTION 7

5.8.2 **DUCTILE IRON PIPE (DIP) AND FITTINGS**

- 5.8.2.1 DIP shall conform to the requirements of ANSI A21.51, minimum Class 50, unless otherwise specified by the EOR. Pipe joints for DIP shall be mechanical or push-on joints. Pipe shall have an exterior bituminous coating in accordance with ANSI A21.51. Pipe interior shall have a cement mortar lining with an asphaltic seal coat conforming to ANSI/AWWA C104/A21.4. The weight and class designation shall be painted in white paint on the exterior surface of each pipe section. Manufacturer code or serial number shall be provided on the bell of each pipe joint. DIP shall be spirally wrapped by purple tape with adhesive backing. DIP will be furnished in 20-foot lengths or as specified by HCUD.

- 5.8.2.2 Fittings: All DIP fittings shall be mechanical joint, shall meet the requirements of ANSI/AWWA C110/A21.10, shall have a pressure rating of 250 PSI and shall be full-radius fittings. All fittings shall be coated and lined as specified above for ductile iron pipe.
- 5.8.2.3 Mechanical Joints: Mechanical joints consisting of bell, socket, gland, gasket, bolt and nuts shall conform to ANSI Standard A21.11. Bolts shall be high strength low alloy steel, such as "Corten," or "U.S. Alloy," T-head type having hexagonal nuts. Bolts and nuts shall be machined true and nuts shall be tapped at right angles to a smooth bearing surface.
- 5.8.2.4 Push-on Joints: Single seal gasket push-on type joints shall conform to the requirements of ANSI A21.11 and shall be U.S. Pipe "Tyton," American Cast Iron Pipe Company "Fastite," CLOW Corporation "Super Bell Tite," or HCUD approved equal.
- 5.8.2.5 Restrained Joints: Restrained joints shall be installed where RW pipe alignment changes direction. Restrained joints shall not be of the type that requires field welding or grooves cut into the pipe barrel for restraint. The length of pipe sections to be restrained shall be determined by the EOR and noted on the drawings. Shop drawings from the manufacture shall be submitted to and approved by the EOR and HCUD prior to actual construction. The restraining joints for mechanical joint fittings and valves shall be ROMAC Industries Grip Ring, EBAA Iron MEGALUG, or HCUD approved equal. See Detail 15.
- 5.8.2.6 Gaskets: Pipe and fitting gaskets, conforming to ANSI A21.11, shall be made of viton (fluorocarbon elastomer), EPDM (Ethylene Propylene Diene Monomer) or SBR (Styrene-Butadiene Rubber).
- 5.8.2.7 Encasement: All DIP and fittings shall be encased in polyethylene in accordance with ANSI/AWWA C105/A21.5 when installed in hostile soil conditions.
- 5.8.2.8 HCUD may require pre-cast 500 pound concrete Thrust Blocks in addition to restrained joints. (See Detail 14)
- 5.8.3 POLYVINYL CHLORIDE (PVC) PRESSURE PIPE AND FITTINGS
 - 5.8.3.1 Pipe color shall be purple for RW mains.
 - 5.8.3.2 PVC pressure pipe 4-inches through and including 12-inches in diameter, shall meet the requirements of AWWA C900, laying length of 20-feet shall have the same outside diameter (OD) as DIP and be compatible for use with ductile iron fittings. PVC pipe less than 4-inches in diameter shall not be accepted by HCUD.
 - 5.8.3.3 Fittings: Fittings for PVC Pressure Pipe (4-inches through 12-inches) shall be ductile iron with mechanical joints, with a minimum pressure rating of 250 PSI and shall conform to the requirements of ANSI A21.10 and A21.4.
 - 5.8.3.4 Joints: Joints for PVC pressure pipe shall be of the compression rubber gasket type and the pipe line installation shall be as recommended by the pipe manufacturer.
- 5.8.4 PIPELINE LOCATORS
 - 5.8.4.1 Magnetic Locator Tape (MLT): RW mains shall have MLT installed 18-inches above the RW line. The tape shall be continuous between and secured to each inline flow control valve. Where other RW lines join the mainline, the MLT used to locate these lines shall be secured to the mainline. The MLT shall be a minimum of 5 ½ mil thick, 2-inches wide material, sandwiched between two layers of polyethylene, purple in color (denoting reclaimed water), with black 1-inch warning letters stating "Caution – Reclaimed Water Buried Below."

5.8.4.2 Electronic Locating Wire (ELW): RW mains shall have ELW. The ELW shall be Direct Burial #10 AWG Solid (.1019" diameter), 21% conductivity copper-clad annealed high carbon steel high strength tracer wire, 600# average tensile break load, 30 mil. high molecular weight-high density Purple polyethylene jacket complying with ASTM-D-1248, 30 volt rating. The ELW shall be Copperhead Industries, LLC (part # 1030P-HS) or HCUD approved equal. The ELW shall be securely installed on top of the pipe at the 12 o'clock position. The ELW shall be held in place with nylon cable ties (or equal means of attachment as approved by HCUD), at each end and 48-inches on center of the pipe sections. The ELW shall be of sufficient length as to be extendable to the surface at each valve box, allowing a current to be induced through the wire to detect the location of the pipeline. The ELW shall be brought to the surface inside each valve pad, through a length of 3-inch PVC pipe, with a threaded cap to protect the wire and terminate with a tinned waterproof wire connector. See Detail 23. The ELW on service lines shall be connected to the main ELW and end 24-inches past the curb stop valve with a tinned waterproof wire connector. The cost of the ELW shall be included with the line items for pipe. ELW "stub-out" access points shall not exceed 1000-foot intervals and shall be noted on the final "As Builts" (Record Drawings) set of plans. See Detail 21. Instances where the ELW requires splicing, the two ends of the ELW shall be joined together with a silicon injected wire nut of the proper size.

5.8.5 VALVES AND APPURTENANCES: All valves shall be the manufacturer's standard design for the service intended and shall bear the maker's name, pressure rating, type, size and flow direction arrow cast on the body. Valves shall open left (counter clockwise) with an arrow cast in the metal of operating hand wheels or nuts indicating the direction of opening. All underground valves 3-inches and larger, shall have mechanical joints.

5.8.5.1 Gate Valves (GV)

5.8.5.1.1 A GV 2-inches in size shall have a full port opening, non-rising stem with hand wheel, thread to thread, and resilient wedge. Example is AVK, No. 03-063-43 with hand wheel. See Detail 23.

5.8.5.1.2 A GV 4-inch, up to and including 12-inch for in-ground applications, shall be of the resilient seat type (meeting the requirements of AWWA C500/C509). These valves shall have non-rising stems, with a 2-inch square AWWA style operating nut, and shall open when the nut is turned counterclockwise when viewed from above the activator nut. Valves shall have mechanical joint ends and shall be furnished complete with joint accessories. Exposed or above-ground GV's shall be outside stem and yoke (OS&Y) flanged joint type. GV's shall be "Ken-Seal" as manufactured by Kennedy; "Metroseal" by U.S. Pipe, AVK, or HCUD approved equal.

5.8.5.1.3 The GV activator nut shall be protected by an adjustable cast iron valve case (similar or equal to Tyler, 2 piece, No. 461-S for short applications or 562-S for long applications) with a cast iron lid marked "RECLAIMED WATER" on top. Valve cases shall be secured by a concrete pad, 24-inches by 24-inches by 6-inches thick, with #4 rebar inside the pad perimeter and shall conform to final grade and slope. If the GV activator nut shall be installed lower than 36-inches below grade, the contractor shall install a valve operation nut extension device, such as Pentek 5 1/4" Roadway Valve Box or HCUD approved equal. The contractor shall modify the valve case to ensure soil does not enter the operating nut area, causing GV operational difficulties.

5.8.5.2 Combination Air-Vacuum Release Valve (ARV) Assembly: The ARV shall be of the type that shall release air from the line when pressurized and keep air from entering the line when not pressurized. The ARV shall be located at high elevation points on the pipeline and operate automatically. The ARV shall have a 2-inch inlet, corporation stop, saddle, - brass or SS pipe and fittings, and locking curb stop. The ARV, fittings, and piping shall be rated for a minimum working pressure of 150 PSI. The ARV shall be installed in traffic bearing shallow pre-cast concrete manholes. Construction plans and "As Builts" (Record drawing) shall include ARV stationing on both the plan and profile views. See Detail 33 for manhole rings and covers.

5.8.5.3 Valve Boxes

5.8.5.3.1 Valve boxes for all valves installed below ground shall be cast iron. Valve boxes shall be adjustable to fit the depth of earth cover over the valve and shall be designed so as to prevent the transmission of surface loads directly to the valve or piping. Valve boxes shall have a minimum interior diameter of 5 ¼ -inches. Valve box extension shall be installed to reserve a minimum of 50% of the adjustment for a future extension. Valve boxes shall be supplied by Tyler MFG., two piece, with cast iron lid, No. 461-S for short applications or 562-S for long applications.

5.8.5.3.2 The operating nut should not exceed 36-inches below finished grade. If conditions require that the operating nut exceeds 36-inches, a mechanical extension shall be attached to the valve. The contractor shall install a valve operation nut extension device, such as Pentek 5¼ "Roadway Valve Box" or HCUD approved equal.

5.8.5.3.3 The cast iron cover of the valve box shall be marked "RECLAIMED WATER" painted purple, and shall be secured with a concrete pad to prevent tipping or moving. See Detail 23.

5.8.5.4 Concrete Valve Pad and Brass Tag: Valve boxes located outside of paved areas shall be cast in a 24-inch x 24-inch x 6-inch thick 3000 PSI concrete slab. See Detail 23 for Standard Pad installations.

5.9 METERING

5.9.1 METERING REQUIREMENTS

5.9.1.1 The EOR shall incorporate all the requirements of this Manual, with attention to Sub-Section 5.12 titled "SYSTEM IDENTIFICATION AND SIGNAGE" of this section. See Detail 11.

5.9.1.2 A master meter shall be installed on a RW distribution line at each location where a distribution line is connected to a RW transmission main in order to measure the flow entering a development. The size and actual placement location of each meter shall be reviewed and approved by the HCUD. The entire meter assembly, including valves and pipes, shall be colored purple, as required by Florida Department of Environmental Protection (FDEP) rules. See Detail 6.

5.9.1.3 All commercial customers with a common area irrigation system shall be metered. All meters shall be appropriately sized and approved. Meters sized 2-inches or smaller shall be installed by HCUD; meters larger than 2-inches shall be approved by HCUD and installed by the customer. All RW meters larger than 2" for commercial customers, including multi-family common area connections, shall be installed above ground. The pipe supports used in the meter assemblies installations shall be adjustable

5.9.1.4 Although meter bypass loops are typically not required because RW delivery is not essential to the public health and safety, HCUD reserves the right to request a bypass design on a case-by-case basis.

5.9.2 METER SPECIFICATIONS (Without Telemetry) (See Table 5-2)

- 5.9.2.1 Meter size shall be dependent upon flow characteristics. The EOR will size the meter or meters and are subject to approval by HCUD.
- 5.9.2.2 Meters sized 1-inch and smaller shall be a displacement type, magnetically driven Neptune T-10 with an E-coder R900i Pit Version MIU Register.
- 5.9.2.3 Meters sized 1.5" thru and including 20" shall be a Neptune HP Turbine with an E-coder R900i Pit Version MIU Register.
- 5.9.2.4 All RW meters shall be ordered with the "RECLAIMED" trim option.
- 5.9.2.5 Meters (with telemetry) for golf courses and other major users are specified in Sub-Section 5.10.
- 5.9.2.6 Meters shall be provided with calibration certification tags prior to installation.

Table 5-2

Reclaimed Water Meter Applications
Without Telemetry

<u>Meter Type</u> ¹	<u>Meter Size</u> ^{2, 3}	<u>Meter Application</u> Not Limited To
Displacement Type Neptune T-10	5/8" to and including 1"	Irrigation and Some Commercial Irrigation
Neptune Turbine (High Flow w/ Little Low Flow)	1.5" to and including 20"	Commercial Irrigation

¹ All Neptune Radio Read Meters require an E-Coder R900i Pit Version MIU Register.

² Neptune Strainers are required on all 3" and larger meter assembly installations.

³ All meter assemblies larger than 2" require above ground installation.

- 5.9.3 PLACING METER IN SERVICE: Once the RW distribution line has been flushed and the meter installation is complete, filling the main line and meter with RW shall be accomplished by slowly opening the inlet valve and allowing trapped air to be released slowly at the highest point available. Avoid the rapid expulsion of large amounts of entrapped air because this could cause damage to the internal measuring mechanism of the meter.

- 5.10 GOLF COURSES AND OTHER MAJOR USERS: Golf courses and other major water users (over 100,000 GPD annual average) shall be required to install a meter with telemetry to monitor and control the flow entering the property. Prior to connection to the RW system, the golf course owner shall enter into a service agreement with HCUD.

- 5.10.1 METER: The meter shall be a Sparling Model 657 TIGERMAG, or HCUD approved equal, and meet the general requirements of Section 5.

- 5.10.2 RECEIVING POND LEVEL SENSOR: The golf course owner shall be responsible for installing and maintaining, in good operating condition, one or more pond level sensors. The type of sensor shall be approved by HCUD before installation.

- 5.10.3 CONTROL VALVE, OPERATOR, AND ELECTRONIC CONTROLLER: A control valve shall be installed at the metering station and shall be configured to sustain upstream pressure and shall shut off when commanded from a remote location. In conjunction with an electronic controller, the valve shall maintain a flow rate set point.

- 5.10.4 **PRESSURE GAUGES AND PRESSURE TRANSMITTER:** Pressure gauges shall be installed on the supply side and distribution side of the metered connection.
- 5.10.5 **REAL-TIME MONITORING AND CONTROL PANEL:** The real-time monitoring and control field panel shall be installed at the metering station shall contain all components necessary for both local and remote monitoring and control of the metering stations. A programmable logic controller (PLC), radio, operator interface unit (OIU), electronic interface controller, open/close/remote hand-switch, power supplies to control circuitry and surge suppression shall be included. The contractor shall provide all programming necessary for operating system.

5.11 SYSTEM IDENTIFICATION AND SIGNAGE

5.11.1 PIPING AND APPURTENANCES

- 5.11.1.1 All RW piping and appurtenances shall be clearly identified as RW facilities, with purple colorings and signage.
- 5.11.1.2 The standard color is Pantone Purple 522C for all RW system piping and above-ground appurtenances including valves, meter assemblies, and BPA(s).
- 5.11.1.2.1 PVC distribution mains shall be color purple which shall be an integral part of the pipe materials.
- 5.11.1.2.2 DIP distribution mains shall be color coded with a purple spiral-wrapped tape with adhesive backing. Adhesive tape shall be at least 5-mils in thickness, at least 2-inches in width, and made of an aluminum material sandwiched between two layers of polyethylene. Above-ground piping shall be painted Pantone Purple 522C.
- 5.11.1.2.3 PET service pipe or tubing. Service pipe shall be the standard purple or identified with a purple stripe with the words "RECLAIMED WATER" at 8-inch intervals.
- 5.11.1.3 Valves installed below ground shall be identified with a SS tag to differentiate RW valves from potable water valves.
- 5.11.1.4 Covers for all valve boxes, meter and service boxes, and other below-ground devices on the RW system shall be painted purple and shall be permanently embossed "RECLAIMED WATER" and bear the words in English and Spanish "DO NOT DRINK, NO BEBER," together with the equivalent standard international symbol.

5.11.2 SIGNAGE: See Detail 11.

- 5.11.2.1 The public shall be notified of the use of RW by posting advisory signs designating the nature of the reuse project area.
- 5.11.2.2 Signage shall be placed, as appropriate, at entrances to residential neighborhoods where RW is used for landscape irrigation and at prominent locations at all commercial sites, including multi-family developments, office parks, schools, churches, condominiums, residential common areas, recreational developments, and golf courses. A notification method for golf courses, for example, shall be to post of advisory signs at the entrance to a golf course and at the first and tenth tees as well as notes on scorecards.
- 5.11.2.3 Advisory signs shall be color-coded Pantone Purple 522C and include the following text in English and Spanish "RECLAIMED WATER" and "DO NOT DRINK, NO BEBER," together with the equivalent standard international symbol. A typical advisory sign is shown in Detail 11.
- 5.11.2.4 Advisory signs shall be posted adjacent to lakes or ponds used to store RW and shall include the following text in English and Spanish "DO NOT DRINK, NO BEBER" and "DO NOT SWIM, NO NADIR," together with the equivalent standard international symbols, in addition to "RECLAIMED WATER".

- 5.12 PIPE HANDLING AND CUTTING, INSTALLATION OPTIONS AND PRESSURE TESTING PROCEDURES:
See section 3.12.
- 5.13 FINAL ACCEPTANCE OF PROJECT BY HCUD: (See sub-paragraph 1.23). Final acceptance of the RW distribution system(s) and release of the performance bond by HCUD shall occur when the following conditions shall be met:
- 5.13.1 Pressure tests, preliminary and final inspections shall have been made and the results are acceptable to HCUD.
 - 5.13.2 Improvements are found to be in accordance with the applicable regulations of HCUD, Hernando County, State and Federal regulatory agencies.
 - 5.13.3 Documents requesting to place water system(s) into service shall have been obtained and acceptance awarded from the appropriate regulatory agencies.
 - 5.13.4 HCUD receives from the EOR, two sets of signed, sealed and dated "As Builts" (Record Drawings) and one complete set of electronic "As Builts" (Record Drawings), prepared in the ".dwg" format and ".pdf" format.
 - 5.13.5 The contractor shall ensure that all above ground valves, piping and mechanical joint fittings are protected from the elements by painting the exposed valves and fittings with an approved oil based enamel paint. The paint used to protect reclaimed water system valves, piping and fittings shall be purple in color.
 - 5.13.6 All applicable utility easements have been acquired, recorded and documents received by HCUD.

SECTION 6

SPECIFICATIONS FOR EMERGENCY POWER GENERATOR SYSTEMS (EPGS)

SECTION 6: EMERGENCY POWER GENERATOR SYSTEM (EPGS)

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SECTION 6

EMERGENCY POWER GENERATOR SYSTEM (EPGS) SPECIFICATIONS

6.1 GENERAL DESCRIPTION

6.1.1 SCOPE: The system shall provide Emergency Power Generator system (EPGS) in event of failure of normal power supply failure. The system shall consist of a liquid cooled diesel engine, an AC alternator and system controls with all necessary accessories for a complete operating system, including but not limited to the items as specified hereinafter.

6.1.2 GENERAL REQUIREMENTS

6.1.2.1 The EPGS shall consist of an internal combustion diesel engine, alternating current (AC) power generator, governor, coupling and all controls, factory tested as a complete unit, representative of the model of the system to be installed.

6.1.2.2 The EPGS shall conform to applicable National Electrical Code (NEC) and applicable inspection authorities and must be available with the Underwriters Laboratories (UL) 2200 listing as a stationary engine-generator assembly.

6.1.3 MANUFACTURER QUALIFICATIONS

6.1.3.1 The EPGS shall be supplied by Tradewinds, Onan, or MTU Onsite Energy.

6.1.3.2 To be classified as a manufacturer, the builder of the EPGS shall be identified as a "one source of supply and warranty" responsibility.

6.1.3.3 The manufacturer shall supply printed literature and brochures describing the standard series specified.

6.2 EMERGENCY POWER GENERATOR SYSTEM (EPGS) COMPONENT SPECIFICATIONS

6.2.1 ENGINE SPECIFICATIONS

6.2.1.1 The engine shall be a liquid cooled, diesel fueled, turbocharged after-cooled engine of 4-stroke cycle design.

6.2.1.2 The engine shall be cooled with a unit mounted radiator, fan, water pump, and closed coolant recovery system providing visual diagnostic means to determine if the system is operating with a normal engine coolant level. The radiator shall be designed for operation in 77-degrees Fahrenheit, 25-degrees Celsius ambient temperature.

6.2.1.3 The intake air filter(s) with replaceable paper element(s) shall be mounted on the unit. Full pressure lubrication shall be supplied by a positive displacement lubrication oil pump. The engine shall have a replaceable oil filter(s) with an internal bypass. Engine coolant and oil drain extensions, equipped with pipe plugs, shall be provided to outside of the engine mounting base for cleaner and more convenient engine servicing. A fan guard shall be installed for personnel safety.

6.2.1.4 The engine shall have a battery charging direct current (DC) alternator with a transistorized voltage regulator. Remote 2-wire starting shall be by a solenoid shift, electric starter motor.

- 6.2.1.5 Engine speed shall be controlled by an isochronous governor to maintain alternator frequency within 0.5% from no load to full load alternator output. Steady state regulation shall be 0.25%.
- 6.2.1.6 The engine fuel system shall be designed for operation on No. 2 diesel fuel. A primary fuel filter, water separator, manual fuel priming pump, fuel shutoff solenoid and all fuel lines shall be installed at the factory.
- 6.2.1.7 The primary diesel fuel filter element shall be replaceable and capable of removing contaminants of 10-microns.
- 6.2.1.8 The engine shall have a thermostatically controlled water jacket heater unit(s) to aid in quick starting with wattage as recommended by the manufacturer. The contractor shall provide proper branch circuit from normal utility power source. See Details 35 A and B. Line voltage of the jacket heater shall be the same as the main service voltage. Adding transformers is not acceptable.
- 6.2.1.9 Sensing elements shall be located on the engine for low oil pressure shutdown, high coolant temperature shutdown, low coolant level shutdown, over-speed shutdown and over-crank shutdown. These sensors shall be connected to the control panel using a wiring harness with the following features: wire number labeling on each end of the wire run for easy identification, a molded rubber boot to cover the electrical connection on each sensor to prevent corrosion and all wiring to be run in flexible conduit for protection from the environment and any moving objects.
- 6.2.1.10 The following items shall be installed at the factory on each EPGS:
 - 6.2.1.10.1 The engine shall have a SS, flexible connector to couple the engine exhaust manifold to the exhaust system.
 - 6.2.1.10.2 The Fuel System:
 - 6.2.1.10.2.1 Shall have a factory installed, double walled, base mounted fuel tank with sufficient capacity to operate the engine for a minimum period of 48-continuous hours operation rated load. The design engineer shall consider the engine size and fuel efficiency when recommending the fuel tank capacity. The capacity of the fuel tanks shall NOT exceed 500 gallons unless approved by HCUD.
 - 6.2.1.10.2.2 Shall have a convenient stub up area for electrical conduit entry.
 - 6.2.1.10.2.3 Shall have the structural integrity to support the engine-generator set and carry the UL 142 mark.
 - 6.2.1.10.2.4 Shall have the minimum features of but not limited to, all welded construction, lockable fuel filler cap, fuel gauge, low fuel level alarm, fuel line check valve, vent and fittings for fuel supply, fuel return and filler tube.
 - 6.2.1.10.3 The base fuel tank shall be supplied with emergency venting capacity as per NFPA 37.

6.2.2 ALTERNATOR SPECIFICATIONS

- 6.2.2.1 The alternator shall be a 4-pole revolving field type. The stator shall be direct connected to the engine to insure permanent alignment. The generator shall meet temperature rise standards for Class "H" insulation, operate within Class "F" standards for extended life. All leads shall be extended into an AC connection panel. The alternator shall be protected by internal thermal overload protection and an automatic reset field circuit breaker.

- 6.2.2.2 One step load acceptance shall be 10-percent of EPGS nameplate rating and meet the requirements of NFPA 110 paragraph 5-13.2.6. The generator set and regulator must sustain at least 90-percent of rated voltage for 10-seconds with 250-percent of rated load at near zero power factor connected to its terminals when equipped with direct or brushless excitation. 300-percent short circuit current shall be selectable on units equipped with permanent magnet exciters shall have a selectable 300-percent short circuit current.
- 6.2.2.3 A solid state voltage regulator designed and built by the alternator manufacturer shall be used to control output voltage by varying the exciter magnetic field to provide + or – 1-percent regulation during stable load conditions. Should an extremely heavy load drop the output frequency, the regulator shall have a voltage droop of 4-Volts/Hertz to maximize motor starting capability. The frequency at which this droop operation begins shall be adjustable, allowing the EPGS to be properly matched to the load characteristics insuring optimum system performance. Additional rheostats for matching generator voltage, droop, and stability characteristics to the specific load conditions shall be available.
- 6.2.2.4 A NEMA 1 panel that is an integral part of the EPGS shall be provided to allow for a convenient location in which to make electrical output connections. A fully rated, isolated neutral shall be included by the EPGS manufacturer to insure proper sizing.
- 6.2.2.5 The electric plant shall be mounted with vibration isolators on a welded steel base that shall permit suitable mounting to any level surface.
- 6.2.2.6 The following items shall be provided and installed at the factory: A main line circuit breaker carrying the UL mark shall be factory installed. The breaker shall be rated per the manufacturer's recommendations and mounted in the genset connection box. The line side connections shall be made at the factory. Output lugs shall be provided for load side connections.

6.2.3 SYSTEM CONTROLS SPECIFICATIONS

- 6.2.3.1 All engine, alternator controls and instrumentation shall be designed, built, wired, tested and shock mounted in a NEMA 1 enclosure to the engine-generator set by the manufacturer. It shall contain panel lighting, a fused DC circuit to protect the controls and a +/-5% voltage adjusting control. This panel shall be able to be rotated 90-degrees in either direction for correct installation.
- 6.2.3.2 The EPGS shall contain a complete 2-wire automatic engine start-stop control which starts the engine on closing contacts and stops the engine on opening contacts. A programmable cyclic cranking limiter shall be provided to open the starting circuit after eight attempts if the engine has not started within that time.
- 6.2.3.3 The panel shall include; meters to monitor AC voltage, AC current and AC frequency with a phase selector switch, an emergency stop switch, an audible alarm, battery charger fuse, and a programmable engine control and monitoring module.
- 6.2.3.4 The control panel shall include: a manual, off, auto switch; four Light Emitting Diode Lamps (LED) to indicate 1) Not In Auto, 2) Alarm Active, 3) Generator Running, 4) Generator Ready; a data entry keypad and a digital display panel.
- 6.2.3.5 The module shall display all pertinent unit parameters including:
 - 6.2.3.5.1 Generator Status - Current unit status shall be in real time.
 - 6.2.3.5.2 Instrumentation - Real time readouts of the engine and alternator analog values for oil pressure, coolant temperature, fuel level, DC battery voltage, and run time hour meter.

- 6.2.3.5.3 Generator Commands - Current demand shall start/stop engine operation.
- 6.2.3.5.4 Alarm Status Conditions: High or low AC voltage, high or low battery voltage, high or low frequency, low or pre-low oil pressure, low water level, low water temperature, high and pre-high engine temperature, high, low and critical low fuel levels (where applicable), over-crank, over-speed, unit not in "Automatic Mode", eight user programmable digital channels and four user programmable analog channels.
- 6.2.3.5.5 Alarm Log - There shall be an electronic memory of last fifty alarm events.
- 6.2.3.5.6 Operating parameters - There shall be access to and manipulation of the current operating parameters and alarm limits.
- 6.2.3.5.7 Software Information - There shall be version information and module display test function.
- 6.2.3.6 A list of equipment to be installed at the engine-generator set manufacturer's facility shall be provided by the manufacturer.
- 6.2.3.7 A list of equipment to be provided by the EPGS manufacturer and shipped loose with the unit shall be provided to HCUD by the manufacturer.

6.3 ADDITIONAL UNIT SPECIFICATIONS

6.3.1 UNIT ACCESSORIES

- 6.3.1.1 The following equipment is to be installed at the EPGS manufacturer's facility:
 - 6.3.1.1.1 The enclosure shall be aluminum, wind rated to 150 mph, weather protective, and sound attenuating: The EPGS shall be factory enclosed with corner posts, uprights and headers. The roof shall aid in the runoff of water and include a drip edge. The enclosure shall be coated with electrostatically applied power paint, baked and finished to manufacturer's specifications. The enclosure shall be completely lined with sound deadening material of self extinguishing design. The enclosure shall have large, hinged removable doors to allow access to the engine, alternator and control panel. Hinges and all exposed fasteners shall be SS. Each door shall have lockable hardware with identical locks all keyed to CH751. Padlocks do not meet this specification. When generator is installed on the site, the combined sound level for the exhaust, engine, fan and all components of the generator must not exceed 75 DBA peak measured at 7 meters for all generators 1000 KW or smaller. HCUD will have the option to measure and record sound levels once the generator is installed. At the minimum, enclosure shall have a level II (2) sound attenuation or approved equal. Enclosure shall be completely lined with 1 inch thick, UL 94, HF 1 listed acoustic insulation. Exhaust discharge should be directed to minimize exhaust noise toward nearest residential or commercial property. HCUD shall have the option of requiring vertical exhaust discharge. For generators larger than 1000 KW shop drawings must be submitted for HCUD approval. The shop drawings must detail enclosure materials of construction, overall dimensions, layout, sound attenuation capabilities, and highest sound level measured at 7 meters from generator.

- 6.3.1.1.2 The exhaust silencer(s) shall be provided of the size as recommended by the manufacturer to achieve required exhaust sound level maximum of 75 DBA measured at 7 meters for all generators 1000 KW or smaller. For larger generators, proposed exhaust silencer(s) shall be submitted to HCUD for approval prior to start of construction. The silencer(s) shall be mounted within the weather protective enclosure for reduced exhaust noise and shall be connected to the engine with a flexible, seamless, stainless steel exhaust connection. A rain cap shall be attached to and terminate the exhaust pipe. All components shall be properly sized to assure operation without excessive back-pressure during operation.
- 6.3.1.1.3 A heavy duty, lead acid battery set rated at 135AMP/HOURS including connecting battery cables shall be installed by the EPGS manufacturer.
- 6.3.1.1.4 Provide an automatic dual rate battery charger manufactured by the EPGS supplier. The automatic equalizer system shall monitor and limit the charge current to 10-amps. The charger shall be protected against a reverse polarity connection. The battery charger shall be factory installed in the automatic transfer switch whenever possible. A battery charger mounted inside the weatherproof enclosure of the EPGS may be acceptable with HCUD approval. The battery charger line voltage shall be the same as the main service voltage. Adding transformers is not acceptable.
- 6.3.1.1.5 The following equipment shall also be provided by the EPGS set manufacturer and shipped loose with the unit: spring type vibration isolators of the type, size and number recommended to support the EPGS set to reduce transmitted vibration.

6.4 AUTOMATIC TRANSFER SWITCH (ATS) SPECIFICATIONS

- 6.4.1 GENERAL: The ATS shall be furnished by Thompson Technology, Onan or the manufacturer of the EPGS set so as to maintain system compatibility and local service responsibility for the complete emergency power system. The ATS shall be listed by UL, Standard 1008, with circuit breaker protection. Representative production samples of the ATS supplied shall have demonstrated through testing the ability to withstand at least 10,000 mechanical operation cycles. One operation cycle shall be the electrically operated transfer from normal to emergency and back to normal. Wiring shall comply with NEC Table 373-6(b). The manufacturer shall furnish schematic and wiring diagrams for the particular ATS and a typical wiring diagram for the entire system.
- 6.4.2 RATINGS AND PERFORMANCE SPECIFICATIONS: The ATS shall be a 3-pole design rated for 200-amps continuous operation in ambient temperatures of -20 degrees Fahrenheit (-30 degrees Celsius) to +140 degrees Fahrenheit (+60 degrees Celsius). Main power switch contacts shall be rated for 600 VOLT-AC minimum. The ATS supplied shall have a minimum withstand and closing rating when fuse protected of 200,000 amperes. Where the line side over-current protection is provided by circuit breakers, the short circuits withstand and closing ratings shall be 25,000 amperes Root Mean Square (RMS). These RMS symmetrical fault current ratings shall be the rating listed in the UL listing or component recognition procedures for the ATS. All withstand tests shall be performed with the over-current protective devices located external to the ATS.

6.4.3 ATS CONSTRUCTION SPECIFICATIONS

- 6.4.3.1 The ATS shall be double throw construction, positively electrically and mechanically interlocked to prevent simultaneous closing and mechanically held in both normal and emergency positions. Independent break before make action shall be used to positively prevent dangerous source to source connections. When switching the neutral, this action prevents the objectionable ground currents and nuisance ground fault tripping that can result from overlapping designs. The ATS shall be approved for manual operation. The electrical operating means shall be by electric solenoid. Every portion of the contactor shall be positively mechanically connected. No clutch or friction drive mechanism shall be allowed. This ATS shall not contain integral over-current devices in the main power circuit, including molded case circuit breakers or fuses.
- 6.4.3.2 The ATS electrical actuator shall have an independent disconnect means to disable the electrical operation during manual switching. Main switch contacts shall be high pressure silver alloy with arc chutes to resist burning and pitting for long life operation.

6.4.4 ATS CONTROLS SPECIFICATIONS

- 6.4.4.1 All control equipment shall be mounted on the inside of the cabinet door in a metal lockable enclosure with transparent safety shield to protect all solid state circuit boards. This shall allow for ease of service access when main cabinet lockable door is open, but shall prevent access by unauthorized personnel. Control boards shall have installed cover plates to avoid shock hazard while making control adjustments. The solid state voltage sensors and time delay modules shall be plug-in circuit boards with silver or gold contacts for ease of service.
- 6.4.4.2 A solid state under voltage sensor shall monitor all phases of the normal source and provide adjustable ranges for field adjustments for specific application needs. Pick-up and drop-out settings shall be adjustable from a minimum of 70-percent to a maximum of 95-percent of nominal voltage. A utility sensing interface shall be used, stepping down system voltage of 277/480 VOLT 3-phase to 24-VOLT, helping to protect the printed circuit board from voltage spikes and increasing personnel safety when troubleshooting.
- 6.4.4.3 An automatic "Alert to Start" signal switch to start the EPGS in the event of a power interruption shall be installed. A set of contacts shall close to start the engine and open for engine shutdown. A solid state time delay start, adjustable 0.1 to 10-seconds, shall delay this signal to avoid nuisance startups on momentary voltage dips or power outages.
- 6.4.4.4 Transfer the load to the EPGS after it reached proper voltage (adjustable from 70 to 90-percent of system voltage) and frequency (adjustable from 80 to 90-percent of system frequency). A solid state time delay adjustable from 5-seconds to 3-minutes shall delay this transfer to allow the engine-generator to warm up before application of load. There shall be a switch to bypass this warm-up timer when immediate transfer shall be required.
- 6.4.4.5 Re-transfer the load to the line after normal power restoration. A return to utility timer (adjustable from 1 to 30-minutes) shall delay this transfer to avoid short term normal power restoration.
- 6.4.4.6 The operating power for transfer and re-transfer shall be obtained from the source to which the load is being transferred. Controls shall provide an automatic re-transfer of the load from emergency to normal if the emergency source fails with the normal source available.

- 6.4.4.7 Signal the EPGS to stop after the load re-transfers to normal. A solid state engine cool-down timer (adjustable from 1 to 30-minutes) shall permit the engine to run unloaded to cool down before shutdown. Should the utility power fail during this time, the switch shall immediately transfer back to the generator.
- 6.4.4.8 Provide an engine minimum run timer (adjustable from 5 to 30-minutes) to ensure an adequate engine run period.
- 6.4.4.9 Provide a solid state plant exercise clock to allow selection of any combination of days of the week and the time of day for the EPGS exercise period. The clock shall have a one-week cycle and be powered by the load side of the transfer switch. A battery shall be supplied to maintain the circuit board clock operation when the load side of the transfer switch is de-energized. Include a switch to select if the load shall transfer to the engine-generator set during the exercise period.
- 6.4.4.10 The transfer switch shall have a time delay neutral feature to provide a time delay (adjustable from 0.1 to 10-seconds) during the transfer in either direction, during which time the load is isolated from both power sources. This allows residual voltage components of motors or other inductive loads (such as transformers) to decay before completing the switching cycle. A switch shall be provided to bypass all transition features when immediate transfer is required.
- 6.4.4.11 The transfer switch shall have an in-phase monitor which allows the switch to transfer between live sources if their voltage waveforms become synchronous within 20-electrical degrees within 10-seconds of transfer initiation signal. A switch shall be provided to bypass this feature if not required.
- 6.4.4.12 If the in-phase monitor shall not allow such a transfer, the control shall default to time delay neutral operation. Switches with in-phase monitors which do not default to time delay neutral operation shall not be acceptable.
- 6.4.4.13 Front mounted controls shall include a selector switch to provide for a NORMAL TEST mode with full use of time delays. FAST TEST mode, which bypasses all time delays to allow for testing the entire system in less than 1-minute, or AUTOMATIC mode to set the system for normal operation.
- 6.4.4.14 Provide bright lamps to indicate the transfer switch position in either UTILITY (white) or EMERGENCY (red). A third lamp is needed to indicate STANDBY OPERATING (amber). These lights shall be energized from utility or the engine-generator set.
- 6.4.4.15 Provide manual operating handle to allow for manual transfer. This handle shall be mounted inside the lockable enclosure so as to be accessible only by authorized personnel.
- 6.4.4.16 Provide a safety disconnect switch to prevent load transfer and automatic engine start while performing maintenance. This switch shall also be used for manual transfer switch operation.
- 6.4.4.17 Provide LED status lights to give a visual readout of the operating sequence. This shall include utility on, engine warm-up, standby ready, transfer to standby, in-phase monitor, time delay neutral, return to utility, engine cool-down and engine minimum run. A "signal before transfer" lamp shall be supplied to operate from optional circuitry.
- 6.4.4.18 The transfer switch mechanism and controls shall be mounted in a NEMA 4X enclosure.

6.5 ADDITIONAL PROJECT SPECIFICATIONS

- 6.5.1 **FACTORY TESTING:** Before shipment of the EPGS, the engine-generator set shall be tested under rated load for performance and proper functioning of control and interfacing circuits. Tests shall include: verifying that all safety shutdowns are functioning properly, verify single step load pick-up per NFPA 110-1996, Paragraph 5-13.2.6., verify transient and voltage dip responses and steady state voltage and speed (frequency) checks.
- 6.5.2 **OWNER/OPERATOR MANUALS:** Three sets of owner/operator manuals specific to the product supplied shall accompany delivery of the EPGS. General operating instruction, preventive maintenance, wiring diagrams, schematics and parts exploded views specific to this model shall be included.
- 6.5.3 **EPGS INSTALLATION SPECIFICATIONS:** The contractor shall install the complete EPGS including all fuel connections in accordance with the manufacturer's recommendations as reviewed by the EOR.
- 6.5.4 **SERVICE SPECIFICATIONS:** Supplier of the EPGS and associated items shall have permanent service facilities with factory trained service personnel on 24-hour call, experienced in servicing this type of equipment, providing warranty and routine maintenance service. Service contracts shall also be available from the manufacturer.

6.5.5 **WARRANTY SPECIFICATIONS:**

- 6.5.5.1 The standby EPGS system components, engine generator and instrumentation panel shall be warranted by the manufacturer against defective materials and factory workmanship for a period of 5-years. Such defective parts shall be repaired or replaced at the manufacturer's option, free of charge for parts, labor and travel for the first 2-years. Parts shall be replaced free for the remaining 3-years of the warranty period.
- 6.5.5.2 The warranty period shall commence when the EPGS shall be placed into service. Multiple warranties for individual components (engine, alternator, controls, etc.) shall not be acceptable. Satisfactory warranty documents shall be provided.

6.5.6 **PRE-OPERATION, OPERATION AND LOAD TEST SPECIFICATIONS:**

- 6.5.6.1 The supplier of the EPGS and associated items covered herein shall provide factory trained technicians to check out the completed installation and to perform an initial startup tests to include: ensuring the engine starts (both hot and cold) within the specified time, verification of engine parameters within specification, verify no load frequency and voltage, adjusting if required and test all automatic shutdowns of the engine-generator.
- 6.5.6.2 **4-Hour Load Bank Test:** The contractor shall perform a 4-hour electric load bank test, at 100-percent load, upon the completion of the installation of an EPGS. The contractor shall schedule such tests to coincide with key HCUD Technical Personnel being on site during the test.
- 6.5.6.3 The emergency power system shall be designed to the specified manufacturer's electrical and physical characteristics. The equipment sizing, spacing, amounts, electrical wiring, ventilation equipment, fuel and exhaust components shall be sized and designed for the specified system. No substitutions shall be made without written permission from HCUD. Upon approval of the specific EPGS, the contractor shall bear responsibility for the installation, coordination and test-operation of the system as well as any engineering and re-design costs which shall result from such substitutions. A separate list of all printed circuit boards with part numbers and current pricing shall also be included.

- 6.5.6.4 Software needed to program the generator and the transfer switch shall be provided to HCUD upon installation.

SECTION 7

SPECIFICATIONS FOR TRENCHLESS PIPE INSTALLATION (HORIZONTAL DIRECTIONAL DRILL)

THIS SECTION IS DIVIDED INTO THE FOLLOWING FIVE SUB-SECTIONS:

- 7 HORIZONTAL DIRECTIONAL DRILL
- 7A FUSIBLE PVC PIPE
- 7B RESTRAINED JOINT PVC PIPE
- 7C CERTAINTED CERTA-LOK PIPE
- 7D HIGH DENSITY POLYETHYLENE PIPE

SECTION 7

SPECIFICATIONS FOR HORIZONTAL DIRECTIONAL DRILLING (HDD)

SECTION 7: HORIZONTAL DIRECTIONAL DRILLING (HDD)
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SECTION 7

HORIZONTAL DIRECTIONAL DRILLING (HDD)

7.1 GENERAL DESCRIPTION

- 7.1.1 **SCOPE OF WORK:** 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. This work shall include all services, equipment, materials, and labor for the complete and proper installation, testing, restoration of underground utilities and environmental protection and restoration.
- 7.1.2 **QUALITY ASSURANCE:** These requirements specify a wide range of procedural precautions to insure the essential aspects of a directional bore installation are adequately controlled. Adherence to the specifications contained herein shall in no way relieve the contractor of the ultimate responsibility for the satisfactory completion of the work.
- 7.1.3 **PROJECT SCHEDULE AND COOPERATION:** The project schedule shall be established on the basis of working a normal work schedule including five days per week, single shift, and eight hours per day or four days per week, single shift, ten hours per day. General items of work, such as bacteriological testing, leakage and pressure testing, density testing and final inspections, shall be scheduled during the normal work schedule.
- 7.1.4 **WARRANTY:** The contractor shall supply to HCUD an 18-month unconditional warranty. The warranty shall include materials and installation and shall constitute complete replacement and delivery to the site of materials and installation of same to replace defective materials or defective workmanship with new materials/workmanship conforming to the specifications.
- 7.1.5 **REFERENCED STANDARDS:** The work shall conform to applicable provisions of applicable AWWA standards and of the HCUD Water and Sewer Specifications Manual.
- 7.1.6 **PERMITS:** Permits for all work shall be obtained by the owner. The contractor shall verify the existence of all permits before commencing any work on the project.
- 7.1.7 **NOTIFICATION:** HCUD shall be notified 48-hours (minimum) in advance of starting the drilling work. The Directional Bore procedure shall not begin until the proper preparations (see work plan) for the operation have been completed.
- 7.1.8 **SUBMITTALS**
 - 7.1.8.1 **WORK PLAN:** Prior to beginning work, the contractor shall submit to the HCUD a work plan detailing the procedure and schedule to be used to properly execute the project.

- 7.1.8.2 SHOP DRAWING SUBMITTALS: Actual catalog data, brochures and descriptive literature shall not be required for items of standard usage which meet the requirements of the HCUD Water and Sewer Standards Manual. Any specialty item not shown in this manual shall require a complete shop drawing submittal for any material which may, in the opinion of the EOR, not be in compliance with the HCUD Water and Sewer Standards.
- 7.1.8.3 Record Drawing: The contractor shall submit as-built records in duplicate to the EOR within five days after completing the pull back. The as-built records shall include a plan, profile, and all information recorded during the progress of the work, including all subsurface anomalies identified by Ground Penetrating Radar (GPR) or vacuum excavation.
- 7.1.8.4 ELECTRONIC LOCATOR WIRE (ELW) AND INSTALLATION: The contractor shall furnish and install two (2) ELWs with the horizontal directional drilled mains. The ELW shall be Direct Burial #10 AWG Solid (.1019" diameter), 21% conductivity copper-clad annealed high carbon steel high strength tracer wire, 600# average tensile break load, 30 mil. high molecular weight-high density polyethylene jacket complying with ASTM-D-1248, 30 volt rating. The ELW shall be Copperhead Industries, LLC. The exterior color shall be blue for water mains and green for sewer mains. The Locate wire shall be brought to grade within a valve box or locate station box at all "entry point locations: and all "exit point locations". There shall be a maximum length or intervals of 500-feet between locate wire stations. No splices or connections shall be allowed underground. After installation, the contractor shall perform a wire continuity test in the presence of a HCUD inspector.

7.2 SITE PREPARATION

- 7.2.1 Prior to any alterations to worksite, the contractor shall video tape entire work area, one copy of which shall be given to HCUD and one copy to remain with the contractor.
- 7.2.2 The contractor shall coordinate utilities locates with Sunshine State One-Call of Florida, Inc., (#800-CAREFUL). Once the locate service has field marked all utilities, the contractor shall verify each utility (including any service laterals, i.e. water, sewer, cable, gas, electric, phone, etc.) and those within each paved area. Verification may be performed utilizing GPR, hand dig, or vacuum excavation. Prior to initiating drilling, the contractor shall record on the drawings both the horizontal and vertical location of the utilities off of a predetermined baseline. The contractor shall utilize the GPR over the projected bore path whether utilities are located in the horizontal drill pathway or not, in order to reduce the opportunity of conflicting with any unforeseen obstructions.
- 7.2.3 Work site shall be graded and filled to provide a level working area. No alterations beyond what is required for operations are to be made. The contractor shall confine all alteration activities to designated work areas.
- 7.2.4 Following drilling operations, the contractor shall demobilize equipment and restore the work-site to original condition. All excavations shall be backfilled and compacted to a minimum of 95% of original density.

- 7.2.5 ENVIRONMENTAL PROTECTION: The contractor shall provide and install silt fencing between all drilling operations and any drainage, wetland, waterway or other area designated for such protection by state, federal and local regulations. The contractor shall place hay bales, or approved protection, to limit intrusion upon project area. Additional environmental protection necessary to contain any hydraulic or drilling fluid spills shall be put in place, including berms, liners, turbidity curtains and other measures. The contractor shall adhere to all applicable environmental regulations including environmental condition stated in local, state and federal permits.
- 7.2.6 SAFETY: The contractor shall adhere to all applicable state, federal and local safety regulations and all operations shall be conducted in a safe manner.
- 7.2.7 PERSONNEL QUALIFICATIONS CERTIFICATION: DIRECTIONAL BORING: All personnel shall be fully trained in the respective duties as part of the directional drilling crew and in safety. A supervisor thoroughly familiar with the equipment and type of work to be performed shall be in direct charge and control of the operation at all times. The supervisor shall be present at the job site during the actual directional bore operation. The contractor shall have a sufficient number of competent workers on the job at all times to insure the directional bore procedure shall be made in a timely and satisfactory manner.

7.3 DELIVERY, STORAGE AND HANDLING OF MATERIALS

- 7.3.1 The contractor shall inspect materials delivered to the site for damage. All materials found during inspection or during the progress of work to have cracks, flaws, cracked linings, or other defects shall be rejected and removed from the job site without delay.
- 7.3.2 The contractor shall unload and store materials as near the place where the work shall be performed, allowing for minimum handling. Material shall be stored under cover or out of direct sun light. Do not store materials directly on the ground. Keep all materials free of dirt, debris and vermin.
- 7.3.3 The contractor is responsible for obtaining, transporting and sorting any fluids, including water, to the work site.
- 7.3.4 Disposal of fluids shall be the responsibility of the contractor. Disposal of fluids shall be done in a manner that is in compliance with all permits and applicable federal, state, or local environmental regulations. The contractor shall thoroughly clean entire area of any fluid residue upon completion of installation, and replace any and all plants and sod damaged, discolored or stained by drilling fluids.

7.4 EQUIPMENT REQUIREMENTS

- 7.4.1 GENERAL: The directional drilling equipment shall consist of a safe directional drilling rig of sufficient capacity to perform the bore and pullback the pipe, a drilling fluid mixing, delivery and recovery system of sufficient capacity to successfully complete the drill, a drilling fluid recycling system to remove solids from the drilling fluid so that the fluid can be re-used, a guidance system to accurately guide boring operations, a vacuum truck of sufficient capacity to handle the drilling fluid volume, trained and competent personnel to operate the system.

7.4.2 DRILLING SYSTEM

- 7.4.2.1 DRILLING RIG: The directional drilling machine shall consist of a safe power 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.
- 7.4.2.2 DRILL HEAD: The drill head shall be controllable by changing its rotation and shall provide the necessary cutting surfaces and drilling fluid jets.
- 7.4.2.3 MUD MOTORS (if required): Mud motors shall be of adequate power to turn the required drilling tools.
- 7.4.2.4 DRILL PIPE: Shall be constructed of high quality 4130 seamless tubing, grade D or better.

- 7.4.3 GUIDANCE SYSTEM: A Magnetic Guidance System (MGS) or proven gyroscopic system shall be used to provide a continuous and accurate determination of the location of the drill head during the drilling operation. The guidance shall be capable of tracking at all depths up to eighty feet and in any soil condition, including hard rock. It shall enable the driller to guide the drill head by providing immediate information on the tool face, azimuth (horizontal direction), and inclination (vertical direction) The guidance system shall be accurate to +/-2% of the vertical depth of the borehole at sensing position at depths up to one hundred feet and accurate within 1.5 meters horizontally.

7.4.4 DRILLING FLUID (MUD) SYSTEM

- 7.4.4.1 MIXING SYSTEM: A self-contained, closed, drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid. Mixing system shall continually agitate the drilling fluid during operations.
- 7.4.4.2 DRILLING FLUIDS: Clean and safe drilling fluid shall be composed of clean water, appropriate additives and clay. No potentially hazardous material shall be used in drilling fluid. Drilling Fluids shall be bentonite slurry only.
- 7.4.4.3 DELIVERY SYSTEM: The delivery system shall have filters in-line to prevent solids from being pumped into the drill pipe. Connections between the pump and drill pipe shall be relatively leak-free. A berm, minimum of 12-inches high, shall be maintained around drill rigs, entry and exit pits to prevent spills into the surrounding environment.

- 7.4.4.5 DRILLING FLUID RECYCLING SYSTEM: The drilling fluid recycling system shall separate sand, dirt and other solids from the drilling fluid to render the drilling fluid re-usable. Spoils separated from the drilling fluid shall be stockpiled for later use or disposal.

7.5 DRILLING PROCEDURES

- 7.5.1 DRILL PATH: Prior to drilling, the contractor shall mark up drawings to determine the drill pathway. The drawings shall be on site at all times during the drill operation.
- 7.5.2 GUIDANCE SYSTEM: The contractor shall provide and maintain instrumentation necessary to accurately locate the pilot hole (both horizontal and vertical displacements), measure pilot string torsional and axial, measure drilling fluid discharge rate and pressure. The EOR shall have access to instrumentation and readings at all times during operation.
- 7.5.3 PILOT HOLE: The pilot hole shall be drilled along the path shown on the plans and profile drawings or as directed by the EOR in the field. Unless approved otherwise by the EOR, the pilot-hole tolerances shall be as follows:
- 7.5.3.1 ELEVATION: As shown on the plans.
- 7.5.3.2 ALIGNMENT: +5-Feet and within 3-feet of right-of-way or easement boundary.
- 7.5.3.3 CURVE RADIUS: The pilot hole radius shall be no less than 75% of the maximum bending radius of the pipe being installed.
- 7.5.3.4 ENTRY POINT LOCATION: The exact pilot hole entry point shall be within +5-feet of the location shown on the drawing or as directed by the EOR in the field.
- 7.5.3.5 EXIT POINT LOCATION: The exit point location shall be within + 5-feet of the location shown on the drawing or as directed by the EOR in the field.
- 7.5.3.6 LIMITATIONS ON DEPTH: If not noted on the plans, 6" pipe and smaller shall be installed with a depth of 3 to 5-feet. 8" pipe thru 12" pipe shall be installed with a depth of 3 to 6-feet unless required to install the pipe deeper due to utility conflicts. Pipe larger than 12" shall be specifically required by the EOR and approved by HCUD. Where utilities cross under FDOT roads, the depth of cover shall comply with applicable FDOT permit.
- 7.5.3.7 WATER MAIN AND NON-WATER MAIN SEPARATION REQUIREMENTS: The minimum separation requirements between a water main and a non-water main shall be as per FDEP regulations.
- 7.5.4 PULL BACK: After successfully reaming bore hole, the contractor will pull the pipe through the bore hole. In front of the pipe shall be a swivel and reamer to compact bore hole walls. Once pull-back operations have commenced, operations shall continue without interruption until pipe is completely pulled into bore hole. In the event that pipe becomes stuck, the contractor shall cease pulling operations to allow any potential hydro-lock to subside. If pipe remains stuck, the contractor will notify EOR to discuss options and before work shall proceed.

SECTION 7A

SPECIFICATIONS FOR FUSIBLE POLYVINYLCHLORIDE PIPE

SECTION 7A: FUSIBLE POLYVINYLCHLORIDE PIPE

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SECTION 7A

FUSIBLE POLYVINYLCHLORIDE PIPE

7A.1 GENERAL

- 7A.1.1 This section specifies fusible polyvinylchloride pipe, including standards for dimensionality, testing, quality, acceptable fusion practice, safe handling and storage.
- 7A.1.2 **MANUFACTURER REQUIREMENTS:** Fusible polyvinylchloride pipe shall be tested at the extrusion facility for properties required to meet all applicable parameters as outlined in either AWWA C900, AWWA C905, applicable sections of ASTM D2241, ASTM D3034, or ASTM F679. Testing priority shall be in conformance with AWWA C900 and AWWA C905, except for pipe made to the ASTM D3034 or ASTM F679 standards, which shall be tested to those standards. All piping shall be made from a PVC compound conforming to cell classification 12454 per ASTM D1784.
- 7A.1.3 **FUSION TECHNICIAN REQUIREMENTS:** Fusion Technician shall be fully qualified by the pipe supplier to install fusible polyvinylchloride pipe of the type(s) and size(s) being used. Qualification shall be current as of the actual date of fusion performance on the project.
- 7A.1.4 **SPECIFIED PIPE SUPPLIERS:** Fusible polyvinylchloride pipe shall be used as manufactured under the trade names FusibleC-900®, Fusible C-905®, and FPVC™ for Underground Solutions, Inc., Poway, CA, (858) 679-9551. Fusion process shall be as patented by Underground Solutions, Inc., Poway, CA, Patent No. 6,982,051. Owner and Engineer are aware of no other supplier or fusible polyvinylchloride pipe that is an equal to this specified pipe supplier and product.
- 7A.1.5 **ELECTRONIC LOCATOR WIRE (ELW) AND INSTALLATION:** The contractor shall furnish and install two (2) ELWs with the horizontal directional drilled mains. The ELW shall be Direct Burial #10 AWG Solid (.1019" diameter), 21% conductivity copper-clad annealed high carbon steel high strength tracer wire, 600# average tensile break load, 30 mil. high molecular weight-high density polyethylene jacket complying with ASTM-D-1248, 30 volt rating. The ELW shall be Copperhead Industries, LLC. The exterior color shall be blue for water mains and green for sewer mains. The Locate wire shall be brought to grade within a valve box or locate station box at all "entry point locations: and all "exit point locations". There shall be a maximum length or intervals of 500-feet between locate wire stations. No splices or connections shall be allowed underground. After installation, the contractor shall perform a wire continuity test in the presence of a HCUD inspector.

7A.2 PRODUCTS

7A.2.1 FUSIBLE POLYVINYLCHLORIDE PRESSURE PIPE FOR POTABLE WATER

- 7A.2.1.1 Fusible polyvinylchloride pipe shall conform to AWWA C900 or AWWA C905, and/or ASTM D2241 or ASTM D1785 for IPS standard dimensions if applicable. Testing shall be in accordance with AWWA standards for all pipe types.
- 7A.2.1.2 Rework material shall be allowed per AWWA C900 and AWWA C905 standards.
- 7A.2.1.3 Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.
- 7A.2.1.4 Fusible polyvinylchloride pipe shall be manufactured in standard 20', 30' or 40' nominal length.
- 7A.2.1.5 Fusible polyvinylchloride pipe shall be blue in color for potable water use.

- 7A.2.1.6 Pipe generally shall be marked per AWWA C900 or AWWA C905, and shall include as a minimum:
- 7A.2.1.6.1. Normal pipe size
 - 7A.2.1.6.2. PVC
 - 7A.2.1.6.3. Dimension Ratio, Standard Dimension Ratio or Schedule
 - 7A.2.1.6.4. AWWA pressure class or standard pressure rating for non-AWWA pipe
 - 7A.2.1.6.5. AWWA Standard designation number or pipe type for non-AWWA pipe
 - 7A.2.1.6.6. NSF-61 mark verifying suitability for potable water service
 - 7A.2.1.6.7. Extrusion production-record code
 - 7A.2.1.6.8. Trademark or trade name
 - 7A.2.1.6.9. Cell Classification 12454 and/or PVC material code 1120 may also be included
- 7A.2.1.7 Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.

7A.2.2 FUSIBLE POLYVINYLCHLORIDE PRESSURE PIPE FOR NON-POTABLE WATER

- 7A.2.2.1 Fusible polyvinylchloride pipe shall conform to AWWA C900 or AWWA C905, and/or ASTM D2241 or ASTM D1785 for IPS standard dimensionality, if applicable. Testing shall be in accordance with AWWA standards for all pipe types.
- 7A.2.2.2 Rework material shall be allowed per AWWA C900 and AWWA C905 standards.
- 7A.2.2.3 Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.
- 7A.2.2.4 Fusible polyvinylchloride pipe shall be manufactured in a standard 20', 30' or 40' nominal length.
- 7A.2.2.5 Fusible polyvinylchloride pipe shall be purple in color for reclaim, reuse, or other non-potable distribution or conveyance. Fusible polyvinylchloride pipe shall be white in color for raw water collection and transmission, or other non-potable resource or irrigation water uses.
- 7A.2.2.6 Pipe generally shall be marked per AWWA C900 or AWWA C905, and shall include as a minimum:
- 7A.2.2.6.1. Nominal pipe size
 - 7A.2.2.6.2. PVC
 - 7A.2.2.6.3. Dimension Ratio, Standard Dimension Ratio or Schedule
 - 7A.2.2.6.4. AWWA pressure class or standard pressure rating for non-AWWA pipe

- 7A.2.2.6.5 AWWA Standard designation number or pipe type for non-AWWA pipe
- 7A.2.2.6.6 Extrusion production-record code
- 7A.2.2.6.7 Trademark or trade name
- 7A.2.2.6.8 Cell Clarification 12454 and/or PVC material code 1120 may also be included
- 7A.2.2.6.9 For reclaim water service, the wording: "Reclaimed Water, NOT for Potable Use"
- 7A.2.2.7 Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
- 7A.2.3 FUSIBLE POLYVINYLCHLORIDE PRESSURE PIPE FOR WASTEWATER
 - 7A.2.3.1 Fusible polyvinylchloride pipe shall conform to AWWA C900 or AWWA C905, and/or ASTM D2241 or ASTM D1785 for IPS standard dimensionality, if applicable. Testing shall be in accordance with AWWA standards for all pipe types.
 - 7A.2.3.2 Rework material shall be allowed per AWWA C900 and AWWA C905 standards.
 - 7A.2.3.3 Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.
 - 7A.2.3.4 Fusible polyvinylchloride pipe shall be manufactured in a standard 20', 30' or 40' nominal length.
 - 7A.2.3.5 Fusible polyvinylchloride pipe shall be green in color for wastewater use.
 - 7A.2.3.6 Pipe generally shall be marked per AWWA C900 or AWWA C905, and shall include as a minimum:
 - 7A.2.3.6.1 Nominal pipe size
 - 7A.2.3.6.2 PVC
 - 7A.2.3.6.3 Dimension Ratio, Standard Dimension Ratio or Schedule
 - 7A.2.3.6.4 AWWA pressure class or standard pressure rating for non-AWWA pipe
 - 7A.2.3.6.5 AWWA Standard designation number or pipe for non-AWWA pipe
 - 7A.2.3.6.6 Extrusion production-record code
 - 7A.2.3.6.7 Trademark or trade name
 - 7A.2.3.6.8 Cell Classification 12454 and/or PVC material code 1120 may also be included.
 - 7A.2.3.7 Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.

7A2.4 FUSIBLE POLYVINYLCHLORIDE NON-PRESSURE PIPE FOR WASTEWATER OR SURFACE WATER

- 7A.2.4.1 Fusible polyvinylchloride pipe shall conform to ASTM D3034 or ASTM F679.
- 7A.2.4.2 Fusible polyvinylchloride pipe may instead conform to AWWA C900 or AWWA C905, and/or ASTM D2241 or ASTM D1785 for IPS standard dimensionality, if applicable. Testing shall be in accordance with AWWA standards for any of these pipe types.
- 7A.2.4.3 Rework material shall be allowed per ASTM D3034, ASTM F679, AWWA C900 or AWWA C905 standards.
- 7A.2.4.4 Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.
- 7A.2.4.5 Fusible polyvinylchloride pipe shall be manufactured in a standard 20', 30' or 40' normal length.
- 7A.2.4.6 Fusible polyvinylchloride pipe shall be green in color for wastewater use. Fusible polyvinylchloride pipe shall be white in color for surface or storm water use.
- 7A.2.4.7 Pipe generally shall be marked per AWWA C900 or AWWA C905, and shall include as a minimum:
- 7A.2.4.7.1 Nominal pipe size
 - 7A.2.4.7.2 PVC
 - 7A.2.4.7.3 Dimension Ratio, Standard Dimension Ratio or Schedule (omit for ASTM D 3034 or ASTM F679 pipe)
 - 7A.2.4.7.4 Pipe legend or stiffness designation, or AWWA pressure class or standard pressure rating for non-AWWA pipe
 - 7A.2.4.7.5 AWWA Standard designation number or pipe type for non-AWWA pipe (omit for ASTM D3034 or ASTM F679 pipe)
 - 7A.2.4.7.6 Extrusion production-record code
 - 7A.2.4.7.7 Trademark or trade name
 - 7A.2.4.7.8 Cell Classification 12454 and/or PVC material code 1120 may also be included.
- 7A.2.4.8 Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.

7A.2.5 FUSION JOINTS: Unless otherwise specified, fusible polyvinylchloride pipe lengths shall be assembled in the field with butt-fused joints. The contractor shall follow the pipe supplier's written instructions for this procedure. All fusion joints shall be completed as described in this specification.

7A.2.6 CONNECTIONS AND FITTINGS FOR PRESSURE APPLICATIONS

- 7A.2.6.1 Connections shall be defined in conjunction with the coupling of project piping, as well as the tie-ins to other piping systems.

- 7A.2.6.2 **DUCTILE IRON MECHANICAL AND FLANGED FITTINGS:**
Acceptable fitting for use with fusible polyvinylchloride pipe shall include standard ductile iron fittings conforming to AWWA/ANSI C110/A21.10 and AWWA/ANSI C111/A21.11.
- 7A.2.6.2.1. Connections to fusible polyvinylchloride pipe may be made using a restrained or non-restrained retainer gland product for PVC pipe, as well as for MJ or flanged fittings.
- 7A.2.6.2.2. Bends, tees and other ductile iron fittings shall be restrained with the use of thrust blocking or other means as indicated in the construction documents.
- 7A.2.6.2.3. Ductile iron fittings and glands must be installed per the manufacturer's recommendations and instructions.
- 7A.2.6.3 **PVC GASKETED, PUSH-ON FITTINGS**
Acceptable fittings for use with fusible polyvinylchloride pipe shall include standard PVC pressure fittings conforming to AWWA C900 or AWWA C905.
- 7A.2.6.3.1. Acceptable fittings for use joining fusible polyvinylchloride pipe other sections of fusible polyvinylchloride pipe or other sections of PVC Pipe shall include gasketed PVC, push-on type couplings and fitting, including bends, tees and couplings as shown in the drawings.
- 7A.2.6.3.2. Bends, tees and other PVC fittings shall be restrained with the use of thrust blocking or other restraint products as indicated in the construction documents.
- 7A.2.6.3.3. PVC gasketed, push-on fittings and mechanical restraints, if used, must be installed per the manufacturer's recommendations.
- 7A.2.6.4 **SLEEVE-TYPE COUPLINGS**
- 7A.2.6.4.1. Sleeve-type mechanical couplings shall be manufactured for use with PVC pressure pipe, and may be restrained or unrestrained as indicated in the construction documents.
- 7A.2.6.4.2. Sleeve-type couplings shall be rated at the same or greater pressure carrying capacity as the pipe itself.
- 7A.2.6.5 **EXPANSION AND FLEXIBLE COUPLINGS**
- 7A.2.6.5.1. Expansion-type mechanical couplings shall be manufactured for use with PVC pipe, and may be restrained or unrestrained as indicated in the construction documents.
- 7A.2.6.5.2. Expansion-type mechanical couplings shall be rated at the same or greater pressure carrying capacity as the pipe itself.
- 7A.2.6.6 **CONNECTION HARDWARE:**
- 7A.2.6.6.1 Bolts and nuts for buried service shall be made of non-corrosive, high-strength, low-alloy steel having the characteristics specified in ANSI/AWWA C111/A21.11, regardless of any other protective coating.

7A.2.7 CONNECTIONS FOR GRAVITY SANITARY SEWER AND NON-PRESSURE APPLICATIONS

- 7A.2.7.1 The following connections are to be used in conjunction with tie-ins to other non-pressure, gravity sewer piping and/or structures, and shall be as indicated in the construction documents.
- 7A.2.7.2 PVC GASKETED, PUSH-ON COUPLINGS
 - 7A.2.7.2.1 Acceptable couplings for joining fusible polyvinylchloride pipe to other sections of fusible polyvinylchloride pipe or other sections of PVC pipe shall include gasketed PVC, push-on type couplings as shown in the drawings.
 - 7A.2.7.2.2 PVC gasketed, push-on fittings and/or restraint hardware must be installed per the manufacturer's recommendations.
- 7A.2.7.3 SLEEVE-TYPE COUPLINGS
 - 7A.2.7.3.1 Sleeve-type mechanical couplings shall be manufactured for use with PVC pipe, and may be restrained or unrestrained as indicated in the construction documents.
- 7A.2.7.4 EXPANSION AND FLEXIBLE COUPLINGS
 - 7A.2.7.4.1 Expansion-type mechanical couplings shall be manufactured for use with PVC pipe, and may be restrained or unrestrained as indicated in the construction documents.
- 7A.2.7.5 CONNECTION HARDWARE
 - 7A.2.7.5.1 Bolts and nuts for buried service shall be made of non-corrosive, high-strength, low-alloy steel having the characteristics specified in ANSI/AWWA C111/A21.11, regardless of any other protective coating.
- 7A.2.7.6 CONNECTION TO SANITARY SEWER MANHOLES AND STRUCTURES
 - 7A.2.7.6.1 Fusible polyvinylchloride pipe shall be connected to manholes and other structures to provide a leak-free, properly graded flow into or out the manhole structure.
 - 7A.2.7.6.2 Connections to existing manholes and structures shall be as specified and shown on the drawings.
 - 7A.2.7.6.2.1 For a cored or drilled opening provide a flexible, watertight connection that meets and/or exceeds ASTM C923.
 - 7A.2.7.6.2.2 For a knock out opening, provide a watertight connection (waterstop or other method) meeting the material requirements of ASTM C923 that is securely attached to the pipe with stainless steel bands or other means.
 - 7A.2.7.6.2.3 Grout opening in manhole wall with non-shrink grout. Pour concrete collar around pipe and outside manhole opening. Provide flexible pipe joint or flexible connector within 2' of collar.

- 7A.2.7.6.3 Connections to a new manhole or structure shall be as indicated in the construction documents.
- 7A.2.7.6.3.1 A flexible, watertight gasket per ASTM C923 shall be cast integrally with riser section(s) for all precast manhole and structures.
- 7A.2.7.6.3.2 Drop connections shall be required where shown on drawings.
- 7A.2.7.6.3.3 Grout internal joint space with non-shrink grout.

7A.3 EXECUTION

7A.3.1 DELIVERY AND OFF-LOADING

- 7A.3.1.1 All pipe shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the Owner or Engineer.
- 7A.3.1.2 Each pipe shipment should be inspected prior to unloading to see if the load has shifted or otherwise been damaged. Notify Owner or Engineer immediately if more than immaterial damage is found. Each pipe shipment should be checked for quantity and proper pipe size, color and type.
- 7A.3.1.3 Pipe should be loaded, off-loaded, and otherwise handled in accordance with AWWA M23, and all pipe supplier's instructions and recommendations shall be followed.
- 7A.3.1.4 Off-loading devices such as chains, wire rope, chokers, or other pipe handling implements that may scratch, nick, cut or gouge the pipe are strictly prohibited.
- 7A.3.1.5 During removal and handling, be sure that the pipe does not strike anything. Significant impact could cause damage, particularly during cold weather.
- 7A.3.1.6 If appropriate unloading equipment is not available, pipe may be unloaded by removing individual pieces. Care should be taken to insure that pipe is not dropped or damage. Pipe should be carefully lowered, not dropped, from trucks.

7A.3.2 HANDLING AND STORAGE

- 7A.3.2.1 Any length of pipe showing a crack or which has received a blow that may have cause an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work. Damaged areas, or possible areas of damage may be removed by cutting out and removing the suspected incident fracture area. Limits of the acceptable length of pipe shall be determined by the Owner or Engineer.
- 7A.3.2.2 Any scratch or gouge greater than 10% of the wall thickness will be considered significant and can be rejected unless determined acceptable by the Owner or Engineer.
- 7A.3.2.3 Pipe lengths should be stored and placed on level ground. Pipe should be stored at the job site in the unit packaging provided by the manufacturer. Caution should be exercised to avoid compression, damage, or deformation to the ends of the pipe. The interior of the pipe, as well as all end surfaces, should be kept free from dirt and foreign matter.

7A.3.2.4	Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in any way.
7A.3.2.5	If pipe is to be stored for periods of 1 year or longer, the pipe should be shaded or otherwise shielded from direct sunlight. Covering of the pipe which allows for temperature build-up is strictly prohibited. Pipe should be covered with an opaque material while permitting adequate air circulation above and around the pipe as required preventing excess heat accumulation.
7A.3.2.6	Pipe shall be stored and stacked per the pipe supplier's instructions and recommendations.
7A.3.3	FUSION PROCESS
7A.3.3.1	GENERAL
7A.3.3.1.1	Fusible polyvinylchloride pipe will be handled in a safe and non-destructive manner before, during, and after the fusion process and in accordance with this specification and pipe supplier's recommendations.
7A.3.3.1.2	Fusible polyvinylchloride pipe will be fused by qualified fusion technicians, as documented by the pipe supplier.
7A.3.3.1.3	Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) affixed to the fusion machine.
7A.3.3.1.4	Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process. Fusion machines must incorporate the following properties, including the following elements;
7A.3.3.1.4.1	HEAT PLATE – Heat plates shall be in good condition with no deep gouges or scratches. Plates shall be clean and free of any debris or contamination. Heater controls shall function properly; cord and plug shall be in good condition. The appropriately sized heat plate shall be capable of maintaining a uniform and consistent heat profile and temperature for the size of pipe being fused, per the pipe supplier's recommendations.
7A.3.3.1.4.2	CARRIAGE – Carriage shall travel smoothly with no binding at less than 50psi. Jaws shall be in good condition with proper inserts for the pipe size being fused. Insert pins shall be installed with no interference to carriage travel.
7A.3.3.1.4.3	GENERAL MACHINE – Overview of machine body shall yield no obvious defects, missing parts, or potential safety issues during fusion.

- 7A.3.3.1.4.4 DATA LOGGING DEVICE – The current version of the pipe supplier's recommended and compatible software shall be used. Protective case shall be utilized for the hand held wireless portion of the unit. Datalogger operations and maintenance manual shall be with the unit at all times. If fusing for extended periods of time, an independent 110V power source shall be available to extend battery life.
 - 7A.3.3.1.5 Other equipment specifically required for the fusion process shall include the following:
 - 7A.3.3.1.5.1 Pipe rollers shall be used for support of pipe to either side of the machine.
 - 7A.3.3.1.5.2 A weather protection canopy that allows full machine motion of the heat plate, fusion assembly and carriage shall be provided for fusion in inclement and/or windy weather.
 - 7A.3.3.1.5.3 Fusion machine operations and maintenance manual shall be kept with the fusion machine at all times.
 - 7A.3.3.1.5.4 Facing blades specifically designed for cutting fusible polyvinylchloride pipe.
- 7A.3.3.2 JOINT RECORDING
 - 7A.3.3.2.1 Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine. The fusion data logging and joint report shall be generated by software developed specifically for the butt-fusion of thermoplastic pipe. The software shall register and/or record the parameters required by the pipe supplier and these specifications. Data not logged by the data logger shall be logged manually and be included in the fusion Technician's joint report.
- 7A.3.4 GENERAL INSTALLATION
 - 7A.3.4.1 Installation instructions from the pipe supplier shall be followed for all installations.
 - 7A.3.4.2 The fusible polyvinylchloride pipe will be installed in a manner so as not to exceed the recommended bending radius.
 - 7A.3.4.3 Where fusible polyvinylchloride pipe is installed by pulling in tension, the recommended Safe Pulling Force, according to the pipe supplier, will not be exceeded.
- 7A.3.5 PREPARATION PRIOR TO MAKING CONNECTIONS INTO EXISTING PIPING SYSTEMS
 - 7A.3.5.1 Approximate locations for existing piping systems are shown in the construction documents. Prior to making connections into existing piping systems, the Contractor shall:

	7A.3.5.1.1	Field verify location, size, piping material and piping system of the existing pipe.
	7A.3.5.1.2	Obtain all required fittings, which may include saddles, sleeve type couplings, flanges, tees, or others as shown in the construction documents.
	7A.3.5.1.3	Have installed all temporary pumps and/or pipes in accordance with established connection plans.
	7A.3.5.1.4	Have on hand necessary pipe stoppers, pancake flanges or other items which may be necessary should an existing valve or appurtenance fail to seal properly.
	7A.3.5.2	Unless otherwise approved by the Engineer, new piping systems shall be completely assembled and successfully tested prior to making connections into existing pipe systems.
7A.3.6	PIPE SYSTEM CONNECTIONS	
	7A.3.6.1	Pipe connections shall be installed per applicable standards and regulations, as well as per the connection manufacturer's recommendations and as indicated in the construction documents. Pipe connections to structures shall be installed per applicable standards and regulations, as well as per the connection manufacturer's recommendations.
7A.3.7	TAPPING FOR POTABLE AND NON-POTABLE WATER APPLICATIONS	
	7A.3.7.1	Tapping shall be performed using standard tapping saddles designed for use on PVC piping in accordance with AWWA C605. Tapping shall be performed only with use of tap saddles or sleeves. NO DIRECT TAPPING WILL BE PERMITTED. Tapping shall be performed in accordance with the applicable sections for Saddle Tapping per Uni-Pub-8.
	7A.3.7.2	All other connections requiring a larger diameter shall be made with a pipe connection as specified and indicated on the drawings.
	7A.3.7.3	Equipment used for tapping shall be made specifically for tapping PVC pipe:
	7A.3.7.3.1	Tapping bits shall be slotted "shell" style cutters, specifically made for PVC pipe. "Hole saws" made for cutting wood, steel, ductile iron, or other materials are strictly prohibited.
	7A.3.7.3.2	Manually operated or power operated drilling machines may be used.
	7A.3.7.4	Taps may be performed while the pipeline is filled with water and under pressure ("wet" tap), or when the pipeline is not filled with water and not under pressure ("dry" tap).
7A.3.8	TESTING	
	7A.3.8.1	Testing shall comply with all local building codes, statutes, standards, local jurisdiction, and laws.
	7A.3.8.2	HYDROSTATIC TESTING AND LEAKAGE TESTING FOR PRESSURE PIPING
	7A.3.8.2.1	Hydrostatic and leakage testing shall comply with AWWA C605.

- 7A.3.8.2.2 For a simultaneous hydrostatic and leakage test, following installation, a pressure equal to 150% of working pressure at point of test, but not less than 125% of normal working pressure at highest elevation is applied. The duration of the pressure test is for two (2) hours.
- 7A.3.8.2.3 If hydrostatic testing and leakage testing are performed at separate times, following procedures as outlined in AWWA C605.
- 7A.3.8.2.4 In preparation for pressure testing the following parameters must be followed:
- 7A.3.8.2.4.1 All air must be vented from the pipeline prior to pressurization. This may be accomplished with the use of the air relief valves or corporation stop valves, or corporation stop valves, vent piping in the testing hardware or end caps, or any other method which adequately allows air to escape the pipeline at all high points. Venting may also be accomplished by “flushing” the pipeline in accordance with the parameters and procedures as described in AWWA C605.
 - 7A.3.8.2.4.2 The pipeline must be fully restrained prior to pressurization. This includes complete installation of all mechanical restraints per the manufacturer’s instructions and recommendations, whether permanent or temporary to the final installation. This also includes the installation and curing of any and all required thrust blocking. All appurtenances included in the pressure test, including valves, blow-offs, and air-relief valves shall be checked for proper installation and restraint prior to the beginning of the test.
 - 7A.3.8.2.4.3 Temporary pipeline alignments that are being tested, such as those that are partially installed in their permanent location shall be configured to minimize the amount of potentially trapped air in the pipeline.

7A.3.8.3 LEAKAGE TESTING FOR NON-PRESSURE PIPING

- 7A.3.8.3.1 Gravity sanitary sewers shall be tested for excessive leakage. This may include appropriate water or low pressure air testing. The leakage outward or inward (exfiltration or infiltration) shall not exceed 25 gallons per inch of pipe diameter per mile per day for any section of the system. An exfiltration or infiltration test shall be performed with a minimum positive head of two feet. The air test, if used, shall be conducted in accordance with ASTM F1417 or UNI-B-6.

7A.3.8.3.2 The testing method selected shall properly consider the existing groundwater elevations during the test. If the test section fails the test for excessive leakage, the Contractor shall repair or replace all defective materials and/or workmanship.

7A.3.8.4 DEFLECTION TESTING FOR NON-PRESSURE PIPING

7A.3.8.4.1 After completion of the backfill, the Engineer or Owner may require that a deflection test be performed. If the test section fails the test for excessive deflection, the Contractor shall repair or replace all defective materials and/or workmanship at no additional cost to the Owner.

7A.3.8.4.2 Deflection tests should be conducted using a go/no-go mandrel. The mandrel's outside dimension shall be sized to permit no more than 7.5 percent deflection. The percent deflection shall be established from the base inside diameter of the pipe. If the internal beading of the joints for the pipe are not required to be removed, the mandrel shall account for this clearance as well. The mandrel shall be approved by the Owner or Engineer prior to use. Lines that permit safe entry may allow other deflection test options, such as directed measurements with extension rulers.

7A.3.8.5 DISINFECTION OF THE PIPELINE FOR POTABLE WATER PIPING

7A.3.8.5.1 After installation, the pipeline, having passed all required testing, shall be disinfected prior to being put into service. Unless otherwise directed by the Owner or Engineer, the Pipeline will be disinfected per AWWA C651.

7A.3.8.6 PARTIAL TESTING

7A.3.8.6.1 Segments of the pipe may be tested separately in accordance with standard testing procedure, as approved by HCUD.

7A.3.8.7 LOCATE WIRE TEST

7A.3.8.7.1 After pipe installation, the contractor shall perform a wire continuity test in the presence of a HCUD inspector.

SECTION 7B

SPECIFICATIONS FOR RESTRAINED JOINT POLYVINYLCHLORIDE PIPE

SECTION 7B: RESTRAINED JOINT POLYVINYLCHLORIDE PIPE

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SECTION 7B

RESTRAINED JOINT POLYVINYLCHLORIDE PIPE

7B.1 GENERAL

- 7B.1.1 This section specifies restrained joint polyvinylchloride pipe from 4" to 12", including standards for dimensionality, testing, quality, safe handling and storage.
- 7B.1.2 **MANUFACTURER REQUIREMENTS:** Restrained joint polyvinylchloride pipe shall be tested at the extrusion facility for properties required to meet all applicable parameters as outlined in AWWA C900, applicable sections of ASTM D2122, ASTM D3139, or ASTM F477. Testing priority shall be in conformance with AWWA C900 standards. All piping shall be made from a PVC compound conforming to cell classification 12454 per ASTM D1784. Acceptable restrained joint pipe is Diamond Lok – 21 manufactured by Diamond Plastics Corporation, or HCUD approved equal.

7B.2 PRODUCTS

7B.2.1 RESTRAINED JOINT POLYVINYLCHLORIDE PRESSURE PIPE FOR POTABLE WATER

- 7B.2.1.1 Restrained joint polyvinylchloride pipe shall conform to AWWA C900 and/or ASTM D2122 or ASTM D3139 for IPS standard dimensions if applicable. Testing shall be in accordance with AWWA standards for all pipe types.
- 7B.2.1.2 Restrained joint polyvinylchloride pipe shall be manufactured in standard 20' nominal length.
- 7B.2.1.3 Restrained joint polyvinylchloride pipe shall be blue in color for potable water use.
- 7B.2.1.4 Pipe generally shall be marked per AWWA C900 and shall include as a minimum:
- 7B.2.1.4.1 Normal pipe size
 - 7B.2.1.4.2 PVC
 - 7B.2.1.4.3 Dimension Ratio, Standard Dimension Ratio or Schedule
 - 7B.2.1.4.4 AWWA pressure class or standard pressure rating for non-AWWA pipe
 - 7B.2.1.4.5 AWWA Standard designation number or pipe type for non-AWWA pipe
 - 7B.2.1.4.6 NSF-61 mark verifying suitability for potable water service
 - 7B.2.1.4.7 Extrusion production-record code
 - 7B.2.1.4.8 Trademark or trade name
 - 7B.2.1.4.9 Cell Classification 12454 and/or PVC material code 1120 may also be included
- 7B.2.1.5 Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.

- 7B.2.2 RESTRAINED JOINT POLYVINYLCHLORIDE PRESSURE PIPE FOR NON-POTABLE WATER
- 7B.2.2.1 Restrained joint polyvinylchloride pipe shall conform to AWWA C900 and/or ASTM D2122 or ASTM D3139 for IPS standard dimensionality, if applicable. Testing shall be in accordance with AWWA standards for all pipe types.
 - 7B.2.2.2 Restrained joint polyvinylchloride pipe shall be manufactured in a standard 20' nominal length.
 - 7B.2.2.3 Restrained joint polyvinylchloride pipe shall be purple in color for reclaim or reuse.
 - 7B.2.2.4 Pipe generally shall be marked per AWWA C900 and shall include as a minimum:
 - 7B.2.2.4.1 Nominal pipe size
 - 7B.2.2.4.2 PVC
 - 7B.2.2.4.3 Dimension Ratio, Standard Dimension Ratio or Schedule
 - 7B.2.2.4.4 AWWA pressure class or standard pressure rating for non-AWWA pipe
 - 7B.2.2.4.5 AWWA Standard designation number or pipe type for non-AWWA pipe
 - 7B.2.2.4.6 Extrusion production-record code
 - 7B.2.2.4.7 Trademark or trade name
 - 7B.2.2.4.8 Cell Clarification 12454 and/or PVC material code 1120 may also be included
 - 7B.2.2.4.9 For reclaim water service, the wording: "Reclaimed Water, NOT for Potable Use"
 - 7B.2.2.5 Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
- 7B.2.3 RESTRAINED JOINT POLYVINYLCHLORIDE PRESSURE PIPE FOR WASTEWATER
- 7B.2.3.1 Restrained joint polyvinylchloride pipe shall conform to AWWA C900 and/or ASTM D2122 or ASTM D3139 for IPS standard dimensionality, if applicable. Testing shall be in accordance with AWWA standards for all pipe types.
 - 7B.2.3.2 Restrained joint polyvinylchloride pipe shall be manufactured in a standard 20' nominal length.
 - 7B.2.3.3 Restrained joint polyvinylchloride pipe shall be green in color for wastewater use.
 - 7B.2.3.4 Pipe generally shall be marked per AWWA C900 and shall include as a minimum:
 - 7B.2.3.4.1 Nominal pipe size
 - 7B.2.3.4.2 PVC
 - 7B.2.3.4.3 Dimension Ratio, Standard Dimension Ratio or Schedule

- 7B.2.3.4.4 AWWA pressure class or standard pressure rating for non-AWWA pipe
- 7B.2.3.4.5 AWWA Standard designation number or pipe for non-AWWA pipe
- 7B.2.3.4.6 Extrusion production-record code
- 7B.2.3.4.7 Trademark or trade name
- 7B.2.3.4.8 Cell Classification 12454 and/or PVC material code 1120 may also be included.
- 7B.2.3.5 Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
- 7B.2.4 CONNECTIONS AND FITTINGS FOR PRESSURE APPLICATIONS
 - 7B.2.4.1 Connections shall be defined in conjunction with the coupling of project piping, as well as the tie-ins to other piping systems.
 - 7B.2.4.2 DUCTILE IRON MECHANICAL AND FLANGED FITTINGS

Acceptable fitting for use with restrained joint polyvinylchloride pipe shall include standard ductile iron fittings conforming to AWWA/ANSI C110/A21.10 and AWWA/ANSI C111/A21.11.

 - 7B.2.4.2.1 Connections to restrained joint polyvinylchloride pipe may be made using a restrained retainer gland product for PVC pipe, as well as for MJ or flanged fittings.
 - 7B.2.4.2.2 Bends, tees and other ductile iron fittings shall be restrained with the use of restrained retainer gland (mega-lug) or other means as indicated in the construction documents.
 - 7B.2.4.2.3 Ductile iron fittings and glands must be installed per the manufacturer's recommendations and instructions.

7B.3 EXECUTION

7B.3.1 DELIVERY AND OFF-LOADING

- 7B.3.1.1 All pipe shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the Owner or Engineer.
- 7B.3.1.2 Each pipe shipment should be inspected prior to unloading to see if the load has shifted or otherwise been damaged. Notify Owner or Engineer immediately if more than immaterial damage is found. Each pipe shipment should be checked for quantity and proper pipe size, color and type.
- 7B.3.1.3 Pipe should be loaded, off-loaded, and otherwise handled in accordance with AWWA M23, and all pipe supplier's instructions and recommendations shall be followed.
- 7B.3.1.4 Off-loading devices such as chains, wire rope, chokers, or other pipe handling implements that may scratch, nick, cut or gouge the pipe are strictly prohibited.

- 7B.3.1.5 During removal and handling, be sure that the pipe does not strike anything. Significant impact could cause damage, particularly during cold weather.
- 7B.3.1.6 If appropriate unloading equipment is not available, pipe may be unloaded by removing individual pieces. Care should be taken to insure that pipe is not dropped or damaged. Pipe should be carefully lowered, not dropped, from trucks.

7B.3.2 HANDLING AND STORAGE

- 7B.3.2.1 Any length of pipe showing a crack or which has received a blow that may have caused an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work. Damaged areas, or possible areas of damage may be removed by cutting out and removing the suspected incident fracture area. Limits of the acceptable length of pipe shall be determined by the Owner or Engineer.
- 7B.3.2.2 Any scratch or gouge greater than 10% of the wall thickness will be considered significant and can be rejected unless determined acceptable by the Owner or Engineer.
- 7B.3.2.3 Pipe lengths should be stored and placed on level ground. Pipe should be stored at the job site in the unit packaging provided by the manufacturer. Caution should be exercised to avoid compression, damage, or deformation to the ends of the pipe. The interior of the pipe, as well as all end surfaces, should be kept free from dirt and foreign matter.
- 7B.3.2.4 Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in any way.
- 7B.3.2.5 If pipe is to be stored for periods of 1 year or longer, the pipe should be shaded or otherwise shielded from direct sunlight. Covering of the pipe which allows for temperature build-up is strictly prohibited. Pipe should be covered with an opaque material while permitting adequate air circulation above and around the pipe as required preventing excess heat accumulation.
- 7B.3.2.6 Pipe shall be stored and stacked per the pipe supplier's instructions and recommendations.

7B.3.3 GENERAL INSTALLATION

- 7B.3.3.1 Installation instructions from the pipe supplier shall be followed for all installations.
- 7B.3.3.2 The restrained joint polyvinylchloride pipe will be installed in a manner so as not to exceed the recommended bending radius.
- 7B.3.3.3 Where restrained joint polyvinylchloride pipe is installed by pulling in tension, the recommended Safe Pulling Force, according to the pipe supplier, will not be exceeded.

7B.3.3.4 ELECTRONIC LOCATOR WIRE (ELW) AND INSTALLATION: The contractor shall furnish and install two (2) ELWs with the horizontal directional drilled mains. The ELW shall be Direct Burial #10 AWG Solid (.1019" diameter), 21% conductivity copper-clad annealed high carbon steel high strength tracer wire, 600# average tensile break load, 30 mil. high molecular weight-high density polyethylene jacket complying with ASTM-D-1248, 30 volt rating. The ELW shall be Copperhead Industries, LLC. The exterior color shall be blue for water mains and green for sewer mains. The Locate wire shall be brought to grade within a valve box or locate station box at all "entry point locations: and all "exit point locations". There shall be a maximum length or intervals of 500-feet between locate wire stations. No splices or connections shall be allowed underground. After installation, the contractor shall perform a wire continuity test in the presence of a HCUD inspector.

7B.3.4 PREPARATION PRIOR TO MAKING CONNECTIONS INTO EXISTING PIPING SYSTEMS

7B.3.4.1 Approximate locations for existing piping systems are shown in the construction documents. Prior to making connections into existing piping systems, the Contractor shall:

- 7B.3.4.1.1 Field verify location, size, piping material and piping system of the existing pipe.
- 7B.3.4.1.2 Obtain all required fittings, which may include saddles, sleeve type couplings, flanges, tees, or others as shown in the construction documents.
- 7B.3.4.1.3 Have installed all temporary pumps and/or pipes in accordance with established connection plans.
- 7B.3.4.1.4 Have on hand necessary pipe stoppers, pancake flanges or other items which may be necessary should an existing valve or appurtenance fail to seal properly.
- 7B.3.4.1.5 Unless otherwise approved by the Engineer, new piping systems shall be completely assembled and successfully tested prior to making connections into existing pipe systems.

7B.3.5 PIPE SYSTEM CONNECTIONS

7B.3.5.1 Pipe connections shall be installed per applicable standards and regulations, as well as per the connection manufacturer's recommendations and as indicated in the construction documents. Pipe connections to structures shall be installed per applicable standards and regulations, as well as per the connection manufacturer's recommendations.

7B.3.6 TAPPING FOR POTABLE AND NON-POTABLE WATER APPLICATIONS

7B.3.6.1 Tapping shall be performed using standard tapping saddles designed for use on PVC piping in accordance with AWWA C605. Tapping shall be performed only with use of tap saddles or sleeves. NO DIRECT TAPPING WILL BE PERMITTED. Tapping shall be performed in accordance with the applicable sections for Saddle Tapping per Uni-Pub-8.

7B.3.6.2 All other connections requiring a larger diameter shall be made with a pipe connection as specified and indicated on the drawings.

7B.3.6.3 Equipment used for tapping shall be made specifically for tapping PVC pipe:

7B.3.6.3.1 Tapping bits shall be slotted "shell" style cutters, specifically made for PVC pipe. "Hole saws" made for cutting wood, steel, ductile iron, or other materials are strictly prohibited.

7B.3.6.3.2 Manually operated or power operated drilling machines may be used.

7B.3.6.4 Taps may be performed while the pipeline is filled with water and under pressure ("wet" tap), or when the pipeline is not filled with water and not under pressure ("dry" tap).

7B.4 TESTING

7B.4.1 HYDROSTATIC TESTING AND LEAKAGE TESTING FOR PRESSURE PIPING

7B.4.1.1 All pressure and leakage testing procedures shall be done in the presence of the HCUD Inspector and the EOR or his designated representative.

7B.4.1.2 PVC water mains shall be tested as a whole or in sections between valves. The mains shall be tested in accordance with Section 4, Hydrostatic Testing, AWWA C600-87 under an average hydrostatic pressure of not less than 150 PSI, using a 200 PSI gauge, for a minimum of 2-hours. The following Table 7B-1 shall be used when pressure testing PVC potable water mains. ANSI/AWWA C600-87 is a copyrighted document. Contact American Water Works Association, 6666 West Quincy Avenue, Denver, Colorado 80235, or www.awwa.org.

Table 7B-1

HYDROSTATIC TEST FORMULA FOR PVC PRESSURIZED WATERMAINS

$$L = [S \times D \times \text{SQ. RT. of } P \div 133,200] \times 2 \text{ Hrs.}$$

"L" = the allowable leakage (in gallons);

"S" = the length of pipe tested (in feet);

"D" = the nominal diameter of the pipe (in inches);

"P" = the required test pressure

SQ. RT. of P = square root of the required test pressure:

Potable Water Mains: SQ. RT. of P = square root of 150 = 12.25;

Reclaimed Water Mains: SQ. RT. of P = square root of 150 = 12.25;

Sewer Force Mains: SQ. RT. of P = square root of 125 = 11.18;

7B.4.1.3 All pumps, gauges and measuring devices shall be furnished, installed and operated by the Contractor and all such equipment and devices and their installation, shall be approved by the HCUD Inspector. All water for testing and flushing shall be potable water provided by the Contractor, at the developer's expense, from a source approved by HCUD. The quantity of water used for testing, which shall be compared to the allowable loss quantity, shall be measured by pumping from a calibrated container, approved by the HCUD Inspector. All pressure and leakage testing shall be done in the presence of the HCUD Inspector and the EOR or his designated representative.

7B.4.1.4 When leakage occurs in excess of the specified amount, defective pipe, pipe joints or other appurtenances causing the loss shall be located and repaired at the expense of the contractor. If the defective portions cannot be located, the contractor, at his own expense, shall remove and reconstruct as much of the original work as necessary to obtain a pipe main within the allowable leakage limits upon retesting.

7B.4.2 DISINFECTION OF THE PIPELINE FOR POTABLE WATER PIPING

7B.4.2.1 After completion of the water main pressure test, the contractor shall disinfect all pipe sections and fittings installed in the system. The contractor shall pay for and schedule with a state certified lab or HCHD for the applicable collection and bacteriological testing of samples from the project. Note: Contractors CAN NOT collect the water samples for the lab. The disinfection shall be accomplished in accordance with the applicable provisions of AWWA C 651-92, "Disinfecting Water Mains," and all appropriate approval agencies. Care should be taken to provide disinfection to the entire system, with sample collection points every 1200-feet, after which the lines shall be thoroughly flushed until water samples show a chlorine residual value equal to or less than the existing line. The disinfection process shall be completed and acceptable bacteriological samples test results received prior to HCUD accepting and placing the system into service.

7B.4.3 Locate Wire Test: After pipe installation, the contractor shall perform a wire continuity test in the presence of a HCUD inspector.

SECTION 7C

SPECIFICATIONS FOR CERTAINTED CERTA-LOK

SECTION 7C: CERTAINTED CERTA-LOK

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SECTION 7C

CERTAINTEED CERTA-LOK

7C.1 GENERAL

- 7C.1.1 This specification covers thrust-restrained Polyvinyl Chloride (PVC) Pipe, 4" – 12", with ductile iron pipe (DIP) outside diameters.
- 7C.1.2 CERTA-LOK may be used for potable water mains only.
- 7C.1.3 Pipe shall be colored blue.
- 7C.1.4 Products delivered under this specification shall be manufactured only from water distribution pipe and couplings conforming to AWWA C900. The restrained joint pipe system shall also meet all short and long term pressure test requirements of AWWA C900. Pipe, couplings, and locking splines shall be completely non-metallic to eliminate corrosion problems.
- 7C.1.5 **ELECTRONIC LOCATOR WIRE (ELW) AND INSTALLATION:** The contractor shall furnish and install two (2) ELWs with the horizontal directional drilled mains. The ELW shall be Direct Burial #10 AWG Solid (.1019" diameter), 21% conductivity copper-clad annealed high carbon steel high strength tracer wire, 600# average tensile break load, 30 mil. high molecular weight-high density polyethylene jacket complying with ASTM-D-1248, 30 volt rating. The ELW shall be Copperhead Industries, LLC. The exterior color shall be blue for water mains. The Locate wire shall be brought to grade within a valve box or locate station box at all "entry point locations: and all "exit point locations". There shall be a maximum length or intervals of 500-feet between locate wire stations. No splices or connections shall be allowed underground. After installation, the contractor shall perform a wire continuity test in the presence of a HCUD inspector.

7C.2 MATERIALS

- 7C.2.1 Pipe and couplings shall be made from unplasticized PVC compounds having a minimum call classification of 12454-B, as defined in ASTM D1784. The compound shall qualify for Hydrostatic Design Basis (HDB) of 4000 psi for water at 73.4°F, in accordance with the requirements of ASTM D2837.

7C.3 APPROVALS

- 7C.3.1 Restrained joint PVC pipe products shall have been tested and approved by Underwriters Laboratories and Factory mutual Research for Continuous use at rated pressures as follows:

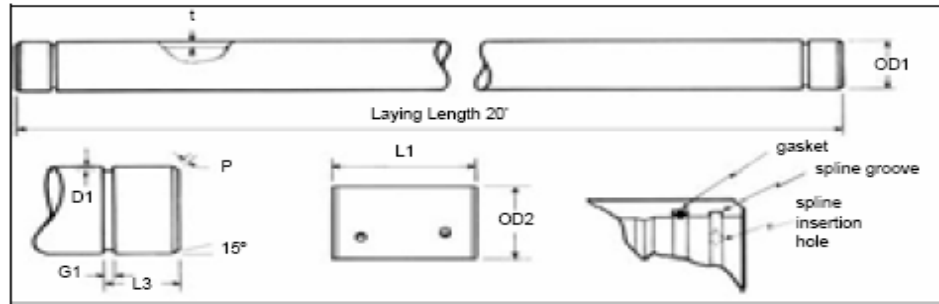
Pipe Size	4"	6"	8"	10"	12"
Use DR18 (Class 150) for Water Mains Operating at Pressures up to 150 psi:				UL & FM listed for Underground Restrained Joint Water Mains	
Use DR14 (Class 200) for Water Mains Operating at Pressures up to 200 psi:			UL & FM listed for Underground Restrained Joint Water Mains	UL & FM listed for Conventional Underground Water Mains Installed with Thrust Blocks	

Note: All UL/FM approvals shown are for a locking-joint system suitable for directional drilling and other underground applications.

- 7C.3.2 Copies of agency approval reports or product listings shall be provided to the Engineer. Products intended for contact with potable water shall be evaluated, tested, and certified for conformance with NSF 61 by an acceptable certifying organization.

7C.4 DIMENSIONS

- 7C.4.1 Nominal outside diameters and wall thicknesses of thrust-restrained pipe shall conform to the requirements of AWWA C900, Thrust-restrained pipe shall be furnished in 4", 6", 8", 10" and 12" sizes, in Class 150 (DR18) and Class 200 (DR14). Pipe shall be furnished in standard lengths of 20 feet. Dimensions of the pipe are shown below:



Sizes	OD1	t min.		P		L3	G1	L1	OD2	D1	
		Class 150	Class 200	min.	max.					min.	max.
4"	4.800"	.267"	.343"	1/4"	5/16"	3.000"	.375"	8.250"	5.964"	.125"	.130"
6"	6.900"	.383"	.493"	1/4"	5/16"	3.000"	.375"	5.250"	8.366"	.125"	.130"
8"	9.050"	.503"	.646"	5/8"	11/16"	3.163"	.500"	10.500"	10.947"	.130"	.135"
10"	11.100"	.617"	.793"	5/8"	11/16"	3.500"	.500"	11.125"	13.361"	.200"	.210"
12"	13.200"	.733"	.943"	5/8"	11/16"	3.500"	.500"	12.000"	15.836"	.200"	.210"

7C.5 JOINTS

- 7C.5.1 Pipe shall be joined using non-metallic couplings for form an integral system for maximum reliability and interchangeability. High-strength, flexible thermoplastic splines shall be inserted into mating, precision-machined grooves in the pipe and coupling to provide full 360° restraint with evenly distributed loading.
- 7C.5.2 Couplings shall be designed for use at or above the rated pressures of the pipe with which they are utilized, and shall incorporate twin elastomeric sealing gaskets meeting the requirements of ASTM F477. Joints shall be designed to meet the leakage test requirements of ASTM D3139.

7C.6 WORKMANSHIP

- 7C.6.1 Pipe and couplings shall be homogeneous throughout and free from voids, cracks, inclusions and other defects, and shall be as uniform as commercially practicable in color, density and other physical characteristics.

7C.7 QUALITY CONTROL

- 7C.7.1 Every pipe and machined coupling shall pass the AWWA C900 hydrostatic proof test requirements of 4 times the pressure class for 5 seconds.

7C.8 IDENTIFICATION: Pipe and couplings shall be legibly and permanently marked in ink with the following minimum information:

PIPE

- 7C.8.1 Normal size (for example, 4 In.)
- 7C.8.2 PVC
- 7C.8.3 Dimension ratio (for example, DR18)
- 7C.8.4 AWWA pressure class (for example, Class 150)
- 7C.8.5 AWWA designation number for this standard which is ANSI/AWWA C900-97 (or latest edition)
- 7C.8.6 Manufacture's name or trademark and production record code
- 7C.8.7 Seal (mark) of the testing agency verifying the suitability of the pipe material for potable water service
- 7C.8.8 Seal (mark) of the certifying agencies which have tested and approved the pipe for use in fire protection systems

COUPLINGS

- 7C.8.9 Nominal size (for example, 4 In.)
- 7C.8.10 PVC
- 7C.8.11 AWWA pressure class (for example, Class 200)
- 7C.8.12 AWWA designation number for this standard which is ANSI/AWWA C900-97 (or latest edition)
- 7C.8.13 Manufacture's name or trademark
- 7C.8.14 Seal (mark) of the testing agency verifying the suitability of the pipe material for potable water service
- 7C.8.15 Seal (mark) of the certifying agencies which have tested and approved the pipe for use in fire protection systems

7C.9 APPROVED MANUFACTURERS

- 7C.9.1 C900/RJ™ PVC restrained-joint pipe from CertainTeed Corporation, or approved equal.

7C.10 TESTING

7C.10.1 HYDROSTATIC TESTING AND LEAKAGE TESTING FOR PRESSURE PIPING

- 7C.10.1.1 All pressure and leakage testing procedures shall be done in the presence of the HCUD Inspector and the EOR or his designated representative.

- 7C.10.1.2 PVC water mains shall be tested as a whole or in sections between valves. The mains shall be tested in accordance with Section 4, Hydrostatic Testing, AWWA C600-87 under an average hydrostatic pressure of not less than 150 PSI, using a 200 PSI gauge, for a minimum of 2-hours. The following Table 7C-1 shall be used when pressure testing PVC potable water mains. ANSI/AWWA C600-87 is a copyrighted document. Contact American Water Works Association, 6666 West Quincy Avenue, Denver, Colorado 80235, or www.awwa.org.

Table 7C-1

HYDROSTATIC TEST FORMULA FOR PVC PRESSURIZED WATERMAINS

$$L = [S \times D \times \text{SQ. RT. of } P \div 133,200] \times 2 \text{ Hrs.}$$

"L" = the allowable leakage (in gallons);

"S" = the length of pipe tested (in feet);

"D" = the nominal diameter of the pipe (in inches);

"P" = the required test pressure

SQ. RT. of P = square root of the required test pressure:

Potable Water Mains: SQ. RT. of P = square root of 150 = 12.25;

Reclaimed Water Mains: SQ. RT. of P = square root of 150 = 12.25;

Sewer Force Mains: SQ. RT. of P = square root of 125 = 11.18;

- 7C.10.1.3 All pumps, gauges and measuring devices shall be furnished, installed and operated by the Contractor and all such equipment and devices and their installation, shall be approved by the HCUD Inspector. All water for testing and flushing shall be potable water provided by the Contractor, at the developer's expense, from a source approved by HCUD. The quantity of water used for testing, which shall be compared to the allowable loss quantity, shall be measured by pumping from a calibrated container, approved by the HCUD Inspector. All pressure and leakage testing shall be done in the presence of the HCUD Inspector and the EOR or his designated representative.

- 7C.10.1.4 When leakage occurs in excess of the specified amount, defective pipe, pipe joints or other appurtenances causing the loss shall be located and repaired at the expense of the contractor. If the defective portions cannot be located, the contractor, at his own expense, shall remove and reconstruct as much of the original work as necessary to obtain a pipe main within the allowable leakage limits upon retesting.

7C.10.2 DISINFECTION OF THE PIPELINE FOR POTABLE WATER PIPING

7C.10.2.1 After completion of the water main pressure test, the contractor shall disinfect all pipe sections and fittings installed in the system. The contractor shall pay for and schedule with a state certified lab or HCHD for the applicable collection and bacteriological testing of samples from the project. Note: Contractors CAN NOT collect the water samples for the lab. The disinfection shall be accomplished in accordance with the applicable provisions of AWWA C 651-92, "Disinfecting Water Mains," and all appropriate approval agencies. Care should be taken to provide disinfection to the entire system, with sample collection points every 1200-feet, after which the lines shall be thoroughly flushed until water samples show a chlorine residual value equal to or less than the existing line. The disinfection process shall be completed and acceptable bacteriological samples test results received prior to HCUD accepting and placing the system into service.

7C.10.3 Locate Wire Test: After pipe installation, the contractor shall perform a wire continuity test in the presence of a HCUD inspector.

SECTION 7D

SPECIFICATIONS FOR HIGH DENSITY POLYETHYLENE PIPE (HDPE)

SECTION 7D: HIGH DENSITY POLYETHYLENE PIPE CONTENTS

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7D.1 GENERAL DESCRIPTION

7D.1.1 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

- 7D.1.1.1 **MATERIALS:** Materials used for the manufacturer of polyethylene pipe and fittings shall be PE3408 high density polyethylene meeting cell classification 345464C per ASTM D3350; and meeting Type III, Class B or Class C, Category 5, Grade P34 per ASTM D1248; and shall be listed in the name of the pipe and fitting Manufacturer in PPI TR-4, Recommended Hydrostatic Strengths and Design Stresses for Thermoplastic Pipe and Fittings Compounds, with a standard grade rating of 1600 PSIG at 73°F per ASTM D2837. The Manufacturer shall certify that the materials used to manufacture pipe and fittings meet these requirements.
- 7D.1.1.2 **POLYETHYLENE PIPE (4-inch and larger):** HDPE Pipe shall conform to AWWA C906, SDR11, Ductile Iron Pipe (DIP) size and NSF 61 Standard. For pipe sizes 24-inch and larger, the HDPE may be IPS size, DR 11. Polyethylene pipe shall be manufactured in accordance with ASTM F714, Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter and shall be so marked. Each production lot of pipe shall be tested for (from material or pipe) melt index, density, percent carbon, dimensions and either quick burst or ring tensile strength (equipment permitting).
- 7D.1.1.3 Nominal pipe sizes only are to be indicated on the drawings and bid form. Outside diameter of pipe is generally 1 to 2-inches greater than the nominal pipe diameter.
- 7D.1.1.4 **SERVICE IDENTIFICATION:** Permanent identification of pipe shall be provided by co-extruding multiple equally spaced color stripes into the pipe outside surface or by solid colored pipe shell. The striping material shall be the same material as the pipe material except for color. The following colors shall be used to identify pressurized piping services:
- 7D.1.1.4.1 Blue - potable water
 - 7D.1.1.4.2 Green - wastewater or force main
 - 7D.1.1.4.3 Purple - reclaimed water
 - 7D.1.1.4.4 Black - raw water
- 7D.1.1.5 **POLYETHYLENE FITTINGS AND CUSTOM FABRICATION:** Polyethylene fittings and custom fabrications shall be molded or fabricated by the pipe manufacturer or trained personnel. Butt fusion outlets shall be made to the same outside diameter, wall thickness, and tolerances as the mating pipe. All fittings and custom fabrications shall be fully rated for the same internal pressure as the mating pipe. Fabricated fittings shall have the same working pressure as the mating pipe.
- 7D.1.1.6 **MOLDED FITTINGS:** Molded fittings shall be manufactured in accordance with ASTM D3261, Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing, and shall be so marked. Each production lot of molded fittings shall be subjected to the test required under ASTM D3261.

- 7D.1.1.7 **FABRICATED FITTINGS:** Fabricated fittings shall be made by heat fusion joining specially machined shapes cut from pipe, polyethylene sheet stock, or molded fittings. Fabricated fittings shall be rated for internal pressure service equivalent to the full service pressure rating of the mating pipe. Directional fittings 16-inch and larger such as elbows, tees, crosses, etc., shall have a plain end inlet for butt fusion and flanged directional outlets.
- 7D.1.1.8 **ELECTROFUSION BRANCH SADDLES:** Shall meet AWWA C-906, outlet shall comply with ASTM-D3261, and shall be specifically manufactured for HDPE pipe. This saddle may be utilized for wet-tap applications. These electrofusion fittings shall be designed and manufactured in accordance with ASTM Specifications F-1055 for use with HDPE or DIP.
- 7D.1.1.9 **POLYETHYLENE FLANGE ADAPTERS:** Flange adapter shall be made with sufficient throughbore length to be clamped in a butt fusion joining machine without the use of a stubend holder. The sealing surface of the flange adapter shall be machined with a series of small v-shaped grooved to provide gasketless sealing, or to restrain the gasket against blow-out. Below ground flange adapter may be utilized for 30-inches and larger, DIP and valves. Adapters for 24-inch and smaller shall utilize an MJ adapter.
- 7D.1.1.10 **BACK-UP RINGS AND FLANGE BOLTS:** Flange adapters shall be fitted with lap joint flanges pressure rated equal to or greater than the mating pipe. Convoluted style backup rings shall be used instead of the flat stock rings. The lap joint flange bore shall be chamfered to provide clearance to the flange adapter radius. Flange bolts and nuts shall be Grade 2 or higher.
- 7D.1.1.11 **POLYETHYLENE (PE) MECHANICAL JOINT (MJ) ADAPTERS:** Mechanical connections of HDPE pipe (4-inches through 24-inches diameter) to Ductile Iron or PVC piping, mechanical joint fittings, or valves shall be through a self-restraining, fusible mechanical joint adapter with or without an integral, internal stainless steel insert. Mechanical joint adapter shall be of the same SDR rating as the pipe. In rare instances, a separate, loose SS type insert shall be allowed for pipe sizes 4-inch through 8-inches when approved by HCUD.
- 7D.1.1.12 **ELECTROFUSION COUPLINGS:** Polyethylene pipe and fittings may be joined using approved electrofusion couplings. Fittings shall be PE3408 HDPE, Cell Class 345464C as determined by ASTM D3350-99. Electrofusion fittings shall have a manufacturing standard of ASTM F1055. Fittings shall have a pressure rating equal to the pipe. All electrofusion fittings shall be suitable for use as pressure conduit per AWWA C906, and have nominal burst.value of 3.5 times the working pressure of the fitting.
- 7D.1.2 **WATER SERVICE LINES:** Polyethylene service line tubing shall be 1-inch polyethylene tubing, blue for water, Endot Manufacturer.
- 7D.1.3 **SERVICE CONNECTIONS:** Services 2-inches and smaller shall include an integral shut-off valve and be Philmac Fuse-A-Corp fusible valve; or Central Plastics electrofusion saddle tapping tee (use shell cutter to cut the HDPE or HCUD approved equal). The contractor shall supply all adapters, electrofused couplings, and special connections necessary to transition from the service connection to the HCUD Standard polyethylene service tubing at both ends. Payment for this item shall be included in the unit price bid amount for the water service.

7D.2 PIPE ASSEMBLY AND INSPECTION

- 7D.2.1 GENERAL: Pipe shall be welded/fused together in one length, if space permits. Pipe shall be placed on pipe rollers before pulling into bore hole to minimize damage to the pipe. For pipes 16-inch and larger, a re-rounding clamp tool shall be utilized during the electro-fusion process to ensure pipe roundness. For pipe sizes larger than 12-inch mechanical scrapers shall be used.
- 7D.2.2 ELECTRONIC LOCATOR WIRE (ELW) AND INSTALLATION: The contractor shall furnish and install two (2) ELWs with the horizontal directional drilled mains. The ELW shall be Direct Burial #10 AWG Solid (.1019" diameter), 21% conductivity copper-clad annealed high carbon steel high strength tracer wire, 600# average tensile break load, 30 mil. high molecular weight-high density polyethylene jacket complying with ASTM-D-1248, 30 volt rating. The ELW shall be Copperhead Industries, LLC. The exterior color shall be blue for water mains and green for sewer mains. The Locate wire shall be brought to grade within a valve box or locate station box at all "entry point locations: and all "exit point locations". There shall be a maximum length or intervals of 500-feet between locate wire stations. No splices or connections shall be allowed underground. After installation, the contractor shall perform a wire continuity test in the presence of a HCUD inspector.
- 7D.2.3 HDPE PIPE JOINTING METHOD
- 7D.2.3.1 HDPE pipe shall be jointed by the butt-fusion process in accordance with pipe manufacturer's directions. Contractor shall provide butt-fusion technicians who are trained and certified by the P.E. pipe manufacturer to complete the project. The date of technician certification shall not exceed 12 months before commencing construction.
- 7D.2.3.2 All HDPE pipe joined by butt-fusion shall be made from the same class and type of raw material made by the same raw material supplier.
- 7D.2.3.3 Butt-fusion means the butt-joining of the pipe by softening the aligned faces of the pipe ends in a suitable apparatus and pressing them together under controlled pressure.
- 7D.2.3.4 The internal and external beads resulting from the butt-fusion process shall be visible and examined for penetration 360 degrees around the pipe diameter.
- 7D.2.3.5 Short pieces of pipe between valves and fittings shall be DIP with all joints restrained for sizes 3-inches and larger. For 2-inch, the short pieces shall be brass or Sch. 80 with IP threads and DI, HDPE or brass fittings and all joints restrained.
- 7D.2.4 PIPE INSPECTION: Cuts, gouges or holes that penetrate the pipe wall thickness by more than 10 percent shall not be acceptable and shall be cut out and discarded. Before pipe installation, the contractor shall be responsible for carefully inspecting the assembled pipeline to insure tat no vandalism or improper acts have occurred to render the new pipeline defective. Any pipeline that has been installed and has failed the required pressure test procedure and upon investigation was found to be defective because of cuts or holes drilled through the pipe walls, shall be removed and/or repaired at expense to the contractor.

- 7D.2.5 MECHANICAL JOINING: Polyethylene pipe and fittings may be joined together or to the materials by means of flanged connections (flange adapters, electro fused couplings, and back-up rings) or mechanical couplings designed for joining polyethylene pipe or for joining polyethylene pipe to another material. Mechanical couplings shall be fully pressure rated and fully thrust restrained such that when installed in accordance with manufacturer's recommendations, a longitudinal load applied to the mechanical coupling will cause the pipe to yield before the mechanical coupling disjoins. External joint restraints shall not be used in lieu of fully restrained mechanical couplings.
- 7D.2.6 MECHANICAL JOINT AND FLANGE INSTALLATION: Mechanical joints and flange connections shall be installed in accordance with the Manufacturer recommended procedure. Flange faces shall be centered and aligned to each other before assembling and tightening bolts. In no case shall the flange bolts be used to draw the flanges into alignment. Bolt threads shall be lubricated, and flat washers shall be fitted under the flange nuts. Bolts shall be evenly tightened according to the tightening pattern and torque step recommendations of the Manufacturer. At least 1-hour after initial assembly, flange connections shall be re-tightened following the tightening pattern and torque step recommendations of the Manufacturer. (See also Detail 19)

7D.3 TESTING

7D.3.1 DISINFECTION TESTS

- 7D.3.1.1 All water pipe and fittings shall be thoroughly disinfected prior to being placed in service. Disinfection shall follow the applicable provisions of the procedure established for the disinfection of water mains as set forth in AWWA - Standard C651 entitled "AWWA Standard for Disinfecting Water Mains". Bacteriological testing on the water main shall be scheduled with a state certified lab, including the HCHD, by the contractor. The state certified lab or HCHD shall collect the water samples and shall complete the water samples and be responsible for completing the water analysis (lab testing). Note: Contractors can not collect the water samples for the lab.
- 7D.3.1.2 Temporary blow-offs shall be installed for the purpose of cleaning the main pipe line. Blow-offs installed on mains up to and including 12-inches shall be the same diameter as the water main. Blow-offs installed on 16-inch mains and larger shall be the next smaller size, in diameter, than the main being tested. Temporary blow-offs shall be removed and plugged after the main is cleared. The HCUD shall be present prior to and during the operation of blow-offs. The main shall be pigged and flushed prior to disinfection.
- 7D.3.1.3 A new water main shall be connected to the existing water main at one point only for flushing purposes. The new main shall have a blow off assembly on the end. After the new main is pigged and thoroughly flushed, the open end shall be sealed and restrained and the main shall be pressure tested. Anytime the new line is reopened (to repair defective joints or pipe, defective fitting or valve) the complete testing process shall be repeated. After successful testing and once bacteriological clearance has been received from the regulatory authority, the new main shall be placed into service.

7D.3.2 PRESSURE AND LEAKAGE TESTS

- 7D.3.2.1 The contractor shall test installed pipelines in accordance with these specifications prior to acceptance of the pipeline by the HCUD. All field tests shall be made in the presence of the EOR and HCUD Representative. Except as otherwise directed, all pipelines shall be tested. All piping to operate under liquid pressure shall be tested in sections of approved length. The pressure testing of an HDPE line section shall be tested separately from the PVC and DIP line sections. Where impractical, the HDPE test section shall include only a minimum amount of PVC and ductile iron pipe within the test section. If at all possible, the PVC and DIP, test sections shall be left exposed during the pressure test for visual leakage observation. For these tests, the contractor shall furnish clean water, suitable temporary testing plugs or caps, and other necessary equipment, and all labor required: If the contractor chooses to pressure test against an existing HCUD water main valve, the new water main must be disinfected prior to connection to the HCUD line. HCUD will not be responsible for failure of the pressure test due to the existing valve leaking. The contractor shall furnish suitable pressure gauges, calibrated by an approved testing laboratory, which increments no greater than 2 PSIG, gauges used shall be of such size that pressures tested will not register less than 10% or more than 90% of the gauge capacity. All valved sections shall be hydrostatic tested to insure sealing (leak allowance) of all line valves.
- 7D.3.2.2 The section of pipe to be tested shall be filled with potable water and air shall be expelled from the pipe. If blow offs or other outlets are not available at high points for releasing air, the contractor shall provide 1-inch (minimum taps and blow-off valves (at the 12:00 position), as necessary. The cost of constructing blow-off valves and plugging them, after a successful pressure test, shall be included in the unit price bid amount for the HDPE pipe.
- 7D.3.2.3 Hydrostatic testing shall consist of a 150 PSIG test pressures, based on the elevation of the highest point of the line or section under tests. Pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the EOR. The pump, pipe connection and all necessary apparatus shall be furnished by the contractor and shall be subject to the approval of the EOR.
- 7D.3.2.4 Maximum duration for pressure test, including initial and final phase of the test, shall not exceed 8-hours. If the test is not completed (due to leakage, equipment failure, etc.), depressurize the test section, and then allow it to "relax" for at least 8-hours before bringing the test section back up to test pressure again.
- 7D.3.2.5 Initial Phase of Pressure Testing: All air shall be removed from the test section. If possible, all flanged or mechanical joint valves and fittings shall be left exposed for visual leak inspection. The pressure within the test section should be raised to approximately 160 PSIG and then allowed to be idle for approximately 3-hours. During this 3-hour period, the test section shall be allowed to stabilize and come to an equilibrium stage. No additional make-up water/pressure shall be applied to the test section during this 3-hour stabilization period unless the line pressure drops below 140 PSIG. Make-up water/pressure shall only be applied to the test section to maintain a minimum of 140 PSIG (during the 3-hour stabilization period).

- 7D.3.2.6 Final Phase of Pressure Testing: The final phase of the pressure test shall involve applying make-up water/pressure to achieve an "initial test pressure" of 150 PSIG (minimum) / 155 PSIG (maximum). The test section is then allowed to be idle (no make-up water/pressure is added) for a period of 2-hours. After this 2-hour period, make-up water/pressure is applied and measured to re-establish the "initial test pressure". The quantity of water utilized to re-pump the line shall be measured and compared to the allowable quantities as determined by the Table 7D-1 below. If the make-up water quantity is equal to or less than the allowable amount, the pressure test passes. If the make-up water quantities are greater than the allowable amount, the pressure test fails.

TABLE 7D-1

ALLOWABLE MAKE-UP AMOUNT

Nominal Pipe Size (inches)	Make-up Water Allowance (U.S. Gallons/100 ft. of Pipe) 2-hour test
6	0.30
8	0.50
10	0.65
12	1.15
14	1.40
16	1.65
18	2.15
20	2.75
22	3.50
24	4.40

- 7D.3.2.7 In the event a section fails to pass the tests, the contractor shall do everything necessary to locate, uncover (even to the extent of uncovering the entire section), and replace the defective pipe, valve, fitting or joint. Visible leaks shall be corrected regardless of total leakage. Lines which fail to meet these tests shall be retested as necessary until test requirements are complied with. All testing shall be performed at the contractor's expense.
- 7D.3.2.8 If, in the judgment of the EOR, it is impracticable to follow the foregoing procedures exactly modifications in the procedure shall be made. Re-disinfection shall be required if the line is de-pressurized for repairs.

7D.3.3 LOCATE WIRE TEST

- 7D.3.3.1 After installation, the contractor shall perform a wire continuity test in the presence of a HCUD inspector.

SECTION 8

SPECIFICATIONS FOR JACK AND BORE (J&B) UNDER ROAD CROSSINGS

SECTION 8: JACK AND BORE (J&B) UNDER ROAD CROSSINGS CONTENTS

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SECTION 8

“JACK AND BORE” (J&B) UNDER ROAD CROSSINGS

- 8.1 J&B INSTALLATION AND MATERIALS: The plan, profile and cross section views of the J&B crossing shall show the steel casing pipe as extending 10-feet beyond the edge of pavement on both sides of the roadway. The steel casing pipe exterior wall surface shall be bituminous coated, to a minimum 16-mil thickness. Steel casing pipe shall be new prime steel pipe conforming to ASTM A-139, Grade B or AWWA C200, latest edition. Steel casing pipe shall be seamless or have no more than one longitudinal weld.
- 8.2 STEEL CASING PIPE SPECIFICATIONS: Minimum steel casing pipe size and wall thickness shall be as indicated in the following Table 8-1.

TABLE 8-1

Carrier Pipe, Steel Casing Pipe Diameter & Wall Thicknesses

<u>Diameter (in.)</u> <u>Carrier Pipe</u>	<u>Outside Diameter (in.)</u> <u>Casing Pipe</u>	<u>Wall Thickness (in.)</u> <u>Casing Pipe</u>
4	8	.188
6	12	.188
8	16	.250
10	20	.250
12	24	.250
14	28	.312
16	32	.312
20	34	.375
24	36	.375

- 8.3 STEEL CASING PIPE WELDING: All section joints of steel casing pipe shall be full penetration welded with a continuous circumferential weld. Joints shall be electric-fusion (Arc) welded by operators qualified in accordance with American Welding Society (AWS) Standard Procedure. After welding, the Contractor shall wire brush the welded joints and apply Kop-Coat Interol Quick drying Primer 626 or HCUD approved equal.
- 8.4 CARRIER PIPE INSTALLATION AND SUPPORT: The J&B carrier pipe shall be installed inside the casing pipe using the polyethylene support block assembly system with spacing as per manufacturer's recommendations. The carrier pipe shall have "mechanical joint restraints" at each bell joint completely through the casing pipe. The carrier pipe ends shall extend beyond steel casing pipe by 6-inches and the voids between the inside of the casing pipe and outside of the carrier pipe shall be sealed with brick and non-shrink grout mortar. Depending upon road bore location, the contractor shall notify FDOT or HCDPW 48-hours in advance before commencing work.
- 8.5 CASING SPACERS
- 8.5.1 GENERAL DESCRIPTION: The Casing spacers shall be used to install the carrier pipe inside the encasement pipe. To provide support around the periphery of the pipe should the pipe twist as it is pushed through the casing, the spacers shall be a projection type that has a minimum number of projections around the circumference totaling the number of diameter inches. For example, 8" pipe shall have a minimum of 8 projections and 18" pipe shall have a minimum of 18 projections.

- 8.5.2 ATTACHMENT: Casing spacers shall use double backed tape, provided with the spacers, to fasten tightly onto the carrier pipe so that the spacers do not move during installation.
- 8.5.3 SPACING: Casing spacers shall have a maximum spacing span of 10 feet. On sewer pipe the maximum span should be 6-1/2 feet to prevent sagging of the carrier pipe. The span between spacers should result in long term safety factor of 2 to 1 to support the carrier pipe full of liquid.
- 8.5.4 HEIGHT: Spacers shall have a minimum height that clears the pipe bell or as otherwise indicated on plans.
- 8.5.5 REQUIREMENTS
- 8.5.5.1 Casing spacers shall be projection type totally non-metallic spacers constructed of preformed sections of high density polyethylene.
 - 8.5.5.2 Spacers shall be ISO 9002 certified for strength and quality.
 - 8.5.5.3 Projection type spacers shall be RACI spacers as marketed by Public Works Marketing, Inc., P.O. Box 38174, Dallas, Texas 75238-0174; Phone (214) 340-4226 or 1-800-517-0395.
- 8.5.6 ENDS: The ends of the casing shall be sealed using PWM model 1 WA Wrap around end seal made of 1/8" thickness rubber and stainless steel bands.

SECTION 9

SPECIFICATIONS FOR WASTEWATER STRUCTURE COATINGS

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SECTION 9 COATINGS

- 9.1 This specification shall cover contractor guidelines and all structures that require protective coatings. All preparation, patching, repairs, and application specifications listed below are to be used as minimum guidelines.
- 9.2 The contractor providing service shall have a minimum of five years' experience in the application of wastewater protective coatings in the state of Florida. Contractors will be required to provide five references of previous work performed, one of which must be at least five years old. The contractor shall provide all coating data sheets, methods of preparation, application methods, and a one contract source for service, repair, and warranty. Contractor must be registered in Hernando County and have all current insurance requirements per Hernando County purchasing guidelines. The contractor shall be certified by the coating manufacturer for installation of the product.
- 9.3 PREPARATION
- 9.3.1 All leaks in structures will be patched or repaired per 9.3.10 below.
- 9.3.2 All pipes shall be plugged or bypassed before any work is done on the structure. No debris shall be flushed down the pipe line.
- 9.3.3 All structures installed or refurbished shall be sandblasted to bare concrete in order to remove all loose patching, old coating, and contamination, and shall include the invert and floor areas.
- 9.3.4 After sandblasting, the structure shall be cleaned of abrasives and debris and pressure washed. The concrete interior shall be forced air dried.
- 9.3.5 Any exposed steel reinforcement shall be sandblasted to bare metal and removed of all corrosion, paint, and contaminants.
- 9.3.6 Surface preparation shall meet all requirements of the coatings system data sheet on concrete preparation (Data sheet shall be provided to the county). All interior surfaces of the structure shall be sound, porous, dry, and free of dust, dirt, oil, grease, and other contaminants prior to application of coating.
- 9.3.7 Lift Stations must have inverts (fillets) poured prior to coating.
- 9.3.8 All Ram Neck needs to be recessed so that the seams and areas around the pipes can be filled creating a smooth continuous surface.
- 9.3.9 Lift Stations may only have invert and force main pipes installed prior to coating.
- 9.3.10 Bench and Trough construction should be completed in the required structures prior to coating.
- 9.3.11 Concrete Patching / Repair Materials

The following products manufactured by the Sika Corporation have been determined to be suitable for the necessary repairs. Products of other manufacturers may be acceptable, providing they meet or exceed the mechanical properties, service records, and warranties of the following products...

1. Sikatop 123 Plus – a two-component, non-sag cementitious mortar intended for vertical and overhead surfaces. This product also contains FerroGard 901 penetrating corrosion inhibitor.
2. Sikarepair 224 – a one component, cementitious mortar intended for repair of vertical and overhead surfaces. Formulated for application by trowel or low-pressure spray.
3. Sika Armatec 110 EpoCem – a three component, solvent-free, moisture tolerant, epoxy-modified, cementitious product specifically formulated as a bonding agent and an anti-corrosion coating. This product shall be applied on existing steel reinforcement.

All surface preparation, storage and application of these products shall strictly conform to the manufacturer's instructions and recommendations. These products shall be manufactured to ISO 9001 and 9002 standards.

9.4 Coating Systems

9.4.1 Epoxy Coating System

- The product shall be 100% solids, solvent-free ultra-high-build epoxy.
- The finished epoxy shall be resistant to sulfuric acid attack associated with domestic sewage.
- The epoxy shall be manually sprayed onto the structure to provide a uniform smooth and even surface.
- The minimum finished thickness shall be as specified on the plans.
- The coating system shall be capable of being applied over wet surfaces without degrading the final product.
- The cured epoxy system shall conform to the minimum physical standards, as listed below...

CURED EPOXY	STANDARD	LONG-TERM DATA
TENSILE STRENGTH	ASTM D-638	7,500 psi
FLEXURAL MODULUS	ASTM D-790	600,000 psi
FLEXURAL STRESS	ASTM D-790	13,000 psi
COMPRESSIVE STRENGTH	ASTM D-695	18,000 psi

- The contractor shall provide certified independent, third party test results verifying the minimum physical properties listed above. The test shall be in conformance with the ASTM specifications listed.
- The finished liner shall be cured in strict accordance with the manufacturer's instructions.
- Composite systems containing layers of different materials or cured-in-place resin systems will not be considered as equal.

9.4.2 Polymorphic Resin Systems

- The polymorphic resin shall be 100% solids, two component, highly modified isophthalic polyester resin material.
- The finished resin shall be resistant to sulfuric acid attack associated with domestic sewage.
- The minimum finished thickness shall be as specified on the plans.
- The cured resin system shall conform to the minimum physical standards, as listed below...

CURED RESIN	STANDARD	LONG-TERM DATA
TENSILE STRENGTH	ASTM D-638	4,900 psi

FLEXURAL STRESS	ASTM D-790	8,630 psi
FLEXURAL MODULUS	ASTM D-790	15,120 psi

- The contractor shall provide certified independent, third party test results verifying the minimum physical properties list above. The test shall be in conformance with the ASTM specifications listed.
- The finished liner shall be cured in strict accordance with the manufacturer's instructions. Composite systems containing layers of different materials or cured-in-place resin systems will not be considered as equal.

9.4.3 Fiber-Reinforced Modified Polyamine Epoxy System

- The finished polyamine epoxy shall be resistant to sulfuric acid attack associated with domestic sewage.
- The epoxy shall be manually sprayed onto the structures to provide a uniform smooth surface.
- The minimum finished thickness shall be as specified on the plans.
- The coating system shall be capable of being applied over wet surfaces without degrading the final product.
- Concrete surfaces shall be prepared for the application of the fiber reinforced modified polyamine system by cleaning and stoppage of infiltration as specified above. Prior to applying the modified polyamine liner, concrete surfaces shall be repaired to the extent needed to provide a smooth and even surface to which the liner will adhere.
- The cured fiber-reinforced modified polyamine system shall conform to the minimum physical standards, as listed below...

CURED RESIN	STANDARD	LONG-TERM DATA
TENSILE STRENGTH	ASTM D-638	2,507 psi
FLEXURAL STRESS	ASTM D-790	8,148 psi
FLEXURAL MODULUS	ASTM D-790	540,000 psi

- The contractor shall provide certified independent, third party test results verifying the minimum physical properties listed above. The test shall be in conformance with the ASTM specifications listed.
- The finished liner shall be cured in strict accordance with the manufacturer's instructions.

9.5 Thickness Verification, Inspections and Testing

- 9.5.1 The contractor shall provide a method of verifying the actual coating thickness installed to ensure it meets or exceeds the minimum values in the manufacturer's specifications. The proposed liner thickness verification method shall be submitted to the engineer for approval. Dry film thickness readings can be taken on concrete by the use of ultrasonic thickness gauges in strict accordance with SSPC PA 9.

Contractor may utilize a wet film thickness gage meeting ASTM D4414 to ensure monolithic coating and uniform thickness during application. A minimum of three readings per 200 square foot area shall be recorded. Documentation on thickness readings shall be conveyed to the inspector on a daily basis when the coating application occurs.

All phases of the structure rehabilitation such as surface preparation, liner application, curing, testing, etc., will be inspected by the County's field engineering personnel from conformance to the specifications, construction drawings, and manufacturer's

instructions. The contractor shall coordinate all rehabilitation work with the County and with due regard for site and weather conditions prevailing at the time.

9.5.2 Spark Testing

- All new construction coating systems will be required to be spark tested prior to acceptance. Existing structures may be required and shall be separate line items on the bid. Documentation for coatings that do not require spark testing must be provided at the time of bid and be reviews by the county's engineering department to be deemed exempt from testing.
- The holiday testing shall be in strict accordance with NACE SP0188
- After the coating system had set hard to touch the coating shall be inspected with high-voltage holiday detection equipment.
- The spark tester shall be initially set at 100 volts per 1 mil (25 microns) of minimum specified (not average) film thickness applied but may be increased if it is insufficient to detect the induced holiday.
- All detected holidays shall be marked and repaired per the manufacturer's recommendations.
- All cost associated with the testing shall be borne by the contractor.
- Testing equipment shall be in good working condition and evidence of certified calibration within the last year shall be provided before the detection test equipment shall be used.

9.6 Bypass Pumping

- 9.6.1 If bypass pumping is required, a detailed by pass pumping submittal will be required and approved by the county's engineering department before work can begin.
- 9.6.2 Bypass pumping is the sole responsibility of the contractor to insure it is functioning at all times including but not limited to set up, monitoring, and fueling.
- 9.6.3 Call out alarms will be required while unmanned. Response to the jobsite for all callouts / alarms is the responsibility of the contractor and must have a response time of no more than 30 minutes.

Any work that may need to be performed by the county due to lack of response by the contractor will be billed to the contractor. All invoice adjustments, credits, or payments for this work must be made before final payment will be approved.

9.7 Warranty

The contractor shall furnish Hernando County with an unconditional 10-year warranty for materials and workmanship. This warranty shall be a guarantee against failure for the warranty period. Failure shall be defined to occur if the rehabilitation system fails to:

1. Prevent the internal damage or corrosion of the structure.
2. Adhere to existing structure surface.

If any failures occur within the specified warranty period after final acceptance, the contracture shall repair or restore the structure to it previously accepted state including all materials, labor, and at no additional cost to the County.

Repairs shall be completed within 30 days of written notification of the failure.

SECTION 10

BACKFLOW PREVENTION ASSEMBLIES (BPA)

SECTION 10: BACKFLOW PREVENTION ASSEMBLIES (BPA)

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SECTION 10

BACKFLOW PREVENTION ASSEMBLIES (BPA)

10.1 GENERAL COMMERCIAL

- 10.1.1 Backflow prevention is required in accordance with PL 93-623, the Federal Safe Drinking Water Act, the Florida Safe Drinking Water Act, the Florida Building Code, Florida Administrative Code 62-555, and by county ordinance for the protection of public health. The BPA shall be a reduced pressure zone assembly (RPZ) for all commercial purposes. In the case of 3" or larger unmetered connections, a reduced pressure detector assembly (RPDA) shall be utilized and will be manufactured by: Ames (4000 series), Apollo RP40, Conbraco 40204T2, Watts 009, Wilkins/Zurn 975 XL, or a HCUD approved equal.
- 10.1.2 BPA(s) shall be installed in all lines where the possibility exists for water from any other source to enter the public water supply system. This includes all properties with auxiliary water sources such as wells, re-use (reclaimed) water systems, ponds, streams, lakes, canals, etc.
- 10.1.3 A physical separation (known as an "Air Gap") is the safest method of cross connection prevention. If an Air Gap application is impractical, then a proper BPA(s) shall be installed in order to prevent possible back siphonage or back flow conditions from occurring into a public potable water supply system.
- 10.1.4 Dedicated, unmetered fire lines shall be RPDA's. Hydrant leads in excess of 50' shall have proper backflow protection.
- 10.1.5 Spacing:
 - 10.1.5.1 BPA(s) shall be attached to the water line in a horizontal position and installed to facilitate "in line maintenance" and/or minor repair.
 - 10.1.5.2 Horizontal separation is to be 12 inches or vertical height may be staggered to allow proper room for testing.
 - 10.1.5.3 The concrete support pad shall be 4-inches thick and extend 12-inches in all directions of the assembly.
 - 10.1.5.4 The BPA's dump zone shall be a minimum of 12-inches above finished grade and a maximum of 48-inches above a rectangular concrete support pad. Maximum distance between the BPA's dump zone and the concrete support pad shall not exceed 24 inches for lines 6 (six) inches or greater. The BPA's dump zone shall be at or above the 100-year flood elevation with the support pad distance spaced appropriately. The distance of the centerline of the wheel valves and the concrete pad shall not be greater than six feet. BPA's shall not be placed in a gully or swale. The use of in-ground vaults is prohibited.

- 10.1.6 Materials shall be either galvanized, copper, black iron, or a HCUD approved equivalent. PVC pipe is not allowed.
- 10.1.7 All BPA(s) shall be installed as per manufacturer's recommendations and inspected by HCUD after installation is completed. BPA(s) must be installed prior to delivery of water on all commercial sites.
- 10.1.8 All BPA(s) shall clearly display the model number and the serial number.
- 10.1.9 Freeze Protection: All BPA's shall be installed with freeze protection. Acceptable freeze protection valves are Dole FP-35 & FP-45 and Conbraco series 40-000. Additional freeze protection shall be of a type sanctioned by the AWWA or FW&PCOA or approved equivalent (foam pipe insulation, custom built boxes, mock rock). The use of fiberglass insulation, rags, old towels, etc. is strictly prohibited. At no time will valves, test ports, relief ports, or serial numbers be covered.

10.2 REDUCED PRESSURE ZONE ASSEMBLY (RPZ)

- 10.2.1 The RPZ shall be installed on the discharge side of the water meter service line (within 18 inches of the water meter) to provide back-siphonage or back pressure protection from high hazard facilities as designated by HCUD.
- 10.2.2 The RPZ shall contain two independently acting check valves, a pressure differential relief valve located in a zone between the two check valves, a shut off valve installed at each end of the assembly and be fitted with the properly located test cock valves. Only complete assemblies will be accepted from the manufacturer (consisting of device and valves fully assembled).
- 10.2.3 The RPZ shall meet the requirements of ASSE Standard 1013 and AWWA Standard C-506 for Reduced Pressure Principal Backflow Preventers and shall be USC tested and approved.
- 10.2.4 All Test ports shall contain a threaded cap or plug to prevent tampering and vandalism.
- 10.2.5 At no time shall there be an unmetered connection anywhere on the assembly, nor shall there be any hose bib or other appurtenance before the #1 shut-off valve on the assembly. All auxiliary connections shall be after the #2 shut-off valve, excluding fire lines, which shall have none except those approved by the fire department.

10.3 COMMERCIAL ACCOUNTS

- 10.3.1 Commercial Building Permit issuance shall be delayed until the owner or developer (or representative) completes a Utility Fees Calculation Data Form, pays the Connection, Hook-Up and Deposit Fees (if applicable), and applies for a standard water service contract (if applicable) through the Customer Service Section of HCUD. The Certificate of Occupancy (C.O.) issuance shall be delayed until the applicable BPA(s) is/are inspected and approved by HCUD and all other project specific items are submitted and approved by HCUD.
- 10.3.2 At no time shall a connection exist between the commercial meter and the interior plumbing until the proper BPA has been installed and inspected. If such a condition is found to exist, the water service shall be locked off until the proper backflow protection is installed and inspected by an HCUD inspector. A separate inspection may be required by the Building Dept.

10.4 INSPECTIONS: The RPZ-BPA shall be inspected as follows:

- 10.4.1 Delivery of water: Water meters will be unlocked after an RPZ-BPA is installed.
- 10.4.2 Issuance of Certificate of Occupancy (C.O.): A final inspection shall be performed on installation, pad, height, etc. prior to issuance of C.O.'s.
- 10.4.3 Annual inspection is required by FAC 62-555.360 (2) and county ordinance. The testing procedure shall be performed in accordance with one of the following standards: ASSE 5013, ASSE 5015, ASSE 5020, ASSE 5047, ASSE 5048, ASSE 5052, ASSE 5056, or CAN/CSA B64.
- 10.4.4 Arrangements for inspection shall be made at least 48-hours in advance.
- 10.4.5 The RPZ shall be tested (and passed) by a state certified tester prior to issuance of C.O.

10.5 RESIDENTIAL IRRIGATION SYSTEMS

- 10.5.1 Irrigation systems are considered high hazard and backflow prevention assemblies shall be either reduced pressure zone (RPZ) or pressure vacuum breaker (PVB) type.
- 10.5.2 All residential irrigation systems connected to potable water and/or having an alternate water source shall have backflow prevention, testable in-line, with dump zones open to the atmosphere.
- 10.5.3 Residential irrigation BPA's (RPZ's & PVB's) operating within HCUD potable water authority jurisdictions shall comply with all sections and rules as listed above for general commercial practices for the purposes of public safety and protection of the public water supply.

10.6 LIFT STATION SPECIFICATIONS

- 10.6.1 Potable water connections at lift stations are considered high hazard and backflow prevention at all lift stations shall be Reduced Pressure Zone (RPZ) type only.
- 10.6.2 Current specifications shall be followed regarding the construction, retrofitting, and rehabilitation of all existing lift stations.

SECTION 11

ELECTRICAL SPECIFICATIONS

SECTION 11: ELECTRICAL SPECIFICATIONS

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SECTION 11

ELECTRICAL SPECIFICATIONS:

- 11.1 GENERAL: The following specifications shall cover the design and installation of the necessary electrical components of Water, Reclaimed Water and Wastewater Systems.
- 11.2 TELEMETRY CONTROL SYSTEM: Telemetry shall be required on all pump stations, water treatment plants and wastewater treatment plants which are to be owned and maintained by HCUD.
 - 11.2.1 CONTROLS (TELEMETRY): Programmable Logic Controllers (PLC) shall be used for water plant and wastewater plant monitoring and control. PLC may be used for lift stations with HCUD approval PLC shall be supplied by Data Flow Systems Inc. Melbourne, FL (321) 259 – 5009. (See Details 35 and 36). The telemetry control unit (TCU) shall be a microprocessor-based multi-pump controller module designed for use with the telemetry systems. As a minimum, the pump control unit shall have the following features:
 - 11.2.1.1 Local automatic control from float, bubbler, transducer, or ultrasonic inputs. All the electronics for each type of input shall be included in the TCU.
 - 11.2.1.2 Local manual control provided by HOA (Hand-off automatic) switches. The HOA switches shall be fail safe and operate in the OFF and HAND position without power. HOA Switch Alarms shall be reported back to central site computer. Alarms shall indicate that an HOA switch has been left in the HAND or OFF position.
 - 11.2.1.3 Remote control from the central site computer shall provide individual pump overrides and disables, station and alarm disables.
 - 11.2.1.4 Triplex/Duplex/Simplex configurable. The module shall have the capability of being configured for one, two or three pumps.
 - 11.2.1.5 Pump alternation function shall be provided. Alternation around non-operational pumps shall be provided.
 - 11.2.1.6 An on-board 240-VOLT three-phase monitor shall be provided. The phase monitor shall be transformer-isolated and detect loss of phase, phase reversal, low phase and high phase faults. All phase monitor adjustments shall be adjustable from the keyboard. Phase voltages from phase A to B and from phase A to C shall be transmitted to the central site computer.
 - 11.2.1.7 The TCU shall be easily replaced by removing two industry standard terminal connectors.
 - 11.2.1.8 Alarm light and bell outputs capable of driving 122-VOLT loads to 1-AMP.
 - 11.2.1.9 Local input for alarm silence switch.
 - 11.2.1.10 Remote alarm bell and light disable from central site computer.

- 11.2.1.11 Float alarm reporting back to central site computer when floats are operating out of sequence. In the float mode each float position shall be transmitted to the central computer.
 - 11.2.1.12 The TCU shall utilize a 16-character display to provide the operators with the elapsed runtime of each pump, the average runtime of each pump, the flow of each pump, the flow of the station and the time of day.
 - 11.2.1.13 Pumps/Starter/Breaker Fault alarms shall be reported back to central site computer. The alarms shall be activated when a pump is called to run, but fails to run, or if the pump is turned off by the TCU, but continues to run.
 - 11.2.1.14 Pump run status shall be reported back to central site computer. Pump run times recorded with 2-second accuracy.
 - 11.2.1.15 Configuration parameters shall be adjustable through the front mounted keypad or a RS-232 service port.
 - 11.2.1.16 Redundancy of level sensing devices shall be supported.
 - 11.2.1.17 All inputs and outputs shall be optically or magnetically isolated and surge suppressed. The TCU shall be manufactured by Data Flow Systems, Inc., of Melbourne, Florida (321) 259-5009.
- 11.2.2 TELEMETRY CONTROL UNIT - As a minimum, the TCU/radio shall have the following features:
- 11.2.2.1 Environmentally sealed/corrosion resistant enclosure.
 - 11.2.2.2 Conformally coated PC Board.
 - 11.2.2.3 Surge protected radio power.
 - 11.2.2.4 On board communications and functional firmware.
 - 11.2.2.5 Watchdog Timer.
 - 11.2.2.6 On board voltage regulation and radio power supply control.
 - 11.2.2.7 RS-232 service port.
 - 11.2.2.8 LED's on test mode, power, transmit data, receive data, and CPU failure.
 - 11.2.2.9 Test mode switch for radio service.
 - 11.2.2.10 Radio current, receiver sensitivity and operating temperature are monitored for system diagnostics.
 - 11.2.2.11 Unit removable without disturbing field wiring or configuration jumpers.
 - 11.2.2.12 The TCU shall be manufactured by DFS, of Melbourne, Florida (321) 259-5009.

11.2.3 ANTENNA SUBSYSTEM (See Detail 37).

- 11.2.3.1 A high gain directional antenna shall be used to transmit and receive data at the Remote Terminal Unit (RTU). The antenna shall be supported on a mast/pole and have DC grounding for lightning protection.
- 11.2.3.2 The antenna mast/pole shall be hot dipped galvanized for corrosion protection. All mounting hardware shall be made of SS. The mast shall meet or exceed the quality and reliability of the AG20 style, manufactured by Rohn.
- 11.2.3.3 The coax cable shall be the type that utilizes an inert semi-liquid compound to flood the copper braid. The coax cable shall be of the RG-8 construction type and have the RF loss characteristic of foam flex. The coax cable shall meet or exceed the quality, reliability and performance of series RTC 400 as supplied by Data Flow Systems, Inc., of Melbourne, Florida. Type N connectors shall be utilized at both ends of the coax. The Type N connectors shall be sealed with 3-inch sections of Alpha FIT321-1-0 sealant shrink tubing. The coax cable shall be secured to the mast/pole with 316 SS cable ties. The cable ties shall meet or exceed the quality, reliability and performance of AE112 cable ties manufactured by Band-It.
- 11.2.3.4 The antenna shall be an all welded aluminum elements. The antenna shall have a single radiator element connected to a type N female connector. Element connections utilizing nuts and bolts are not acceptable. The antennas shall meet or exceed the quality, reliability and performance of the RTA series as provided by Data Flow Systems, Inc., of Melbourne, Florida. The antenna/tower shall be designed to meet wind loading without damage as specified in Detail D-37. Sealed engineering drawings shall be submitted to verify the design.

11.2.4 ENCLOSURES – No external enclosures allowed. The TCU shall be installed within the new control panel by the panel manufacturer; in the event of an existing control panel, a new control panel shall be required to replace the exiting control panel.

- 11.2.5 PRESSURE TRANSDUCER: A Pressure Transducer shall be installed to transmit water pressure data from the RTU to the existing Central Site via SCADA. The pressure transducer shall be 0-100 psig, 4-20 ma output, +/- 1.0% Accuracy, NEMA 4X with NPT threaded process connection. The pressure transducer shall be installed in a tee that is located before the BPA and after the lockable curb stop on the inlet piping of the BPA for the water service to the lift station. The cable for the pressure transducer shall be installed in a conduit from the transducer to the bottom of the control panel. This conduit shall be installed down through the concrete slab then back up to the control panel. The Pressure Transducer shall be wired to the TCU's Analog Input 2, and water pressure shall be displayed on the RTU's graphic screen at the Central Site. The Pressure Transducer shall be Model TIS-9001-2 manufactured by Data Flow Systems or HCUD approved equal. (Detail 37)

- 11.2.6 SURGE PROTECTION - Surge protection must be provided for all power supply and power monitoring circuits. The protection shall be equipped with both energy limiting and clamping circuits with slow blow fuses designed for overload conditions. This design shall provide a very high level of non-destructive transient immunity. With the exception of a direct lightning strike, the device shall protect the RTU power supply and power monitoring circuits from damage due to voltage transients. The unit shall provide circuit protection to withstand multiple transients in excess of 6500-VOLTS, 3250-AMPS, without damage. Damage shall be limited to a blown fuse when exposed to larger transients. The device shall be transient-tested to ANSI standard C62.41. The unit shall meet or exceed the quality, reliability and performance of the Transient Filter Shield TFS001 as manufactured by DFS.
- 11.2.7 WARRANTY - The system supplier shall warrant all hardware provided under this contract against all defects in material and workmanship for a period of one year. When installed with a DFS Transient Filter Shield (TFS001-2), the TCU shall carry an additional 2-year, return-to-factory warranty. The addition of a properly installed TFS shall also extend the TCU Pack warranty to include damage caused by lightning and electrical surge.
- 11.2.8 SERVICE - The supplier shall offer full factory support of the installed products through the use of factory employees. Service representatives who are not direct employees of the system supplier, or who are not specifically trained in the service of radio telemetry systems shall be unacceptable. The customer shall have 24-hour per day access to service personnel through the use of a pager.
- 11.3 CONTROLS (STANDARD): The contractor shall install a complete control system as required for system operation. The control panel shall operate the equipment at the power characteristics shown on the plans. A level control system shall be provided to start and stop equipment in response to liquid level or pressure. On and off levels shall be sensed by float mercooid switches or transducer. Control Panels shall be manufactured and UL approved.
- 11.3.1 The control panel shall be NEMA 4X, 14-gauge, Type 304 SS, with padlock type locking hasp and removable back panel. The enclosure door shall have a full length piano type hinge with a stainless steel hinge pin. A rain drop shield shall be positioned on the top front of the panel. A three point latch, operated from 1 exterior stainless steel handle shall secure door and allow for pad locking. The enclosure shall contain an interior aluminum "DEADFRONT" panel door with a $\frac{3}{4}$ -inch break on all four sides for rigidity, mounted on a full length aircraft type hinge and a hand operated latch assembly which latches to a full length door stop. The dead front panel shall have "cut-outs" for the operating handles of all circuit breakers. The outer SS door shall be equipped with a safety "hold-open" arm device.
- 11.3.2 The control panel shall be floor or wall mounted or on two 6-inch x 6-inch x 10-feet pre-cast concrete posts. A 4-inch thick concrete base slab on grade shall be installed. Panel horizontal centerline shall be 5-feet above ground elevation, with the bottom of said panel to be at or above the "100 year flood elevation", where applicable. The panel shall be located 3-feet away from wet well hatch cover to avoid interference when access doors are in open position. Control panels within plants shall be installed per plans with a minimum of 3-feet working clearance. See Detail 34.

- 11.3.3 Float level test switches and level indication lights shall be provided in the control panel to test and monitor the float level activation. A test switch and an indicator light shall be provided for each float switch.
- 11.3.4 CONTROL POWER TRANSFORMER: A power transformer to supply 120-VOLT control power shall be provided when 120-VOLT is unavailable from the electrical service. The power transformer shall provide 120-VOLT to power the control circuits, panel lights, meters, outlets, generator block heater and other 120-VOLT devices.
- 11.3.5 CONTROL PANEL: The control panel shall be fully shop tested by manufacturer prior to shipment and all components UL listed. The control panel shall contain the following components (see Detail 35 and 37):
- 11.3.5.1 Main and emergency circuit breakers with interlock shall be Square D, Type H or J Frame, 600 VOLTS only.
 - 11.3.5.2 Automatic "on and off" at designated points through level sensors, 24-VOLT AC.
 - 11.3.5.3 Red globed alarm light, top mounted, activated by high water level sensor. Light shall be equipped with a flasher to pulse the light during high level condition.
 - 11.3.5.4 Audible horn, side mounted, activated by high water level sensor, and equipped with external weatherproof "push-to-silence" button. The silence button shall be mounted on the right side of the panel.
 - 11.3.5.5 Liquid level indicator lights with "push-to-test" circuit and light.
 - 11.3.5.6 Pump run and seal fail lights with "push-to-test" circuit and light.
 - 11.3.5.7 Automatic thermal overload protection on each leg of starter with manual reset.
 - 11.3.5.8 Where 3-phase is used, phase monitor by "Diversified", SLJ series, or equal, reading phase and voltage with adjustable delay on make time delay. Phase monitor to "Lock out" or protect motor starters only.
 - 11.3.5.9 Ammeter monitoring one leg of each pump motor complete with selector switch and momentary read button.
 - 11.3.5.10 Lightning arrestor externally mounted on main disconnect box and shall be connected to the load side of the main circuit breaker with leads as short and straight as possible.
 - 11.3.5.11 The transient voltage surge protection shall be mounted inside the control panel.
 - 11.3.5.12 Pump elapsed time indicators, STA-CON D851 or equal, mounted on dead front for each pump.

- 11.3.5.13 120 VOLT duplex outlet with ground fault interrupter (GFI).
- 11.3.5.14 Generator receptacle, female type, shall be Crouse Hines AR 1041-M-72, 100-AMP rated, side mounted and angled down.
- 11.3.5.15 600-VOLT terminal strips.
- 11.3.5.16 Alternator - lead, lag, auto select. For Triplex Stations, "Diversified ARA 120 AHE". For duplex stations, "Diversified ARB 120 AEA P".
- 11.3.5.17 Heavy-duty motor starters, relays and other related control components and hardware, shall be Square D, Class 8536 only. Relays shall be octal base design with 8 or 11 pin configuration.
- 11.3.5.18 All wiring shall be color-coded, numbered and matched to wiring diagram.
- 11.3.5.19 Control panel breakers, Square D, H or J frame only, shall be molded case, thermo-magnetic 600-VOLT 18,000 RMS minimum.
- 11.3.5.20 Starters shall have heavy-duty HOA ("Hand-off-Automatic") selector switches.
- 11.3.5.21 For single phase pumps, separate "start" and "run" capacitors shall be furnished in the control panel. Capacitors in motors shall not be acceptable.
- 11.3.5.22 Resetable Cycle counter for each pump shall be installed.
- 11.3.5.23 Any penetration into the control panel box by the Contractor shall be made from the bottom of the control panel.
- 11.3.5.24 Control Panel Design – Approved Parts List
 - 11.3.5.24.1 Float switches
Anchor Scientific Type S (N.O.)
S.J. Electro System – Model SWI (N.O.)
 - 11.3.5.24.2 Main, Emergency Circuit Breaker, and Pump Circuit Breaker, Square D, H or J Frame, 600-VOLT rated – 25,000-AMP interrupting rating
 - 11.3.5.24.3 Flasher solid state, approximately 75 F.P.M.
SSAC – FS127
Diversified Electronics – TSL series
 - 11.3.5.24.4 Phase Monitor Relay – Independent N.O. and N.C. Contacts with time delays
Diversified Electronics – Model No. SLJ-230-ALE (240-VOLT),
SLJ-440-ALE (480-VOLT) or
SLA Series with Separate Time Delay is also acceptable.

11.3.5.24.5	Transient Voltage Surge Suppressor Square D SDSA650 GE – 9L18BB301 EDCO
11.3.5.24.6	Duplex Receptacle 15A, 125 VOLT (GFI, Standard) Leviton – 6598-I, 5662-I Hubbell – GF-5262-I, 5262-I Eagle – 666-2 VOLT-BOX
11.3.5.24.7	Motor Starter – Full Voltage with Coil Surge Suppressor Square D – 8536 (with hand reset overload relays only)
11.3.5.24.8	Overload Relays (Provided with Motor Contractor) Square D – Class 9065 only
11.3.5.24.9	Emergency Generator Receptacle – Receptacle with angle adapter Crouse-Hinds #1041 @ 100-AMPS or #2041 @ 200- AMPS
11.3.5.24.10	Elapsed Time Meter – 120 VOLT, Not Resettable, Round Face Cramer – Series 635E Redington/Engler – 710-0002 Sta-Con D 851
11.3.5.24.11	Alternator Diversified Electronics ARB-120-AEA-P (Electronic – switchable duplex/triplex) Diversified Electronics ARA-120-AHE (Electronic – triplex)
11.3.5.24.12	Hand-Off Automatic Switch (3-position, maintained) Square D – KS43BH13 only
11.3.5.24.13	Alarm Light – 120 VOLT, Shatterproof Red Lexan Lens Ohio Electric – RL3K Edwards – Adaptabeacon (built-in flash)
11.3.5.24.14	Pump Running (Gree, 120 VOLT) Square D – 9001KP38G9 only
11.3.5.24.15	Alarm Horn – 120 VOLT Federal – 350 WB Edwards – 876-N5
11.3.5.24.16	Terminal Blocks Square D – 9080-GA6, GK6, GC6, GD6 Buchanan #725

- 11.3.5.24.17 Transformer – Control 480/120 VOLT, Low Voltage
120/24 VOLT
Square D – 907Ot2000d15 (480/120 VOLT),
9070T100D13 (120/24 VOLT) only
- 11.3.5.24.18 Alarm Silence and Alarm Reset Buttons
Square D – Class 9001-KR1BH13 only
- 11.3.5.24.19 Fuse – 120 VOLT (Control), 24 VOLT (Low Voltage)
Littelfuse – KLDR
Bussman – FNQR
- 11.3.5.24.20 Control Relays
Square D – Class 8501 – KU-13 (120 VOLT and 24
VOLT coils)
- 11.3.5.24.21 Ammeter Selector Switch
Entrelec – VY10/D – S7022565 – (3-position,
duplex),
VY10/D/A22/ST/C511 (4-position, triplex)
Electro-switch – Series 20K – 20KC-08 with 53C-
3A12A
Nameplate (duplex), 20Kc-10 with 53C-4A13
nameplate (triplex)
- 11.3.5.24.22 Ammeter Yokogawa – 250-340LSXX
Simpson – Type 1327 Series (with appropriate
scale)
- 11.3.5.24.23 Current Transformer – 600 VOLT 5A
Yokogawa – TR11-RT-XXX
Anderson Electrical Connectors (Square D) – Class
4210 Simpson Donut CT's – Type 012XX
- 11.3.5.24.24 Fuseholder – 600 VOLT/300 VOLT, 2 Pole/1 Pole
Bussman – 2079/2078
Littelfuse – Class CC, Type L60030C-2SQ
- 11.3.5.24.25 Main Disconnect – Heavy Duty, Rain-tight Hubs,
E.G. Kit, NEMA 4 x SS Enclosure
Square D – HU Series only
- 11.3.5.24.26 Motor Junction Box JBI (NEMA 4X, 316 Stainless
Steel)
Hoffman – Bulletin A-41
Carlson
Vynckier
- 11.3.5.24.27 Control Panel (NEMA 3R, Stainless Steel with
Swing-out Deadfront Panel and 3-Point Latch)
Hoffman
May be custom fabricated by StaCon
- 11.3.5.24.28 Test Switch (Single Pole, Single Throw, Two-
Position Toggle Switch) Carlingswitch – 6FA54-73
(Spring Return)

- 11.3.5.24.29 Seal Failure Module
Syrelec – PNRU110
- 11.3.5.24.30 Seal Failure Lights (Red)
Square D – 9001KP38R9
- 11.3.5.24.31 Floats Junction Box JB2 (NEMA 4X, 316 Stainless Steel)
Hoffman Bulletin A-41
- 11.3.5.24.32 Receptacle, Control and Flowmeter Circuit Breaker
Square D – FA Type, 600-VOLT Rated
- 11.3.5.24.33 Test Lights (White, Amber, Green, Red)
Dial light – 95-5710-319X-301 (Type 757, T – 3-1/4, 28 VOLT bulb)
- 11.3.5.24.34 Flow Meter
Thermopolysonics, Model: DCT#1088
- 11.3.5.24.35 Wire Markers
Panduit Corp. – Thomas & Betts Insta-Code clip on markers.

11.3.6 Pump Station Junction Boxes

- 11.3.6.1 There shall be two junction boxes, (JB1 and JB2), NEMA 4X, constructed of 304 SS and installed under the control panel. The JB1 shall house the pump motor connections with two 2-inch PVC conduits exiting from the bottom of the box, going to the wet well. The JB2 shall house the floats connections and have one 2-inch PVC exiting from the bottom to the box, going to the wet well. There shall be a minimum of four spare wires pulled into the JB2 from the control panel.
- 11.3.6.2 Junction box shall be sized to permit at least 3-inches of spacing between terminal strips, 4-inches between conduits entering box and terminal strips, and 3-inches between the terminal strips and sides of the box. Enclosure shall be at least 6 3/4-inches deep and shall have watertight bushings and hubs at all outlets.
- 11.3.6.3 The junction boxes JB1 and JB2 shall be mounted directly under the control panel. The top of the control panel shall not be higher than 6-feet from the top of the finished concrete slab. The bottom of junction box (JB1) shall be at least 30-inches above the top of the finished slab. A minimum of 18-inches of horizontal clear mounting space shall be provided adjacent to the control panel for future telemetry cabinet installation. A sealing fitting shall be installed in each conduit connecting JB1 to the control panel.

- 11.3.6.4 Three 2-inch schedule 40 PVC conduits shall run from the junction boxes over to and through the manhole wall, with a minimum of 12-inches cover. One conduit shall contain wiring for level sensors. The remaining conduits shall contain pump wiring with one pump set per conduit. The PVC conduits shall be sized for the largest future pump wire requirements.
- 11.4 CIRCUIT BREAKERS: Thermal magnetic molded case circuit breakers shall be furnished for each motor and accessory load. Each motor breaker shall be adequately sized to meet the pump motor operating conditions and shall have a minimum symmetrical RMS interrupting rating of 18,000-amperes. All breakers shall be heavy duty Square D, 600V, H or J Frame, molded case breakers. "Q" frame breakers shall not be acceptable. The controls and the 15-AMP ground fault receptacle shall be individually controlled by circuit breakers.
- 11.4.1 The main and motor circuit breakers shall be of the thermal-magnetic, molded case type with 25,000-amperes interrupting rating (minimum) at 600-VOLTS rated. The main and emergency generator circuit breakers shall be provided with a mechanical interlock to permit connection to either the utility service or the emergency generator receptacle, but not to both at the same time.
- 11.4.2 Circuit breakers shall be quick-make and quick-break on manual, as well as, automatic operation and have inverse time characteristics, secured through the use of bimetallic tripping elements supplemented by a magnetic trip.
- 11.4.3 Multi-pole breakers shall be designed so an overload on 1 pole automatically causes all poles to open and it shall be common trip. Field installed handle ties shall not be accepted.
- 11.5 MOTOR STARTERS: An open frame, across the line, NEMA rated, magnetic motor starter Class 8536 Square "D" shall be furnished for each pump motor. Pump motor starter contacts and overload relays shall be easily replaceable without removing the motor starter from its mounted position. Overload relays, with individual protection for each leg shall be block type, utilizing melting alloy spindles and shall have visual trip indication with trip-free construction. Adjustable type overload relays, definite purpose contactors, horsepower rated conductors, relays, and fractional NEMA sizes shall not be acceptable. Starter coil voltage shall be 120-VOLTS.
- 11.6 CONCRETE BASE PAD: A concrete (3,000 PSI) pad shall be installed around panel base to extend 12-inches from each concrete mounting post or a minimum size of 30-inches by 60-inches 4-inches thick.
- 11.7 MISCELLANEOUS ELECTRICAL: (Aluminum wire is not acceptable)
- 11.7.1 If underground service is available, the "meter can" and main disconnect shall be installed by a licensed electrical contractor on the outside face of the two 6-inches x 6-inches x 10-feet pre-cast concrete post, with the control panel mounted on the inside face adjacent to the manhole. Mounting hardware shall be aluminum or stainless steel. Copper only installed in conduit. Direct burial wire shall not be accepted.

- 11.7.2 Overhead service shall have a separate concrete pole installation for the "meter can" and main disconnect, with PVC conduit connecting the control panel. Main disconnect shall be provided in a separate rain-tight steel box with provision for locking in the "on" or "off" position.
- 11.7.3 Service shall be "sized" as required but a minimum of 100-AMPS capacity.
- 11.7.4 An adequate service loop shall be provided from the dead-front swing-out panel to the control panel to protect the wire bundle from crimping or binding during door movement. The service loop shall be secured at both ends.
- 11.7.5 Main disconnects shall be fuse type and rated at 600VOLT. Note: A fused disconnect may be required before the meter on 277/480 volt services per local power company. See Detail 43
- 11.7.6 The lightning arrestor shall be mounted on the outside of the main disconnect enclosure and shall be connected to the load side of the main disconnect with leads as short and straight as possible. The secondary transient voltage surge suppressor shall be mounted inside the control panel.
- 11.7.7 Phase, neutral and equipment grounding conductors shall be color coded per the requirements of NFPA-70. The 120 VOLT control wiring shall be color coded differently than 24 VOLT control wiring. Colored tape may be used for conductors, sizes AWG #8 and larger. All control wiring shall have color coded insulation.
- 11.7.8 All conductors throughout the installation shall be copper. Aluminum wire is unacceptable.
- 11.7.9 Conductors to wet well shall be installed in minimum 2-inch schedule 40 PVC conduit with separate conduits for sensor leads and motor leads. All conduits shall be plugged with duct putty compound.
- 11.7.10 Pump Station Security Fence Enclosure Grounding:
- 11.7.10.1 The security fence enclosures around all HCUD Pump Stations shall be grounded by installing a ground rod at each of two opposite corners of the enclosure. The fence fabric shall be securely connected with (a minimum of a) #6 AWG bare copper wire bonded back to the electric service ground rods. The barbed wire shall be bonded to the ground rods as well. See Detail 41.
- 11.7.10.2 The enclosure gates shall be grounded by installing a ground rod beside each gatepost with a heavy-duty copper grounding strap connecting the gates to the ground rods.
- 11.7.10.3 All ground rods shall be $\frac{5}{8}$ -inch in diameter, copper to resist corrosion, and be of sufficient length to register a maximum of 5-ohms resistance when tested after installation. The grounding conductor shall not be smaller than a # 4 AWG bare copper and installed inside PVC conduit.

- 11.7.11 Electrical installations shall conform with NEC and any local codes having jurisdiction.
- 11.7.12 All conductors shall be stranded copper with type THHN/THWN, moisture and heat-resistant thermoplastic insulation. All control wiring shall be THHN/THWN insulated stranded copper and numbered for identification at each end. Control wire size shall be at least AWG # 16. All wiring shall be installed on the surface of the back-panel and laid in plastic raceways. Numbering of wires shall be from the meter can through the field side of the terminal strip in the junction boxes.
- 11.7.13 The pump motor power and control cable shall be the pump manufacturer's standard cable or Type W moisture and oil resistant, multi-conductor flexible power cable with identified grounding conductor suitable for extra hard duty usage in wet locations. Cable installations shall be suitable for disconnect and removal when the pump is removed and reinstalled.
- 11.7.14 A weatherproof schematic wiring diagram shall be permanently affixed to the interior of the enclosure door. For each external connection required, a separate terminal shall be provided. No double wires shall be permitted on outgoing terminals. Terminal blocks shall be located far enough away from the enclosure side(s) to permit convenient and safe connection of incoming wires. Supplementary or miscellaneous items, equipment, appurtenances, or devices necessary for or incidental to complete and functional installation, whether or not shown on the plans or addressed in the specifications, shall be provided and installed in complete accordance with the contract documents.

11.8 FLOW METERS

- 11.8.1 Reclaimed water mains shall require a Water Specialties propeller type meter with 4-20 MA output or HCUD approved equal. A bypass line to circumvent the flow meter shall be installed.
- 11.8.2 Wells shall require a Water Specialties propeller type meter with 4-20 MA output or HCUD approved equal.
- 11.8.3 Water mains leaving water plants shall require a McCrometer Ultra Mag UMO6-R or HCUD approved equal flow meter. A bypass line to circumvent the flow meter shall be installed.
- 11.8.4 Lift stations with 16 inch effluent force mains shall require a Unimag DT flow meter or HCUD approved equal. A bypass line to circumvent the flow meter shall be installed. The flow meter transmitter is preferred to be installed above ground whenever possible; if not, then in a dry vault with access lid. See Detail 6.
- 11.8.5 Non-potable water mains within a wastewater treatment plant shall require a Water Specialties propeller type meter with 4-20 MA output or HCUD approved equal.

- 11.8.6 Return activated sludge, waste activated sludge and the influent flow to the waste water treatment plants shall require a Rosemont 8705 series flow meter. The flow meter transmitter shall be a Rosemount 8723E series and it shall be mounted on a 6-inch by 6-inch concrete pole. The flow meter is preferred to be installed above ground whenever possible; if not, then in a dry vault with access lid. See Detail 6.
- 11.8.7 Wastewater treatment plant effluent mains at the chlorine contact chamber shall require a Teledyne ISCO 4200 Series ultrasonic type flow meter.
- 11.9 VARIABLE SPEED DRIVES: Variable speed drives shall have across the line by-pass capability. Acceptable variable speed drives are as follows: Magnatech (Yaskawa), Sq D, or HCUD approved equal.
- 11.10 ELECTRIC MOTORS: Electric motors shall be US, Baldor, GE, or HCUD approved equal. Electric motors shall be TEFC with cast iron or aluminum casing (rolled steel will not be acceptable).

SECTION 12

UTILITIES DEVELOPMENT REVIEW CHECK LIST

SECTION 12: UTILITIES DEVELOPMENT REVIEW CHECK LIST

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12.2 ONSITE COMMERCIAL PROJECTS NOT OWNED AND MAINTAINED BY HCUD.....	12 - 4
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SECTION 12

UTILITIES DEVELOPMENT REVIEW CHECK LIST:

The following are the standard specifications required for utility plans review by HCUD. In some instances these items are not applicable and the designer should refer to each section in the manual for allowable deviations.

12.1 Subdivision, Commercial and Offsite Utilities to be Owned and Maintained by HCUD

12.1.1 General

- ☐ Water and Sewer services are provided to all lots and/or out parcels.
- ☐ 1 inch water service is provided to the lift station.
- ☐ Water and Sewer services are located at the property line or in utility easements.
- ☐ Valves, bends, tees, etc are located in green areas not roadways.
- ☐ Valves, fittings, hydrants, etc are symbolized and labeled.
- ☐ No 90 degree bends are used (use two 45 degree bends).
- ☐ HDPE pipe, Fusible PVC pipe and/or steel casing extends 10 feet past the edge of pavement on both sides of the road in areas where drilling or boring is performed.
- ☐ Sidewalks shall be located no closer than 2.5 feet from the right of way line to allow room for water meter box installation. Water and sewer utility mains shall be placed a minimum of 3 feet away from the curb and shall not be placed within 1.5 feet of or under the sidewalk.

12.1.2 Water Mains

- ☐ Water mains constructed along local streets shall have a minimum of 36-inches of cover. Water mains constructed along arterial streets or roadways shall have a minimum of 48-inches of cover. Cover is measured from finished grade to top of pipe line.
- ☐ Valves are located to isolate no greater than 30 lots.
- ☐ Fire Hydrants are installed on no less than an 8 inch line.
- ☐ Minimum distribution line pipe size is 4 inch.
- ☐ Water mains are constructed of PVC C900.
- ☐ Cul-de-sacs are looped.
- ☐ Dead ends and cul-de-sacs have blow-off assemblies.
- ☐ Fire Hydrants are less than 600 linear feet apart in residential areas and less than 500 linear feet apart in commercial.

12.1.3 Sewer Force Mains

- ☐ Minimum pipe size is 4 inch.
- ☐ Constructed of PVC C900.
- ☐ Have a minimum of 48 inches of cover.

12.1.4 Sewer Gravity Systems

- ☐ Manhole spacing does not exceed 350 feet apart.
- ☐ Manholes and wet wells greater than 20 feet in depth are constructed of Monolithic Fiberglass.
- ☐ Double laterals are not located within drainage easements.
- ☐ Manholes 12 feet deep and greater are labeled as IET coated or monolithic fiberglass.
- ☐ Collector Manholes are IET coated or monolithic fiberglass.
- ☐ Manholes are no less than 48 inches and no greater than 30 feet in depth.
- ☐ Wet wells are no less than 48 inches and no greater than 35 feet in depth.
- ☐ Nearby laterals (usually within 50 feet) are connected directly into the manhole.
- ☐ Existing or proposed manholes receiving force main flows are to be IET coated or monolithic fiberglass.
- ☐ Proposed sewer service laterals are no more than 48-inches deep at the property line.

12.1.5 Notes and Details

- ☐ The following note is indicated on at least one utility sheet: "All installations shall meet or exceed Hernando County Utilities Department specifications as defined in the Water and Wastewater Construction Specifications Manual, (insert date of current edition) Edition/or latest edition."
- ☐ Notes pertaining to locator wire and tape are shown.
- ☐ Notes pertaining to water and sewer mains and fittings are shown on the plans (cover depth, material, testing, etc.)
- ☐ FDEP utilities separation requirements are shown on the plans.
- ☐ Notes regarding temporary water service are shown on the plans.
- ☐ Details from the current HCUD specifications manual are shown.

12.1.6 Lift Stations

- ☐ Are equipped with DFS telemetry.
- ☐ The pump has a minimum of a 4 inch discharge.
- ☐ Minimum internal piping is 4 inch, C900.
- ☐ Are equipped with an Odor Control Unit when applicable.
- ☐ Are equipped with a generator when applicable.
- ☐ The wet well is IET coated or monolithic fiberglass.

12.2 Onsite Commercial Projects Not Owned and Maintained by HCUD

12.2.1 General

- ☐ Locations and sizes of all proposed/existing water and sewer lines are shown.
- ☐ Proposed points of connection and sizes for potable and irrigation service water meters are shown.
- ☐ Proposed points of connection for sanitary sewer service & "Clean-Out" fittings are shown.
- ☐ Proposed locations and sizes of Reduced Pressure Zone-Backflow Prevention Assemblies (RPZ-BPA's) for potable, irrigation, &/or fire services are shown. Note: RPZ-BPA sizes must be equal to or greater than the proposed waterline. HCUD does not accept Double Detector Check Valve Assemblies. (DDCVA's).
- ☐ All water lines entering the property have a Reduced Pressure Zone-Backflow Prevention Assemblies (RPZ-BPA's) installed directly downstream of the water meter. Fire line RPZ's are installed directly inside the property line.
- ☐ If a well is used to supply potable &/or irrigation service, or a septic tank is proposed, note accordingly.
- ☐ Potable water meters larger than 2-inch are shown as a Neptune Tru/Flo Radio Read compound water meter. These meters are purchased & installed by the contractor. (If applicable)
- ☐ Location, type, and size of the proposed grease interceptor system (grease trap) are shown. (If applicable)
- ☐ Proposed & existing utilities/access easements are shown. (If applicable)
- ☐ A project location map is shown on all utility sheets.
- ☐ Utility details shown are the current HCUD Specification Manual version.

12.2.2 Notes

The following notes must be shown on at least one utility sheet:

- ☐ "All installations shall meet or exceed Hernando County Utilities Department specifications as defined in the Water and Wastewater Construction Specifications Manual, (insert date of current edition) Edition/or latest edition."
- ☐ Construction water shall be provided by a temporary construction water meter installed by HCUD on the closest fire hydrant to the site. Contractor is to contact HCUD's Commercial Customer Service Division to sign up for service, if construction water is required.
- ☐ Contractor shall notify HCUD Inspector 48 hours prior to utility construction in the County Right-of-Way. HCUD Inspector MUST be present for all water and sewer connections.
- ☐ HCUD shall not own, operate, or maintain on-site water &/or sewer utilities.

- ☐ Engineer/Developer/Contractor/Owner is to complete and dedicate all offsite water and/or sewer infrastructure constructed by the contractor to HCUD. Contact HCUD to obtain the contributed asset form. (If applicable)
- ☐ Contractor shall schedule a preconstruction meeting five (5) business days prior to the start of off-site utility construction. Contractor must provide the HCUD inspector with all utility submittals for approval at the preconstruction meeting. A HCUD inspector MUST attend the preconstruction meeting. (If applicable)
- ☐ Contractor to install emergency contact signage on all private liftstation control panels indicating the following: FOR EMERGENCIES CALL: (***) ***-****. Signage shall be permanent type and visible from at least 25 feet away.

12.3 Commercial Building Permit approval check list

- ☐ Construction plans have all required data & are approved by HCUD.
- ☐ Owner/Developer has completed a HCUD Utilities Fees Calculation Data Form, submitted to HCUD's Commercial Customer Service Division, paid the applicable fees, and signed a Sewer and/or Water Service Application.
- ☐ Permit is approved by HCUD for construction at the Building Department.
- ☐ A preconstruction meeting is scheduled with HCUD inspector present (Notify HCUD inspector 5 business days prior to meeting). (If applicable)
- ☐ Notify HCUD inspector 48 hours prior to utility construction in the right-of-way including all water and sewer connections.
- ☐ Water meters 2-inch and smaller as set by HCUD upon request from owner/contractor.
- ☐ Project is constructed by contractor with all water/sewer connections made with a HCUD Utility Inspector present.

12.4 Commercial Building Permit Certificate of Occupancy (C.O.) approval process:

12.4.1 The Reduced Pressure Zone Backflow Prevention Assembly (RPZ-BPA) for potable, irrigation, &/or fire services have been installed and meet the following criteria:

- ☐ USC (University of Southern California) Certified and Underwriter Laboratories (UL) approved.
- ☐ Installed per HCUD specifications and tested by a licensed plumber/BPA tester.
- ☐ Site inspected & approved by HCUD's BPA Inspector; contact BPA inspector at (352)754-4037. Note: This inspection is separate from the plumbing inspection scheduled with the Development Department.
- ☐ BPA test results have been sent to HCUD's BPA Inspector.

12.4.2 Grease Interceptor (Grease Trap) Installation & inspection criteria:

- ☐ Contact HCUD's Waste Water Operations Inspector at (352) 754-4490 to schedule an inspection of new grease trap installations.

12.4.3 Utility/Access Easements (if applicable)

- ☐ Signed easement documents have been approved by HCUD and recorded at the Clerk of Courts office. Recorded easement document copies have been provided to HCUD's Permitting and Development Review Coordinator, Scott Rimby.

12.4.4 Contributed Assets (if applicable)

- ☐ A completed contributed asset form with itemized material cost list has been submitted to and approved by HCUD. Contact HCUD Utility Inspector to obtain the contributed asset form.

12.4.5 As-built Construction Drawings (if applicable)

- ☐ Two (2) sets of 24"x36" signed and sealed As-built drawings have been submitted for review.
- ☐ Two (2) sets of AutoCAD as-built CD's with Adobe PDF's of all utility sheets have submitted for review. As-built data shown on the original site/utility plan (submitted for building permit approval).

12.4.6 Utility Infrastructure Testing

- ☐ Submitted all required pressure tests for water lines, sewer force mains, and gravity sewer lines per FDEP and HCUD requirements. (if applicable)
- ☐ Submit two (2) consecutive bacteriological samples for all contractor installed potable water lines per FDEP and HCUD requirements. (if applicable)
- ☐ Submit a copy of the sanitary sewer system visual inspection CD or DVD and report. (if applicable)

THIS FORM MUST BE RETURNED WITH YOUR SUBMITTAL

ATTACHMENT A

BID FORM

Business Name: _____
(This name must match the name on your current W9 Form. The W9 will be requested at the time of award.)

Item No.	Quantity	Description	Unit Price	Total
GRAND TOTAL				

THIS FORM MUST BE RETURNED WITH YOUR SUBMITTAL

LIQUIDATED DAMAGES

The Proposer/Contractor hereby agrees to commence work under the Independent Contractor Agreement on the date to be specified in this document below and to fully complete the Project within the Number of consecutive calendar days thereafter, as indicated within this document below.

The Proposer Bidder will commence work within SIXTY (60) calendar days after the Notice to Proceed is issued and will complete the work within THREE HUNDRED SIXTY-FIVE (365) consecutive calendar days after the Notice to Proceed is issued. The Bidder will pay as liquidated damages the sum of \$200.00 per day over the THREE HUNDRED SIXTY-FIVE (365) days agreed to for work to be completed.

Authorized Signature

Date

Print Name

**ENGINEERING ESTIMATES ONLY -
CONTRACTOR MUST PROVIDE/CONFIRM ALL AMOUNTS AND QUANTITIES**

CORTEZ BOULEVARD PUMP STATION REPLACEMENT PROJECT					
BID TAB					
ITEM	DESCRIPTION	ESTIMATED QUANTITY		UNIT PRICE	AMOUNT
LS=Lump Sum, EA=Each, LF=Linear Foot, SF=Square Foot, CY=Cubic Yard, SY=Square Yard					
I. GENERAL CONDITIONS					
1	Mobilization	1	LS		
2	Insurance, Permits, & Performance and Payment Bond	1	LS		
3	Maintenance of Traffic	1	LS		
4	Survey Layout/As-built	1	LS		
5	Pre/Post Video	1	LS		
6	Erosion Sediment Control (incl. NPDES Permit/insp rpt./NOT	1	LS		
7	Construction Material Testing	1	LS		
8	Pump Station Site Demo and Grading	1	LS		
9	Temporary Bypass Pumping	1	LS		
10	Refurbish Existing Wet Well	1	LS		
11	Manhole Rehabilitation	1	LS		
12	Connect 8" Gravity Main to Existing Manhole	1	EA		
13	Replace existing pumps with Tri-plex pump system including rails, wiring, piping, valves, fittings, core drill, conduits, etc. in wet well & valve box	3	LS		
14	Precast Valve Vault and Lid with 6'x10' Access Hatch	1	LS		
15	6-ft Diameter Concrete Manhole w/composite cover	1	LS		
16	5-ft Diameter Concrete Manhole w/composite cover	1	LS		
17	Replace Manhole Frame & Covers w/ Composite	1	EA		
18	Pump Station Electrical Control Panels & Lighting	1	LS		
19	Remove existing 12-inch fm	1	LS		
20	8" PVC C-900 DR26	73	LF		

ENGINEERING ESTIMATES ONLY -
CONTRACTOR MUST PROVIDE/CONFIRM ALL AMOUNTS AND QUANTITIES

CORTEZ BOULEVARD PUMP STATION REPLACEMENT PROJECT					
BID TAB					
ITEM	DESCRIPTION	ESTIMATED QUANTITY		UNIT PRICE	AMOUNT
21	12" PVC C-900 DR18 FM	20	LF		
22	24" DIP, CL 50, Gravity	13	LF		
23	8" 316 SS, Sch 40	46	LF		
24	8" 45-Deg Elbow, FLG, 316 SS Sch 40	2	EA		
25	8" 90-Deg Elbow, FLG, 316 SS Sch 40, Long Radius	3	EA		
26	8" 90-Deg Elbow, FLG, 316 SS Sch 40	2	EA		
27	12"x8" TEE w/Restrains	1	EA		
28	8" Gate Valve with box, FLG, DI, w/special coating	1	EA		
29	8" Gate Valve with Box and Restrains	1	EA		
30	12" 45 Deg Elbow w/ Restrains	2	EA		
31	Connect to Existing 12" FM	1	LS		
32	6" (3,000 PSI w/ Fibermesh) Concrete Driveway	3,035	SF		
33	6 " #57 Stone	200	CY		
34	6-FT High, Galvanized Interwoven Fence w/Cantilever Slide Gate	1	LS		
35	Sod Restoration of Disturbed Areas	240	SY		
SUBTOTAL					\$

LS=Lump Sum, EA=Each, LF=Linear Foot, SF=Square Foot, CY=Cubic Yard, SY=Square Yard

SUMMARY	
SUBTOTAL	\$
CONTINGENCY @ 10%	\$
ITEM TOTAL	\$

**ENGINEERING ESTIMATES ONLY -
CONTRACTOR MUST PROVIDE/CONFIRM ALL AMOUNTS AND QUANTITIES**

CORTEZ BOULEVARD PUMP STATION REPLACEMENT PROJECT

BID TAB

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT

Note: The Consultant has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions. Opinions of probable cost provided herein are based on the information known to the Consultant at this time and represent only the Consultant's judgment as a design professional familiar with the construction industry. The Consultant cannot and does not guarantee that bids or actual construction cost will not vary from that shown herein.

Coastal Engineering Associates, Inc.

September, 2022

ATTACHMENT B

AUTHORIZATION

We offer to sell/provide the City of Brooksville, Florida, the above item(s) and/or service(s) at the price(s) stated, in accordance with the terms and conditions contained herein. In addition, the item(s) and/or service(s) offered above meet all specifications contained herein or attached, unless otherwise stipulated by exception. This offer to sell/provide is firm for ninety (90) days.

MUST BE SIGNED BY AN OFFICER OF THE FIRM OR INCLUDE WRITTEN PROOF THAT THE INDIVIDUAL SIGNING HAS THE AUTHORITY TO OBLIGATE THE FIRM.

FOR SERVICES ONLY:

**VENDOR MUST BE REGISTERED ON SUNBIZ <http://www.sunbiz.org/index.html>
FLORIDA DEPARTMENT OF STATE DIVISION OF CORPORATIONS.**

(Signature of Bidder—Ink)

(Printed Name and Title)

Receipt of Addendum No. _____ through No. _____ is acknowledged.

Business Name: _____
(The Name on File with the Internal Revenue Service)

Doing Business as (Fictitious Name): _____

Business Organization: ☐ Corporation

Partnership: ☐ General ☐ Limited ☐ Limited Liability Company (LLC)

State Registered: _____ Year: _____

☐ Sole Proprietorship Owner: _____
☐ Other: _____ Fed ID # _____

☐ Local Vendor Preference (Business Tax Receipt Required with Submittal)

Telephone: _____ Email Address: _____

(Vendor Point Contact): _____

Address: _____

ATTACHMENT C
OFFEROR INFORMATION
CERTIFICATION FORM

Legal Name of Offeror. Indicate if the Offeror is a Corporation, Joint Venture, Partnership, etc.:

(This name must match the name on your current W9 Form. The W9 will be requested at time of award)

Name/title of contact person for the Offeror: _____

Business and mailing address: _____

Primary business and mailing address (if different): _____

Telephone number: _____ Email: _____

The above-named Offeror affirms and declares:

- A. That the Offeror understands all requirements of this request and states that as a serious Offeror they will comply with all the stipulations included in this request.
- B. That the Offeror is of lawful age and that no other person, firm or corporation has any interest in this Proposal or in the contract proposed to be entered into except as expressly stated below:
- C. That this proposal is made without any understanding, agreement, or connection with any other person, firm or corporation making a proposal for the same purpose, and is in all respects fair and without collusion or fraud except as expressly stated below:
- D. That the Offeror is not in arrears to the City of Brooksville upon debt or contract and is not a defaulter, as surety or otherwise, upon any obligation to the City except as expressly stated below:
- E. That no officer or employee or person whose salary is payable in whole or in part from the City of Brooksville is, will be or become interested, directly or indirectly, surety or otherwise in this response; in the performance of the resulting contract; in the purchase of supplies, materials, equipment, work and/or labor to which they relate; or in any portion of the profits thereof.
- F. That the Offeror has received and carefully examined all Addenda issued prior to the opening/closing date indicated on the cover.
- G. That by submitting a response, the Offeror certifies that it is not currently debarred

THIS FORM MUST BE RETURNED WITH YOUR SUBMITTAL

from submitting proposals for contracts issued by any political subdivision or agency of the State of Florida or Federal Government and that it is not an agent of a person or entity that is currently debarred from submitting proposals for contracts issued by any subdivision or agency of the State of Florida or Federal Government.

- H. That pursuant to Section 287.087, Florida Statutes, Offerors understand that they **may** but are not required to certify in their response (unless otherwise required in the solicitation) that they have implemented a drug free workplace program. If two or more responses are deemed equal,
preference will be given in the award process to the offeror who has furnished such certification with their response.
- I. By signing this Certification, I represent that I have the authority to bind the Offeror for contract purposes and has attached verification of such authorization.

Exceptions to any Contract Provisions and Miscellaneous Declarations (attach additional sheets, if necessary):

IN WITNESS WHEREOF, this proposal is hereby signed and sealed as of the
date indicated.

ATTEST:

OFFEROR:

Witness No. 1 Signature

BY: _____(SEAL)
Authorized Signature in Ink

Print Name of Witness

Print name of Signatory

Witness No. 2 Signature

Print Title of Signatory

Print Name of Witness

Signature Date

CORPORATE
SEAL

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ATTACHMENT D

ADDENDA ACKNOWLEDGEMENT

The undersigned acknowledges receipt of the following addenda to the (RFP-PM-245-2022) (Give number and date of each):

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

FAILURE TO SUBMIT ACKNOWLEDGEMENT OF ANY ADDENDUM THAT AFFECTS THE PROPOSAL IS CONSIDERED A MAJOR IRREGULARITY AND WILL BE CAUSE FOR REJECTION OF THE BID.

BY: _____
Signature Print Name/Title

NAME OF BUSINESS: _____

MAILING ADDRESS: _____

CITY/STATE/ZIP: _____

PHONE: _____ EMAIL ADDRESS: _____

ATTACHMENT E

DRUG FREE WORKPLACE CERTIFICATE

I, the undersigned, in accordance with Florida Statute 287.087 (2017), hereby
certify that, (print or type name of firm) _____

- Publishes a written statement notifying that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the Workplace named above and specifying actions that will be taken against violations of such prohibition.
- Informs employees about the dangers of drug abuse in the workplace, the firm's policy of maintaining a drug free working environment, and available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug use violations.
- Gives each employee engaged in providing commodities or contractual services that are under proposal or proposal, a copy of the statement specified above.
- Notifies the employees that as a condition of working on the commodities or contractual services that are under proposal or proposal, the employee will abide by the terms of the statement and will notify the employer of any conviction of, pleas of guilty or nolo contendere to, any violation of Chapter 893, or of any controlled substance law of the State of Florida or the United States, for a violation occurring in the workplace, no later than five (5) days after such conviction, and requires employees to sign copies of such written statement to acknowledge their receipt.
- Imposes a sanction on, or requires the satisfactory participation in, a drug abuse assistance or rehabilitation program, if such is available in the employee's community, by any employee who is so convicted.
- Makes a good faith effort to continue to maintain a drug free workplace through the implementation of the Drug Free Workplace program.
- "As a person authorized to sign this statement, I certify that the above-named business, firm or corporation complies fully with the requirements set forth herein".

Authorized Signature

Date

THIS FORM MUST BE RETURNED WITH YOUR SUBMITTAL

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 thirty-six (36) months shall be considered an affiliate.

☐ I understand that a "person" as defined in § 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 Proposals or applies to Proposal on Contracts for the provisions 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.

Based on information and belief, the statement which I have marked below is true in relation to the entity submitting this sworn statement: [indicate which statement applies]

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

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

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

☐ 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 DECEMBER 31, OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT I AM REQUIRED TO INFORM THE PUBLIC ENTITY PRIOR TO ENTERING INTO A CONTRACT.

Authorized Signature

Date

ATTACHMENT G

AFFIDAVIT OF NON-COLLUSION AND OF NON-INTEREST OF THE CITY OF BROOKSVILLE EMPLOYEES

Certification that Vendor/Contractor affirms that the Bid/Proposal presented to the owner is made freely, and without any secret agreement to commit a fraudulent, deceitful, unlawful or wrongful act of collusion.

_____, * being first duly sworn, deposes and says that he/she (it) is the Vendor/Contractor in the above bid/proposal, that the only person or persons interested in said proposal are named therein; that no officer, employee or agent of the City of Brooksville or of any other Vendor/Contractor is interested in said bid/proposal; and that affiant makes the above bid/proposal with no past or present collusion with any other person, firm or corporation.

Affiant Signature

Print Name/Title

*NOTICE: State name of Vendor/Contractor followed by name of authorized individual (and title) that is signing as Affiant. If Vendor/Contractor is an individual, state name of Vendor/Contractor only.

THIS FORM MUST BE RETURNED WITH YOUR SUBMITTAL

ATTACHMENT H
VENDOR INFORMATION FORM

DATE: _____

☐ **W-9 ATTACHED**

☐ **ATTACHMENTS**

VENDOR INFORMATION:

☐ New Vendor ☐ Change Information ☐ Update Vendor

Vendor Name: _____

DBA Name: _____
(If applicable/available)

FEIN/SSN Number: _____

Vendor Addresses:

Accounts Payable address: _____

City/State/Zip Code: _____

Purchase Order address: _____

City/State/Zip Code: _____

Contact Name (if applicable): _____

Vendor Telephone: _____

Vendor Email: _____

All purchase orders will be sent through email.

**ATTACHMENT I
NOTARY ACKNOWLEDGMENT**

STATE OF _____ }

} ss

COUNTY OF _____ }

The foregoing instrument was acknowledged before me by means of ☐ physical presence or ☐ online notarization on this _____ day of , 20____, by [as applicable, complete one of the choices below]:

FOR A CORPORATION OR LIMITED LIABILITY COMPANY:

[Name] _____, who executed the foregoing instrument as [Title] _____ of [Corporation or Company Name] _____, a [check one] ☐ corporation ☐ limited liability company, organized under the laws of [State] _____, and who severally and duly acknowledged the execution of such instrument as aforesaid on behalf of the corporation or limited liability company.

FOR AN INDIVIDUAL ACTING IN HIS OR HER OWN RIGHT:

[Name] _____

FOR PARTNERSHIP:

[Name] _____, Partner (or Agent), on behalf of [Name of Partnership] _____, a State of _____ partnership.

Said person is personally known to me or has produced _____ as identification on behalf of [Name, or Name of Corporation, Company, Partnership, Principal, as applicable]:

Notary Signature

Print Name

NOTARY STAMP

ATTACHMENT J
BID PROPOSAL CHECKLIST



Bid Proposal Checklist for:

City of Brooksville
RFP-DPW-2025-0006
Cortez Blvd Pump Station Replacement Project

	ATTACHMENT	Description
☐	A	BID FORM
☐	B	AUTHORIZATION
☐	C	OFFEROR INFORMATION/CERTIFICATION FORM
☐	D	ADDENDA ACKNOWLEDGEMENT
☐	E	DRUG FREE WORKPLACE CERTIFICATE
☐	F	PUBLIC ENTITY CRIMES
☐	G	AFFIDAVIT OF NON-COLLUSION AND OF NON-INTEREST
☐	H	VENDOR INFORMATION FORM
☐	I	NOTARY ACKNOWLEDGMENT
☐	J	BID PROPOSAL CHECKLIST
☐	BID BOND	
☐	1 Original proposal and 3 copies in a sealed envelope	

INDEPENDENT CONTRACTOR'S AGREEMENT

Cortez Blvd Pump Station Replacement Project

THIS INDEPENDENT CONTRACTOR'S AGREEMENT (hereinafter this "Agreement") is made and entered into this _____ day of _____ 2025, by and between **CITY OF BROOKSVILLE**, a municipal corporation of the State of Florida (hereinafter the "CITY") and **TBD** a Florida corporation (hereinafter "CONTRACTOR").

WITNESSETH

WHEREAS, the CITY is a municipal corporation in the State of Florida, having a responsibility to provide certain services to benefit the citizens of City of Brooksville; and

WHEREAS, the CITY has the full power and authority to enter into the transactions contemplated by this Agreement; and

WHEREAS, CONTRACTOR is in the business of general contracting in City of Brooksville and elsewhere in the State of Florida; and

WHEREAS, CONTRACTOR is competent and has sufficient manpower, training, and technical expertise to perform the services contemplated by this Agreement in a timely and professional manner consistent with the standards of the industry in which CONTRACTOR operates; and

WHEREAS, CONTRACTOR was the successful bidder of a project competitively bid and identified as RFP-DPW-2025-0004 which satisfies the CITY's Procurement Policy; and

WHEREAS, CONTRACTOR agrees to provide such goods and services as more particularly described in this Agreement, as well as in any bid or proposal documents issued in connection with this project.

WHEREAS, Section 119.0701, Fla. Stat., requires that certain public agency contracts must include certain statutorily required provisions concerning the contractor's compliance for Florida's Public Records Act; and

WHEREAS, Section 768.28, Fla. Stat., sets forth certain mandatory limitations on indemnification and liability for Florida public agencies; and

WHEREAS, Florida law requires that public agency contracts be subject to non-appropriation and thereby contingent upon appropriation during the public agency's statutorily mandated annual budget approval process; and

WHEREAS, Section 448.095, Fla. Stat., imposes certain obligations on public agencies with regard to the use of the E-Verify system by their contractors and subcontractors; and

WHEREAS, Section 287.133 and 287.135, Fla. Stat., provides restrictions on local governments contracting with companies that are on certain Scrutinized Companies lists or convicted vendor list; and

WHEREAS, additional terms consistent with Sections 282.3185(5) and (6) related to data management and Section 287.05701 related to social government and corporate activism are also added by virtue of this Addendum; and

INDEPENDENT CONTRACTOR'S AGREEMENT

Cortez Blvd Pump Station Replacement Project

WHEREAS, Section 286.101, Florida Statutes contains a list of "foreign countries of concern" including, the People's Republic of China, the Russian Federation, the Islamic Republic of Iran, the Democratic People's Republic of Korea, the Republic of Cuba, the Venezuelan regime of Nicolás Maduro, or the Syrian Arab Republic, including any agency of or any other entity under significant control of such "foreign country of concern". Any entity that does business with a state agency or political subdivision must disclose certain of their dealings with those "foreign countries of concern" to the Florida Department of Financial Services; and

WHEREAS, Section 787.06(13), Florida Statutes provides that when a contract is executed, renewed, or extended between a nongovernmental entity and a governmental entity, the nongovernmental entity must provide the governmental entity with an affidavit signed by an officer or a representative of the nongovernmental entity under penalty of perjury attesting that the nongovernmental entity does not use coercion for labor or services as defined in such statute.

NOW THEREFORE in consideration of the premises, and in consideration of the mutual conditions, covenants, and obligations hereafter expressed, the parties agree as follows:

1. **Acceptance of work product, payment, and warranty.** Upon receipt of a periodic work product or notice that work has progressed to a point of payment in accordance with Attachment "A" attached or the Bid Documents, if any, together with an invoice sufficiently itemized to permit audit, the CITY will diligently review those documents. When it finds the work acceptable under this Agreement the installment payment, found to be due to CONTRACTOR, will be paid to CONTRACTOR within thirty (30) days after the date of receipt of the invoice, unless another payment schedule is provided in Attachment "A". CONTRACTOR warrants that the data utilized by CONTRACTOR (other than as provided by the CITY) is from a source, and collected using methodologies, which are generally recognized in CONTRACTOR's industry or profession to be a reliable basis and foundation for CONTRACTOR's work product. CONTRACTOR must notify the CITY in writing if it appears, in CONTRACTOR's professional judgement that the data or information provided by the CITY for use in CONTRACTOR's work product is incomplete, defective, or unreliable. CONTRACTOR guarantees to amend, revise, or correct to the satisfaction of the CITY any error appearing in the work as a result of CONTRACTOR's failure to comply with the warranties and representations contained herein. Neither inspection nor payment, including final payment, by the CITY will relieve CONTRACTOR from its obligations to do and complete the work product in accordance with this Agreement.

2. **Commencement and completion/Term.** ☒ Yes ☐ No

CONTRACTOR must commence work under this Agreement within sixty (60) calendar days upon receipt by CONTRACTOR of the Notice to Proceed, and must complete the work not later than three hundred sixty-five (365) consecutive days after the Notice to Proceed is issued.

3. **Description of Work.**

- a. The CITY hereby retains CONTRACTOR to furnish services as described in the Scope of Services, which is attached hereto as Attachment "A" and incorporated herein by reference. Any conflict between the terms and conditions in the body of this Agreement and the terms and conditions set forth in Attachment "A" will be resolved in favor of the body of this Agreement.

INDEPENDENT CONTRACTOR'S AGREEMENT

Cortez Blvd Pump Station Replacement Project

- b. CONTRACTOR must provide all permits, labor, materials, equipment, and supervision necessary for the completion of the Scope of Services, unless specifically excluded.
- c. CONTRACTOR must also comply with, and abide by, all requirements as contained in any invitation to bid (ITB), request for proposals (RFP), request for qualifications (RFQ), bid specifications, engineering plans, shop drawings, material lists, or other similar documents issued for this project by the CITY, together with any addenda, hereinafter the "Bid Documents, as applicable." The Bid Documents, if applicable, are hereby incorporated into this Agreement by reference and are declared to be material part of this Agreement.

4. **Federal or State Funding.** If any portion of the funding for this Agreement is derived from the State of Florida, or any department of the State of Florida, or from federal funding through the State of Florida, the provisions of this sub-paragraph shall apply, provisions elsewhere in this Agreement to the contrary notwithstanding. CONTRACTOR shall make inquiry from the CITY's Project Manager to determine whether Federal or State funding is applicable to this Agreement.

Federal Aid Construction Contract

☐ Yes

☒ NO

Federal-aid construction projects shall be subject to the provisions in Attachment "A" which is attached hereto and incorporated herein by reference.

5. **Bond.**

Performance Bond:

☒ YES

☐ NO

A Performance Bond, in the amount of 100 percent of the bid, shall be required of the successful Proposer/Contractor to ensure satisfactory completion of the work. The bond shall be a Corporate Surety Bond issued by a surety company authorized to do business in the State of Florida. The Attorney in Fact, who signs the bond, must file with the bond, a certificate and effective dated copy of a Power of Attorney. The surety company shall have a current, valid Certificate of Authority issued by the State of Florida. The surety company shall have current, valid Certificate of Authority issued by the United States Treasury Department under Sections 9304 to 9308 of Title 31 of the U.S. Code. The surety company shall be in full compliance with the provisions of the Florida Insurance Administrative Code and shall have at least twice the minimum surplus and capital required by the same at the time the Invitation for Bid is issued.

The Proposer/Contractor shall record the Performance Bond in Hernando County public records as required by §255.05 Florida Statutes. The Proposer/Contractor shall furnish a certified copy of the recorded Performance Bond to the City before the Notice to Proceed, when required, or before payment will be issued. The failure of the Proposer/Contractor to accept an award and file and provide an acceptable Performance Bond within fifteen (15) days after receipt of contract but prior to any work activities shall be just cause for cancellation of the award and the forfeiture of the bid surety to the City of Brooksville as liquidated damages. Award may then be made to the next, lowest, responsive, and responsible Proposer/Contractor.

INDEPENDENT CONTRACTOR'S AGREEMENT

Cortez Blvd Pump Station Replacement Project

Payment Bond: ☒ **YES** ☐ **NO**

A Payment Bond, in the amount of 100 percent of the bid, shall be required of the successful CONTRACTOR to guarantee payment of all persons who have and fulfill contracts with the CONTRACTOR for performing labor or providing equipment or material in the performance of the work provided for in the contract. The bond shall be a Corporate Surety Bond issued by a surety company authorized to do business in the State of Florida. The Attorney in Fact, who signs the bond, must file with the bond, a certificate and effective dated copy of Power of Attorney. The surety company shall have a current, valid Certificate of Authority issued by the State of Florida. The surety company shall have current, valid Certificate of Authority issued by the United States Treasury Department under Sections 9304 to 9308 of Title 31 of the U.S. Code. The surety company shall be in full compliance with the provisions of the Florida Insurance Administrative Code and shall have at least twice the minimum surplus and capital required by the same at the time the Invitation for Bid is issued.

The Proposer/Contractor shall record the Payment Bond in Hernando County public records as required by §255.05 Florida Statutes. The Proposer/Contractor shall furnish a certified copy of the recorded Payment Bond to the City before the Notice to Proceed, when required, or before payment will be issued. The failure of the Proposer/Contractor to accept an award and file and provide an acceptable Payment Bond within fifteen (15) days after receipt of contract but prior to any work activities shall be just cause for cancellation of the award and the forfeiture of the bid surety to the City of Brooksville as liquidated damages. Award may then be made to the next, lowest, responsive, and responsible Proposer/Contractor.

The CITY will not make any payment to CONTRACTOR, nor will any payment be deemed to be due to CONTRACTOR, until such surety for the faithful payment and performance of the work is furnished in a manner and form satisfactory to the CITY.

6. **Independent contractor.**

a. CONTRACTOR is, and will be deemed to be, an independent contractor and not a servant, employee, joint adventurer, or partner of the CITY. None of CONTRACTOR's agents, employees, or servants are, or will be deemed to be, the agent, employee, or servant of the CITY. None of the benefits, if any, provided by the CITY to its employees, including but not limited to, compensation insurance and unemployment insurance, are available from the CITY to the employees, agents, or servants of CONTRACTOR. CONTRACTOR will be solely and entirely responsible for its acts and for the acts of its agents, employees, servants, and subcontractors during the performance of this Agreement. Although CONTRACTOR is an independent contractor, the work contemplated herein must meet the approval of the CITY and is subject to the CITY's general right of inspection to secure the satisfactory completion thereof. CONTRACTOR must comply with all Federal, State and municipal laws, rules and regulations that are now or may in the future become applicable to CONTRACTOR, or to CONTRACTOR's business, equipment, or personnel engaged in operations covered by this Agreement or accruing out of the performance of such operations. The CITY will not be held responsible for the collection of or the payment of taxes or contributions of any nature on behalf of CONTRACTOR.

INDEPENDENT CONTRACTOR'S AGREEMENT

Cortez Blvd Pump Station Replacement Project

- b. CONTRACTOR will bear all losses resulting to it on account of the amount or character of the work, or because of bad weather, or because of errors or omissions in its contract price.

7. **Insurance.**

- a. CONTRACTOR must maintain such insurance as will fully protect both CONTRACTOR and the CITY from any and all claims under any Workers Compensation Act or Employers Liability Laws, and from any and all other claims of whatsoever kind or nature to the damage or property, or for personal injury, including death, made by anyone whomsoever, that may arise from operations carried on under this Agreement, either by CONTRACTOR, any subcontractor, or by anyone directly or indirectly engaged or employed by either of them.

- b. The insurance coverage required by this Agreement must not be less than the amounts described in the Bid Documents. If the Bid Documents do not state an insurance requirement or the amount of insurance, then the amount of insurance required by this Agreement must not be less than:

i. WORKERS' COMPENSATION:

Coverage is to apply for all employees for statutory limits in compliance with the applicable state and federal laws. The policy must include Employers' Liability with a limit of \$500,000 each accident, \$500,000 each employee, \$500,000 policy limit for disease.

ii. COMMERCIAL GENERAL LIABILITY - OCCURRENCE FORM REQUIRED:

CONTRACTOR shall maintain commercial general liability (CGL) insurance with a limit of not less than \$500,000 each occurrence. If such CGL insurance contains a general aggregate limit, it shall apply separately to this location/project in the amount of \$1,000,000. Products and completed operations aggregate shall be \$1,000,000. CGL insurance shall be written on an occurrence form and shall include bodily injury and property damage liability for premises, operations, independent contractors, products and completed operations, contractual liability, broad form property damage and property damage resulting from explosion, collapse or underground (x, c, u) exposures, personal injury and advertising injury. Damage to rented premises shall be included at \$100,000.

iii. COMMERCIAL AUTOMOBILE LIABILITY INSURANCE:

CONTRACTOR shall maintain automobile liability insurance with a limit of not less than \$1,000,000 each accident for bodily injury and property damage liability. Such insurance shall cover liability arising out of any auto (including owned, hired and non-owned autos.) The policy shall be endorsed to provide contractual liability coverage.

- iv. BUILDERS RISK INSURANCE ☒ Yes ☐ No

When a contract includes **construction of and/or additions to above ground buildings or structures**, Builders Risk coverage must be provided. Contract

INDEPENDENT CONTRACTOR'S AGREEMENT

Cortez Blvd Pump Station Replacement Project

specifications should state whether the owner or contractor takes out this policy. The contract should specify a waiver of subrogation between the owner and contractor to the extent that damage to the project is covered by insurance. The contractor shall purchase and maintain Builders Risk Insurance to cover the subject property for all risks of loss, subject to a waiver of coinsurance, and covering off-site storage, transit and installation risks. The policy is to be endorsed to cover the interests of all parties, including the Entity and all contractors and subcontractors. The insurance is to be endorsed to cover testing and to grant permission to occupy the facility under construction/renovation during such activity.

1. EVIDENCE OF INSURANCE.

The CONTRACTOR shall furnish the City of Brooksville with Certificates of Insurance. The Certificates are to be signed by a person authorized by that insurer to bind coverage on its behalf. The City of Brooksville is to be specifically included as an additional insured on all policies except Worker's Compensation. In the event the insurance coverage expires prior to the completion of the projects, a renewal certificate shall be issued 30-days prior to said expiration date. The policy shall provide a 30-day notification clause in the event of cancellation or modification to the policy. All certificates of insurance must be on file with and approved by the City of Brooksville before the commencement of any work activities.

- c. The insurance coverages procured by CONTRACTOR as required herein will be considered as primary insurance over and above any other insurance, or self-insurance, available to CONTRACTOR, and any other insurance, or self-insurance available to CONTRACTOR will be considered secondary to, or in excess of, the insurance coverage(s) procured by CONTRACTOR as required herein.

8. **Liquidated Damages.** ☒ Yes ☐ No

Liquidated damages shall apply to compensate for delays. The parties acknowledge and agree that the damages to the CITY associated with any delay in completion of the Project are not readily ascertainable as of the time of execution of this Agreement, and concur that the sum of \$200.00 per day, bears a reasonable relationship to the actual damages which the CITY would suffer as a consequence of any such delay in completion of the Work. The parties agree that such sums are reasonable and would not constitute a penalty against the CONTRACTOR. In arriving at these sums, consideration has been given to the loss to the public of the use of the Project due to delay, the additional administrative costs caused by any delay, higher labor and material costs associated with delay, risks associated with litigation from delay, and other factors.

Failure to complete the Work by any Milestone Date(s) set forth in this Agreement up to and including that for Final Completion, therefore, shall entitle the CITY to deduct these sums from the Contract Price for each day of delay in meeting each such Milestone Date. The amounts of Liquidated Damages for individual Milestone Dates are additive for each day of delay they are concurrently in effect.

INDEPENDENT CONTRACTOR'S AGREEMENT

Cortez Blvd Pump Station Replacement Project

The Procurement Officer will issue a letter in writing within thirty (30) days after the intermediate Milestone Date, Substantial Completion Date, or Final Completion Date notifying the CONTRACTOR that liquidated damages will be assessed each calendar day until the work is completed and accepted by the CITY Representative for substantial or final completion date whichever one applies. Liquidated damages shall be deducted at the daily rate in the amount stated in the Contract Documents from any monies due the CONTRACTOR. The City Manager, however, retains discretion to recommend to the Council that any portion or all of the liquidated damages be waived in order to advance the best interests of the City.

The Bidder will pay as liquidated damages the sum of \$200.00 per day over the 365 days agreed to for work to be completed.

9. **Personal nature of Agreement; Assignment.**

- a. The parties acknowledge that the CITY places great reliance and emphasis upon the knowledge, expertise, training, and personal abilities of CONTRACTOR. Accordingly, this Agreement is personal, and CONTRACTOR is prohibited from assigning or delegating any rights or duties hereunder without the specific written consent of the CITY.
- b. If CONTRACTOR requires the services of any subcontractor or professional associate in connection with the work to be performed under this Agreement, CONTRACTOR must obtain the written approval of the CITY Project Manager prior to engaging such subcontractor or professional associate. CONTRACTOR will remain fully responsible for the services of any subcontractors or professional associates.

10. **General Provisions.** CONTRACTOR must comply with the following general provisions:

- A. **Compliance with Laws.** In providing the Scope of Services, CONTRACTOR must comply with all federal, state, and local laws, statutes, ordinances, rules, and regulations pertaining to or regulating the provision of such services, including those now in effect and hereafter adopted.
- B. **Data Management; Notice of Breach.** Contractor shall cooperate with the City and provide timely incident reporting, response activities/fact gathering, public and agency notification, severity level assessment, after-action reports, etc., which the City must report in accordance with Sections 282.3185(5) & (6), Florida Statutes in the event of a data breach.
- C. **Discrimination.** CONTRACTOR shall not discriminate against any employee employed in the performance of this Agreement, or against any applicant for employment because of age, ethnicity, race, religious belief, disability, national origin, or sex. CONTRACTOR shall not exclude any person, on the grounds of age, ethnicity, race, religious belief, disability, national origin, or sex, from participation in, denied the benefits of, or be otherwise subjected to discrimination in any activity under, this Agreement.

CONTRACTOR shall provide a harassment-free workplace, with any allegation of harassment given priority attention and action by management.

INDEPENDENT CONTRACTOR'S AGREEMENT

Cortez Blvd Pump Station Replacement Project

D. Indemnification.

- a. CONTRACTOR indemnifies and holds the CITY harmless against and from any and all claims, losses, penalties, interest, demands, judgments, costs, damages, or expenses incurred by the CITY, or its agents, officers, or employees, arising directly or indirectly from CONTRACTOR's performance under this Agreement or by any person on CONTRACTOR's behalf, including but not limited to those claims, losses, penalties, interest, demands, judgments, costs, damages, or expenses arising out of any accident, casualty, or other occurrence causing injury to any person or property. This includes persons employed or utilized by CONTRACTOR (including CONTRACTOR's agents, employees, and subcontractors). CONTRACTOR further indemnifies the CITY against any claim that any product purchased or licensed by the CITY from CONTRACTOR under this Agreement infringes a United States patent, trademark, or copyright. CONTRACTOR acknowledges that CONTRACTOR has received consideration for this indemnification, and any other indemnification of the CITY by CONTRACTOR provided for within the Bid Documents, the sufficiency of such consideration being acknowledged by CONTRACTOR, by CONTRACTOR's execution of this Agreement. CONTRACTOR's obligation will not be limited by, or in any way to, any insurance coverage or by any provision in or exclusion or omission from any policy of insurance, whether such insurance is in connection with this Agreement or otherwise. Such indemnification is in addition to any and all other legal remedies available to the CITY and not considered to be the CITY's exclusive remedy.
- b. In the event that any claim in writing is asserted by a third party which may entitle the CITY to indemnification, the CITY must give notice thereof to CONTRACTOR, which notice must be accompanied by a copy of statement of the claim. Following the notice, CONTRACTOR has the right, but not the obligation, to participate at its sole expense, in the defense, compromise or settlement of such claim with counsel of its choice. If CONTRACTOR does not timely defend, contest, or otherwise protect against any suit, action or other proceeding arising from such claim, or in the event the CITY decides to participate in the proceeding or defense, the CITY will have the right to defend, contest, or otherwise protect itself against same and be reimbursed for expenses, costs and attorneys fees upon not less than ten (10) days' notice to CONTRACTOR, to make any reasonable compromise or settlement thereof. In connection with any claim as aforesaid, the parties hereto must cooperate fully with each other and make available all pertinent information necessary or advisable for the defense, compromise or settlement of such claim.
- c. The indemnification provisions of this paragraph will survive the termination of this Agreement.

- E. Compliance/Consistency with Section 768.28, Fla. Stat.** Any indemnification or agreement to defend or hold harmless by City specified in the Agreement shall not be construed as a waiver of City's sovereign immunity, and shall be limited to such indemnification and liability limits consistent with the requirements of Section 768.28, Fla. Stat. and subject to the procedural requirements set forth therein. Any other purported indemnification by City in the Agreement in derogation hereof shall be void and of no force or effect.

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F. Disclosure Requirements for "Foreign Countries of Concern". CONTRACTOR shall comply with the disclosure requirements set forth in section 286.101 (3) (a), F.S., which requires "Any entity that applies to a state agency or political subdivision for a grant or proposes having a contract value of \$100,000 or more shall disclose to the state agency or political subdivision any current or prior interest of, any contract with, or any grant or gift received from a "foreign country of concern" if such interest, contract, grant or gift received from a "foreign country of concern" if such interest, contract, grant or gift has a value of \$50,000 or more and such interest existed at any time or such contract, grant or gift was received or in force at any time during the previous five (5) years. Such disclosure shall contain the name and mailing address of the disclosing entity, the amount of the gift or the value of the interest disclosed, the applicable "foreign country of concern" and, if applicable the date of termination of the contract or interest, the date of receipt of the grant or gift and the name of the agent or controlled entity that is the source or interest holder. Within one (1) year before applying for any grant or proposing any contract, such entity must provide a copy of such disclosure to the Department of Financial Services". Pursuant to section 268.101(7), F.S.: "In addition to any fine assessed under [section 286.101(7)(a), F.S.], a final order determining a third or subsequent violation by an entity other than a state agency or political subdivision shall automatically disqualify the entity from eligibility for any grant or contract funded by a state agency or any political subdivision until such ineligibility is lifted by the Administration Commission for good cause."

G. Public Records Compliance.

Contractor agrees that, to the extent that it may "act on behalf" of the City within the meaning of Section 119.0701(1)(a), Florida Statutes in providing its services under this Agreement, it shall:

- (a) Keep and maintain public records required by the public agency to perform the service.
- (b) Upon request from the public agency's custodian of public records, provide the public agency with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in this chapter or as otherwise provided by law.
- (c) 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 contract term and following completion of the contract if the contractor does not transfer the records to the public agency.
- (d) Upon completion of the contract, transfer, at no cost, to the public agency all public records in possession of the contractor or keep and maintain public records required by the public agency to perform the service. If the contractor transfers all public records to the public agency upon completion of the contract, 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 contract, the contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the public agency, upon request from the City's custodian of

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public records, in a format that is compatible with the information technology systems of the City.

- (e) Pursuant to Section 119.0701(2)(a), Fla. Stat., **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 THE CUSTODIAN OF PUBLIC RECORDS AT:**

CITY HALL
201 HOWELL AVENUE
BROOKSVILLE, FL 34601
352-540-3816
JBATTISTA@CITYOFBROOKSVILLE.US

- H. **Public Records Compliance Indemnification.** Contractor agrees to indemnify and hold the City harmless against any and all claims, damage awards, and causes of action arising from the contractor's failure to comply with the public records disclosure requirements of Section 119.07(1), Florida Statutes, or by contractor's failure to maintain public records that are exempt or confidential and exempt from the public records disclosure requirements, including, but not limited to, any third party claims or awards for attorneys' fees and costs arising therefrom. Contractor authorizes the public agency to seek declaratory, injunctive, or other appropriate relief against Contractor in Hernando County Circuit Court on an expedited basis to enforce the requirements of this section.
- I. **E-Verify Compliance.** By entering into this Agreement, the Contractor is obligated to comply with the provisions of Section 448.095, Florida Statutes "Employment Eligibility," as amended from time to time. This includes but is not limited to register with and use the E-Verify System to verify the work authorization status of all newly hired employees, and requiring all subcontractors to provide an affidavit to Contractor attesting that the subcontractor does not employ, contract with, or subcontract with, an unauthorized alien. Contractor agrees to maintain a copy of such affidavit for the duration of this Agreement. Failure to comply with this paragraph will result in the termination of this Agreement as provided in Section 448.095, Florida Statutes, as amended and Contractor will not be awarded a public contract for at least one (1) year after the date on which the Agreement was terminated. Contractor will also be liable for any additional costs to the City as a result of the termination of this Agreement in accordance with this paragraph. Contractor affirmatively states, under penalty of perjury, that in accordance with Section 448.095, Florida Statutes, Contractor is registered with and uses the E-Verify system to verify the work authorization status of all newly hired employees, that in accordance with such statute, Contractor requires from each of its subcontractors an affidavit stating that the subcontractor does not employ, contract with, or subcontract with an unauthorized alien, and that Contractor is otherwise in compliance with Sections 448.09 and 448.095, Florida Statutes.

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- J. **Agency.** CONTRACTOR agrees and acknowledges that it, its employees, and its subcontractors are not agents or employees of the Federal Government, of the State of Florida, or of any department of the Federal Government or the State of Florida.
- K. **Inspections.** CONTRACTOR shall permit, and require its subcontractors to permit, the CITY's and the State of Florida's authorized representatives to inspect all work, materials, payrolls, and records, to audit the books, records, and accounts pertaining to the financing and development of the Services described in the Contract Documents.
- L. **Auditor General Cooperation.** CONTRACTOR shall comply with §20.055 (5), Florida Statutes, and shall incorporate in all subcontracts the obligation to comply with §20.055 (5), Florida Statutes.
- M. **Non-appropriation.** CITY'S performance and obligation to pay under this Agreement is contingent upon an appropriation during the CITY's annual budget approval process. If funds are not appropriated for a fiscal year, then the CONTRACTOR shall be notified as soon as is practical by memorandum from the City Manager or designee that funds have not been appropriated for continuation of the Agreement, and the Agreement shall expire at the end of the fiscal year for which funding has been appropriated. The termination of the Agreement at fiscal year-end shall be without penalty or expense to the CITY subject to the CITY paying all invoices for services rendered during the period the Agreement was funded by appropriations.
- N. **Compliance/Consistency with Scrutinized Companies Provisions of Florida Statutes.** Section 287.135(2)(a), Florida Statutes, prohibits a company from bidding on, submitting a proposal for, or entering into or renewing a contract for goods or services of any amount if, at the time of contracting or renewal, the company is on the Scrutinized Companies that Boycott Israel List, created pursuant to section 215.4725, Florida Statutes, or is engaged in a boycott of Israel. Section 287.135(2)(b), Florida Statutes, further prohibits a company from bidding on, submitting a proposal for, or entering into or renewing a contract for goods or services over one million dollars (\$1,000,000) if, at the time of contracting or renewal, the company is on either the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, both created pursuant to section 215.473, Florida Statutes, or the company is engaged in business operations in Cuba or Syria. CONTRACTOR hereby certifies that CONTRACTOR is not listed on any of the following: (i) the Scrutinized Companies that Boycott Israel List, (ii) Scrutinized Companies with Activities in Sudan List, or (iii) the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List. CONTRACTOR further hereby certifies that CONTRACTOR is not engaged in a boycott of Israel or engaged in business operations in Cuba or Syria. CONTRACTOR understands that pursuant to section 287.135, Florida Statutes, the submission of a false certification may subject CONTRACTOR to civil penalties, and/or costs. CONTRACTOR further understands that any contract with CITY for goods or services of any amount may be terminated at the option of CITY if CONTRACTOR (i) is found to have submitted a false certification, (ii) has been placed on the Scrutinized Companies that Boycott Israel List, or (iii) is engaged in a boycott of Israel. And, in addition to the foregoing, if the amount of the contract is one million dollars (\$1,000,000) or more, the contract may be terminated at the option of CITY if the company is found to

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have submitted a false certification, has been placed on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or has been engaged in business operations in Cuba or Syria.

- O. **Miscellaneous Provisions.** The following miscellaneous provisions apply to this Agreement: TBD
- P. **Binding Nature of Agreement.** This Agreement is binding upon the successors and assigns of the parties hereto.
- Q. **Entire Agreement.** This Agreement states the entire understanding between the parties and supersedes any written or oral representations, statements, negotiations, or agreements to the contrary. CONTRACTOR recognizes that any representations, statements, or negotiations made by the CITY staff do not suffice to legally bind the CITY in a contractual relationship unless they have been reduced to writing, authorized, and signed by the authorized CITY representatives.
- R. **Amendment.** No modification, amendment, or alteration in the terms or conditions of this Agreement will be effective unless contained in a written document executed with the same formality as this Agreement.
- S. **Severability.** If any term or provision of this Agreement is held, to any extent, invalid or unenforceable, as against any person, entity, or circumstance during the Term hereof, by force of any statute, law, or ruling of any forum of competent jurisdiction, such invalidity will not affect any other term or provision of this Agreement, to the extent that the Agreement will remain operable, enforceable, and in full force and effect to the extent permitted by law.
- T. **Construction.** If any provision of this Agreement becomes subject to judicial interpretation, the court interpreting or considering such provision should not apply the presumption or rule of construction that the terms of this Agreement be more strictly construed against the party which itself or through its counsel or other agent prepared it. All parties hereto have participated in the preparation of the final form of this Agreement through review by their respective counsel, if any, or the negotiation of specific language, or both, and, therefore, the application of such presumption or rule of construction would be inappropriate and contrary to the intent of the parties.
- U. **Environmental and Social Government and Corporate Activism.** The City has not given preference or requested documentation from the Contractor based on Contractor's social, political or ideological interest. Contractor agrees to similarly not request documentation or give preference to any subcontractor based on the subcontractor's social, political or ideological interests.
- V. **Headings.** All headings in this Agreement are for convenience only and are not to be used in any judicial construction or interpretation of this Agreement or any paragraph.

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- W. **Waiver.** The indulgence of either party with regard to any breach or failure to perform any provision of this Agreement does not constitute a waiver of the provision or any portion of this Agreement, either at the time the breach or failure occurs or at any time throughout the term of this Agreement. The review of, approval of, or payment for any of CONTRACTOR's work product, services, or materials does not operate as a waiver, and should not be construed as a waiver, of any of the CITY's rights under this Agreement, or of any cause of action the CITY may have arising out of the performance of this Agreement.
- X. **Force Majeure.** Notwithstanding any provisions of this Agreement to the contrary, the parties will not be held liable if failure or delay in the performance of this Agreement arises from fires, floods, strikes, embargos, acts of the public enemy, unusually severe weather, outbreak of war, restraint of government, riots, civil commotion, force majeure, act of God, or for any other cause of the same character which is unavoidable through the exercise of due care and beyond the control of the parties. This provision does not apply if the "Scope of Services" of this Agreement specifies that performance by CONTRACTOR is specifically required during the occurrence of any of the events mentioned.
- Y. **Attorney's Fees and Costs.** Notwithstanding any other provision to the contrary, if litigation ensues regarding this Agreement, each party hereto shall bear its own attorney's fees and costs.
- Z. **Venue and Jurisdiction.** Notwithstanding any other provision to the contrary, this Agreement and the parties' actions under this Agreement shall be governed by and construed under the laws of the state of Florida, without reference to conflict of law principles. As a material condition of this Agreement, each Party hereby irrevocably and unconditionally: i) consents to submit and does submit to the jurisdiction of the Circuit Court in and for Hernando County, Florida for any actions, suits or proceedings arising out of or relating to this Agreement.
- AA. **No coercion for labor or services.** The Contractor swears under penalty of perjury that the Contractor does not use coercion for labor or services as defined as follows:
- a. "Coercion" means:
 1. Using or threatening to use physical force against any person;
 2. Restraining, isolating, or confining or threatening to restrain, isolate, or confine any person without lawful authority and against her or his will;
 3. Using lending or other credit methods to establish a debt by any person when labor or services are pledged as a security for the debt, if the value of the labor or services as reasonably assessed is not applied toward the liquidation of the debt, the length and nature of the labor or services are not respectively limited and defined;
 4. Destroying, concealing, removing, confiscating, withholding, or possessing any actual or purported passport, visa, or other immigration document, or any other actual or purported government identification document, of any person;
 5. Causing or threatening to cause financial harm to any person;
 6. Enticing or luring any person by fraud or deceit; or
 7. Providing a controlled substance as outlined in Schedule I or Schedule II of Sec. 893.03, Fla. Stat. to any person for the purpose of exploitation of that person.

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BB. Notices. All notices to the parties under this Agreement must be in writing and sent certified mail to:

- a. To CITY: City Manager, City of Brooksville, 201 Howell Ave., Brooksville, FL 34601
- b. To CONTRACTOR: TBD

CC. Payment.

- a. The CITY agrees to compensate CONTRACTOR, for work actually performed under this Agreement, at the rate or basis described in Attachment "A", which is attached hereto and incorporated herein by reference. CONTRACTOR must perform all work required by the Scope of Services, but in no event will CONTRACTOR be paid more than the negotiated amount set forth in Attachment "A".
- b. Progress payments, if any, will be made as set forth in Attachment "A".
- c. The CITY reserves the right to ratably withhold amounts in the event of the nonperformance of all or part of CONTRACTOR's obligations. CONTRACTOR must, without additional compensation, correct and revise any errors, omissions, or other deficiencies in its work product, services, or materials arising from the error or omission or negligent act of CONTRACTOR.

DD. Public Entities Crime or Convicted Vendor List. Contractor agrees and assumes a continuous duty to disclose to the City if the Contractor or any of its affiliates as defined by Section 287.133(1)(a), Florida Statutes are placed on the Convicted Vendor List or the Antitrust Violator Vendor List maintained by the Florida Department of Management Services. **Recitals.** The foregoing recitals are true and correct, constitute a material inducement to the parties to enter into this Agreement and are hereby ratified and made a part of this Agreement.

EE. Special Provisions. This Agreement is a non-exclusive contract; the CITY is not prohibited, or deemed to be prohibited, from bidding similar services either as an independent job or a component of a larger project.

FF. Taxes. The City shall not be liable for any taxes and assessments imposed by a federal, state or local governmental agency to the extent that the City is exempt from same by Florida law, including but not limited to any sales or use tax.

GG. Termination.

- a. Termination at Will: This Agreement may be terminated by the CITY in whole or in part at any time without cause by the CITY giving written notice to CONTRACTOR not less than 30 days prior to the date of termination; provided, however, that in such event, neither party will be relieved from its rights or obligations of this Agreement through the date of the actual termination. Notice must be delivered by certified mail, return receipt requested, or in person with proof of delivery.

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- b. Termination for Cause: This Agreement may be terminated by either party for cause by the CITY or CONTRACTOR giving written notice to the other party not less than 10 days prior to the date of termination; provided, however, that in such event, neither party will be relieved from its rights or obligations of this Agreement through the date of the actual termination. Prior to any termination for cause, by either party, the breaching party shall be given written notice of its breach and an opportunity to cure such breach. Notice must be delivered by certified mail, return receipt requested, or in person with proof of delivery.

HH. **Additional Terms.** Notwithstanding any of other provision to the contrary, the parties agree as follows:

- a. TBD.

IN WITNESS WHEREOF, the parties hereto have signed and sealed this Agreement effective the date first written above.

Under penalties of perjury, and pursuant to Sec. 92.525, Fla. Stat., Contractor declares that Contractor has read the foregoing Section 10 AA above and that the facts stated in it are true.

Contractor:

Print Name: _____

Title: _____

Company: _____

ATTEST:

City of Brooksville

Jennifer Battista, City Clerk

Christa G.Tanner, Mayor

APPROVED AS TO FORM

Gretchen R. H. "Becky" Vose, City Attorney