

SECTION 01 11 13

SUMMARY OF WORK

PART 1 – GENERAL

1.1 SECTION INCLUDES- NOT USED

1.2 LOCATION AND DESCRIPTION OF WORK

The work is broken into two parts:

A. Force main

- 1. The force main work is located in Sarasota County, and extends from the Home Depot Master Pump Station proceeding east under I-75, north on Hawaii Drive, east on Bikini Road crossing Phillippi Creek Branch AA, and north on Maui Way to the intersection on Bee Ridge Road.
- 2. Another forcemain is located on Cattleman Road near Center Pointe Drive and will run from Cattleman Road into the Vortex Drop Manhole at the Home Depot Master Lift Station.
- 3. Work to be performed under this Contract includes, but is not limited to, constructing a sanitary sewer force main ranging in size from 12-inch diameter PVC and 16-inch diameter PVC to 18-inch diameter HDPE. Included, but not limited to, are air release valves, piping installed by open-cut and trenchless methods, and all other Work required in accordance with the Contract Documents.

B. Master Pump Station

- 1. The Work is located at the Home Depot Master Pump Station, at 4099 Cattlemen Road, Sarasota, FL 34233.
- 2. The Work to be performed under this Contract includes, but is not limited to, constructing the Work described below and all related appurtenances. The Work includes, but is not limited to, the following
  - a. General Conditions
    - 1) Mobilization and demobilization.
    - 2) Provisions of a complete project administration and management.
    - 3) Provisions for all applicable permits and inspections.
    - 4) Coordination, sequencing, and scheduling.
    - 5) Provisions for all bonding.
    - 6) Provisions for all construction facilities and temporary controls.
    - 7) Payment of all applicable fees associated with the Project.
    - 8) Provisions for all required shop drawings and submittals.
    - 9) Procurement and provisions for storage of all CONTRACTOR-supplied materials and equipment.
    - 10) Protection of existing facilities.
    - 11) Provisions for temporary lift and rigging equipment.

- 12) Provisions for temporary bypass pumping and temporary odor control.
  - 13) Attendance of meetings.
  - 14) Provisions for construction of staging area.
  - 15) Development of a Site-specific health and safety plan.
  - 16) Provision of all record documentation.
  - 17) Provision of all O&M manuals.
  - 18) Provision of all testing, start-ups, inspections, and training.
  - 19) Provision of an orderly Work closeout following Work acceptance by OWNER.
  - 20) Provision of Work guarantee and warranties.
- b. Demolition (Refer to Section 02 41 00)
- 1) Removal and disposal of existing odor control system in its entirety.
  - 2) Removal and disposal of existing generator in its entirety.
  - 3) Removal of above ground piping associated with the abandoned valve vault on the corner of Cattleman Rd and Center Pointe Drive, as well as the removal of the vault and associated piping within.
  - 4) Removal of all electrical components.
  - 5) Removal of water line and backflow preventer.
  - 6) Removal and disposal of existing fence in its entirety.
  - 7) Removal and disposal of manhole cone and cover.
  - 8) Removal and disposal of force main piping as shown on drawings.
- c. Cleaning
- 1) The OWNER will pump down the existing wet well. CONTRACTOR shall be responsible for removal of the residual wet well contents. Approximately 2 feet of wastewater, as measured upward from the wet well floor elevation, shall require removal by CONTRACTOR.
  - 2) CONTRACTOR shall be responsible for cleaning to remove debris and settled solids from existing wet well as required to complete the modifications, including floor fill concrete and bench work and repairs to the existing wet well interior liner system. The existing wet well is a confined space.
  - 3) CONTRACTOR shall be responsible for the handling, management, transport, and disposal of all settled solids debris removed from the existing wet well. Transportation and disposal shall be in accordance with all federal, state, and local regulations.
- d. Site/Civil Improvements
- 1) Proposed site perimeter fencing and gate.
  - 2) Proposed buried piping, fittings, valves, and appurtenances.
  - 3) Proposed underground electrical services upgrade.
  - 4) Temporary excavation support system, by-pass pumping, odor control, and dewatering, as required.
  - 5) Tree and stump removal, where called for.
  - 6) Clearing and grubbing.

- e. Structural Improvements
  - 1) Supply and installation of proposed cast-in-place concrete equipment housekeeping pads/foundations, as indicated on Drawings.
  - 2) Supply and installation of concrete pipe supports, as indicated on Drawings.
  
- f. Process/Mechanical Improvements
  - 1) Supply and installation of new impellers on existing pumps.
  - 2) Supply and installation of exposed piping, fittings, valves, supports, restraints, and appurtenances.
  - 3) Supply and installation of proposed coating systems, as specified or scheduled.
  - 4) Supply and installation of proposed odor control system.
  - 5) Supply and installation of proposed diesel back up pump.
  - 6) Testing, start-up, troubleshooting, and commissioning of proposed equipment and piping.
  
- g. Electrical Improvements
  - 1) Coordination with local utility for proposed electrical service secondary relocation.
  - 2) Supply and installation of new service entrance and distribution equipment
  - 3) Installation of equipment based on area classifications, including hazardous, wet, and corrosive areas.
  - 4) Supply and installation of new RVSS and ATL starter cabinets
  - 5) Wiring and connection of proposed process/mechanical equipment including, but not limited to, submersible pumps, diesel back-up pump, odor control system (by others), and liquid level, pressure, and flow sensing instrumentation.
  - 6) Installation, wiring, and connection of proposed pump station pump control panel, Mission RTU, and Network Interface Panel.
  - 7) Testing, start-up, troubleshooting, and commissioning of electrical distribution equipment as well as instrumentation and control circuits.
  
- h. Instrumentation Improvements
  - 1) Supply, installation, and integration of field instruments.
  - 2) Supply, installation and integration of new redundant level instruments and floats in the wet well.
  - 3) Supply and installation of PLC based control panel and network interface panel for integration with Owner's existing SCADA network.
  - 4) Supply of Mission RTU for integration with Diesel Engine Pump.
  - 5) Configuration of PLC, OIT and SCADA HMI for monitoring and controls of the pump station.
  - 6) Testing, start-up, troubleshooting and commissioning of field instruments, panels, and control components for proposed operation of the pump station.

C. Contracting Method: The Project shall be constructed under one prime Contract.

D. Hazardous Environmental Conditions:

1. To the best of Owner's knowledge, information and belief, the Site has been a sewage lift station since 1982. Prior to that time the site was undeveloped land.

1.3 OTHER CONSTRUCTION CONTRACTS (NOT USED)

1.4 WORK BY OTHERS

- A. Non-Professional Services Contracted by OWNER: OWNER will retain services of the following entities to perform the services indicated relative to the Project. CONTRACTOR shall coordinate and schedule the Work with, and cooperate with, the entities performing the following services for OWNER.

1. Odor Control System:

- a. OWNER has, or will, retain the services of Evoqua for all work related to the Odor Control system.

1.5 WORK BY OWNER (NOT USED)

1.6 OWNER FURNISHED EQUIPMENT AND MATERIALS (NOT USED)

1.7 ASSIGNED PROCUREMENT CONTRACTS (NOT USED)

1.8 SEQUENCE AND PROGRESS OF WORK

- A. Incorporate sequencing of the Work into the Progress Schedule

1.9 CONTRACTOR'S USE OF SITE

- A. CONTRACTOR's use of the Site shall be confined to the areas shown.
- B. Move stored materials and equipment that interfere with operations of OWNER, other contractors, and others performing work for OWNER.
- C. Site access shall be directed by the OWNER and ENGINEER.
- D. The CONTRACTOR shall not engage in any construction within the easements during the months of December 2026, January 2027, or February 2027. This only applies to the LA Fitness parking lot.
- E. The CONTRACTOR shall be responsible for any fees associated with any delay in construction lasting beyond nine (9) weeks, starting on the tenth (10th) in the amount of \$24,000/week. This only applies to the work taking place in the LA Fitness parking lot.

1.10 EASEMENTS AND RIGHTS-OF-WAY

- A. General:

1. Easements and rights-of-way required for the permanent improvements included in the Work will be provided by OWNER in accordance with the General Conditions.

2. Confine construction operations within OWNER's property, public rights-of-way, easements obtained by OWNER, and limits shown, and property for which CONTRACTOR has made arrangements directly with property owner(s).
3. Use care in placing construction tools, equipment, excavated materials, and materials and equipment to be incorporated into the Work to avoid damaging property and interfering with traffic.
4. Do not enter private property outside the construction limits without permission from the owner of the property.

B. On Private Property:

1. General limits of OWNER-furnished easements are shown on the Drawings.

1.11 NOTICES TO OWNERS AND AUTHORITIES OF PROPERTIES ADJACENT TO THE WORK

- A. Notify owners of adjacent property and utility owners when prosecution of the Work may affect their property, facilities, or use of property.
- B. When it is necessary to temporarily obstruct access to property, or when utility service connection will be interrupted, provide notices sufficiently in advance to enable affected persons to provide for their needs. Such notifications shall comply with Laws and Regulations and, whether delivered orally or in writing, shall include appropriate information concerning the interruption and instructions on how to limit inconvenience caused thereby.
- C. Notify utility owners and other concerned entities not less than 48 hours prior to cutting or closing streets or other traffic areas or excavating near Underground Facilities or exposed utilities.
- D. Contractor shall coordinate with the shopping plaza management to schedule and notify them of the planned work times, any damage to the driveway or parking lot surfaces outside the trench limits caused by the construct work shall be repaired at the contractor's expense. Coordination shall include written and email notice to Home Depot, My Poor Kitty, LLC d/b/a Madfish Grill NNN REIT, and Fitness International d/b/a L.A. Fitness 30 days before commencement of construction on all parcels and be provided with full contact information for a supervisor of the contractor and a County representative to be able to contact for any issues which arise until completion of construction. Those persons receiving notice for shall be the following:
  1. John\_chescavage@homedepot.com  
Home Depot U.S.A., Inc.  
2455 Paces Ferry Road  
Atlanta, GA 30339
  2. Trey\_conway@homedepot.com  
Home Depot U.S.A., Inc.  
2455 Paces Ferry Road  
Atlanta, GA 30339
  3. hwilliams@greenbergfarrow.com  
Home Depot U.S.A., Inc.

- 1230 Peachtree St. NE, Suite 2900  
Atlanta, GA 30309
4. Ivelisse\_Guadalupe@homedepot.com  
Home Depot U.S.A., Inc.  
2455 Paces Ferry Road  
Atlanta, GA 30339
  5. Connie\_rockwell@homedepot.com  
Home Depot U.S.A., Inc.  
2455 Paces Ferry Road  
Atlanta, GA 30339
  6. HD\_Propmgmt@homedepot.com  
Home Depot U.S.A., Inc.  
2455 Paces Ferry Road  
Atlanta, GA 30339
  7. RM@MESIMER.COM  
4738 Central Ave  
St. Petersburg, FL 33711
  8. Mark.tobin@eminentdomain.us  
1100 Biscayne Blvd, Suite 2201  
Miami, FL 33132
  9. Lisandra.Diaz@eminentdomain.us  
1100 Biscayne Blvd  
Suite 2201  
Miami, FL 3313
  10. Kristin.furniss@nnnreit.com  
NNN REIT, Inc.. f/k/a National Retail Properties, Inc.,  
and f/k/a Commercial Net Lease Realty, Inc., all  
Maryland corporations  
450 S. Orange Avenue, Suite 900  
Orlando, FL 32801
  11. brian.smith@lowndes-law.com  
Lowndes, Drosdick, Doster, Kantor & Reed, PA.  
c/o Brian E. Smith, Esq.  
215 North Eola Drive  
Orlando, FL 32801
  12. Fitness International, LLC, a California limited liability  
company, d/b/a LA Fitness and Pro Results  
C/o Shutts & Bowen,S LLP  
Attn: Fred Werdine, Esq.  
4301 West Boy Scout Blvd., Suite 300, Tampa FL 33607
  13. My Poor Kitty, LLC, a Florida limited liability company  
d/b/a Madfish Grill  
C/o Ryan C. Reese, Esquire  
Moore, Bowman, Reese. PA.  
4100 W. Kennedy Blvd., #221, Tampa, FL 33609
  14. The Cutter Corporation of Sarasota, Inc., a Florida  
corporation  
C/o Milcs R. Milwee. Registered Agent  
5955 Sheps Island Road. Sarasota, FL 34241-950

#### 1.12 SALVAGE OF MATERIALS AND EQUIPMENT (NOT USED)

#### PART 2 – PRODUCTS (NOT USED)

Home Depot MPS and FM  
Summary of Work  
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PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

## SECTION 01 22 13

## MEASUREMENT AND PAYMENT

PART 1 – GENERAL1.1 SUMMARY

## A. Scope:

1. Items listed starting in Article 1.4 of this Section refer to and are the same pay items listed in the Pricing Table and constitute all pay items for completing the Work. No direct or separate payment will be made for providing miscellaneous temporary or accessory works, plant or facility services, CONTRACTOR'S or ENGINEER'S field offices, layout surveys, Project signs, sanitary requirements, testing, safety provisions and safety devices, submittals and record drawings, water supplies, power and fuel, maintenance of traffic, removal of waste, security, coordination with OWNER'S operations, information technology (including hardware, software, and services) required during construction, commissioning where specified, bonds, insurance, or other requirements of the General Conditions, Division 01 Specifications, and other requirements of the Contract Documents. Compensation for all services, items, materials, and equipment shall be included in prices stipulated for lump sum and unit price pay items listed in this Section and included in the Contract.

1.2 ENGINEER'S ESTIMATE OF QUANTITIES

- A. ENGINEER's estimated quantities for items of Work, as included in the Contract, are approximate only and are included solely for purpose of comparing Bids and pricing. OWNER does not expressly or by implication agree that nature of materials encountered below the ground surface or actual quantities of material encountered or required will correspond with the quantities included in the Contract at the time of award and reserves right to increase or decrease quantities or to eliminate quantities as OWNER may deem necessary.

1.3 RELATED PROVISIONS

- A. Payments to CONTRACTOR: Refer to General Conditions and Agreement
- B. Changes in Contract Price: Refer to General Conditions
- C. Schedule of Values: Refer to Section 01 29 73, Schedule of Values.

1.4 BID ITEMS

## Item 1.

Mobilization/Demobilization: Payment for mobilization and demobilization shall be made at the contract lump sum price for mobilization and demobilization. The lump sum dollar value listed on the Pricing Table for this Bid Item shall not exceed five (5%) percent of the subtotal of Bid Item Nos. 2 through 11. This price shall be full compensation for all costs incurred for preparatory work and operations including, but not limited to those necessary for the movement of

personnel, equipment, supplies, construction signs, and incidentals to the project site; for the establishment of the field offices and other facilities necessary for work on the project; fees for bonds and insurance; and for all other work and operations including submittals, which must be performed prior to beginning work on the various items. Payment for mobilization will be payable in the first partial payment at 75% of the contract lump sum price for mobilization and demobilization, and the balance of 25% of the contract lump sum price will be payable in the final project close-out payment upon demobilization.

Item 2.

Demolition: Payment for the complete Demolition work shall be made at the contract lump sum price for this Bid Item. The lump sum price shall include the demolition, cleanup, removal, and disposal of existing equipment and materials, to the limits indicated on the Drawings, and as specified herein.

Item 3.

Pump Station General Construction: Payment for the complete Pump Station General Construction work shall be made at the contract lump sum price for this Bid Item. This Bid Item includes furnishing, installing, testing, and commissioning water and wastewater process piping, fittings, and valves associated with the Home Depot Master Pump Station; replacement of existing impellers with new impellers, labor, testing, and startup of pumps; furnishing, installing, testing, and commissioning all piping, fittings, supports, and guide rails for conditioning pump; all work associated with the installation of two vortex drops in the manhole specified in the drawings as well as all structural work associated with the pump station including but not limited to: concrete slab and hatches, security fence and gates, and manhole cone replacement; Furnishing, installing, testing, and commissioning of a diesel back up pump; rehabilitation of manhole being used for the vortex drops; civil work associated with earthwork and erosion control; site restoration including removal of unsuitable materials, backfill, select fill material, grading and sodding, and all other Work not specifically included under the other items.

Item 4.

Temporary Bypass Pumping and Odor Control: Payment for the complete Temporary Bypass Pumping and Odor Control work shall be made at the contract lump sum price for this Bid Item. This Bid Item includes the cost of temporary bypass pumping as well as temporary odor control.

Item 5.

Electrical, Instrumentation & Controls Construction: Payment for the complete Electrical, Instrumentation & Controls Construction work shall be made at the contract lump sum price for this Bid Item. The lump sum bid price shall include construction and installation of all electrical and I&C equipment such as but not limited to site lighting, horn/strobe alarm, conduit runs, fittings, cables, and wiring, pull and junction boxes, raceways, control panel, and field instrumentation. This will also include testing, start-up, troubleshooting and commissioning of field instruments, panels, and control components for operation of the pump station.

Item 6.

C900 PVC Force Main (16-inch) DR 25: Payment for Item 6 will be full compensation for completing the Work associated with C900 PVC Force Main (16-inch) DR 25, as shown and specified. The unit price bid shall be on a linear foot (LF) basis, and shall include all supervision, labor, materials, tools,

equipment and services for the completion of all work associated with the C900 PVC Force Main (16-inch) DR 25.

Item 7.

HDPE Force Main (18-inch) DR 11-HDD: Payment for Item 6 will be full compensation for completing the Work associated with HDPE Force Main (18-inch) DR 11-HDD, as shown and specified. The unit price bid shall be on a linear foot (LF) basis, and shall include all, supervision, labor, materials, tools, equipment and services for the completion of all work associated with the HDPE Force Main (18-inch) DR 11-HDD.

Item 8.

Force Main General Construction: Payment for the complete Force Main General Construction work shall be made at the contract lump sum price for this Bid Item. This Bid Item includes furnishing, installing, testing, and commissioning valves associated with the Force Main; maintenance of traffic; jack and bore operations; pavement restoration; clearing and grubbing; civil work associated with earthwork and erosion control; site restoration including removal of unsuitable materials, backfill, select fill material, grading and sodding, and all other Work not specifically included under the other items.

Item 9.

Open Cut Across Home Depot Driveway and Parking Lot:

1. Measurement:

- a. This bid item covers the excavation, installation, backfilling, temporary surface restoration, and final restoration associated with the open-cut crossing of the driveway and parking lot at the shopping plaza. The work will involve trenching to install the specified pipeline or utility infrastructure and shall be conducted with minimal disruption to the shopping plaza operations.
- b. All work related to the driveway crossing and in the parking lot must be performed during nighttime hours on weekends (Saturday night after 11 P.M. and Sunday nights after 9 P.M.) to minimize traffic and business disruptions. The work site is to be secured and traffic control measures to be installed per contract requirements. Except for Saturday and Sunday nights as described in this paragraph, no vehicles, equipment and/or materials shall be parked or stored within the north-south access driveway. The affected driveway and parking lots are to be operable for safe pedestrian and vehicular traffic by 5 A.M. on Saturday and Sunday mornings and by 4 A.M. on Monday mornings local time. Additionally, there will be a period of eight weeks where the area of the L.A. Fitness parking lot within the subject easement area will not be available while the contractor conducts open cut pipe installation and directional drilling. Temporary steel plates or other approved temporary surface materials shall be used to cover all trenches and make the work area accessible.
- c. Final restoration of the driveway and parking lot, including curbing, paving, markings, and landscaping, is to be completed as soon as practical after the pipeline and utility installation is finished. The final restoration is to match the existing driveways, curbing, pavement, and surface conditions, including material type and thickness, or as specified in the contract documents.
- d. Contractor shall coordinate with the shopping plaza management to schedule and notify them of the planned work times. Any damage to

the driveway or parking lot surfaces outside the trench limits caused by the construction work shall be repaired at the contractor's expense.

- e. Payment will be made to the Contractor based on actual invoiced amounts paid by the Contractor to FP&L for services associated with both coordinating the isolation of, as well as connecting and disconnecting service conductors within the pad-mounted utility transformer and any additional FP&L fees.
2. Payment:
    - a. This bid item will be paid for on a lump sum basis, which shall include all labor, materials, equipment, traffic control, temporary and final surface restoration, and all other incidental items necessary to complete the open cut across the driveway and parking lot in accordance with the contract specifications.

#### Item 10.

##### Temporary Phillippi Creek Crossing

1. Measurement: This bid item covers the design, permitting, materials, and all necessary appurtenances for construction, installation, filling, and surface restoration, associated with the temporary access to the west side of the Phillippi Creek from the east. Contractor shall include in the price shop drawings with a design signed and sealed by a licensed Florida PE.
2. Payment: This bid item will be paid for on a lump sum basis, which shall include all labor, design, permitting, materials, and all necessary appurtenances for construction, installation, filling, and surface restoration, and all other incidental items necessary to complete associated with the temporary access to the west side of the Phillippi Creek from the east in accordance with the contract specifications.

#### Item 11.

C-900 PVC Force Main (12-inch) DR 25: Payment for Item 11 will be full compensation for completing the Work associated with PVC Force Main (12-inch) DR 25, as shown and specified. The unit price bid shall be on a linear foot (LF) basis, and shall include all supervision, labor, materials, tools, equipment and services for the completion of all work associated with the PVC Force Main (12-inch) DR25.

#### PART 2 – PRODUCTS (NOT USED)

#### PART 3 – EXECUTION (NOT USED)

++ END OF SECTION++

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## SECTION 01 33 00

## SUBMITTALS

## PART 1 -GENERAL

## 1.01 DESCRIPTION OF REQUIREMENTS

- A. Submittals, as referenced under this section, shall include the general requirements of shop drawings, product data, samples, mock-ups and miscellaneous work-related submittals. The individual submittal requirements for each unit of work will be more particularly defined in the section applicable to the work item.
1. Unless otherwise noted, each item of submittal shall be submitted to the Engineer and County via e-Builder for review and acceptance prior to purchase, fabrication, delivery, or installation.
  2. The Engineer's acceptance will be for general conformance of the product with the design concept and Contract Documents.
- B. Submittals shall be transmitted using the County's project management system, e- Builder.
1. When it is not feasible to make submittals electronically, as in the case of product samples, the conventional approach of using mail or hand delivery may be used.
  2. Upload files to e-Builder in Portable Document Format (PDF) as generated by Adobe. Scan documents or convert electronic files into PDF format before uploading files to e-Builder.
  3. Scan resolution shall be 300 dpi or greater to allow for character recognition.
  4. Perform Optical Character Recognition (OCR) capture on images so text can be searched, selected, and copied from generated PDF file.
  5. Provide bookmarks for contents of all submittals allowing navigation through Adobe PDF bookmark window.
- C. The submittal will not be accepted for review unless it is clear, legible, and contains complete information in compliance with the Contract Documents. Submittals that are not accepted will be returned to the Contractor, via e-Builder, with notations of requirements necessary for acceptance. The Contractor shall resubmit revised material once it has been amended to comply

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with review comments. When marked RESUBMIT, do not proceed with work covered by submittal (purchasing, fabrication, delivery or other activity); revise submittal or prepare a new submittal and resubmit without delay, in accordance with County's notations stating reasons for returning submittal; repeat, if necessary, to obtain an accepted action marking.

- D. If submittals show deviations from Contract requirements because of standard shop practice or for other reasons, the Contractor shall clearly describe such deviations in the letter of transmittal. If the Contractor fails to describe such deviations, no relief from the responsibility of executing the work in accordance with the Contract Documents will be granted, even though such submittals were reviewed and accepted.
- E. "Or equal" submittals for review shall be in accordance with the General Conditions, Substitutions of Equipment and/or Material.

## 1.02 GENERAL SUBMITTAL REQUIREMENTS

### A. Coordination and Sequencing:

1. The Contractor shall coordinate the preparation and processing of submittals with the performance of the work and in accordance with the submittals schedule prepared in accordance with the General Conditions, so that work will not be delayed by the submittal process. The Contractor shall coordinate and sequence different categories of submittals for the same work, and for interfacing units of work, so that one will not be delayed for coordination with another. The Contractor should not proceed with purchasing, fabrication, or delivery of work related to a submittal until the submittal procedure has been successfully completed.
2. No extension of time will be allowed by the County due to the failure of the Contractor to properly coordinate and sequence submittals or for delays caused by the failure of the Contractor to make complete submittals.

### B. Preparation of Submittals:

1. Provide permanent marking on each submittal to identify it by project, date, Contractor, subcontractor, submittal name, project specification reference section and sequential number of each submittal to distinguish it from other submittals. Contractor's approval marking shall be on each submittal.

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Submittals which are received directly from sources other than the Contractor will not be reviewed.

2. Where manufacturer's data sheets, catalog pages, or drawings have several items shown or a selection of characteristics shown in chart and graphs, the Contractor shall clearly mark the information to indicate exactly what will be supplied.

### 1.03 SPECIFIC CATEGORY SUBMITTAL REQUIREMENTS

A. General: Individual submittal requirements for each unit of work will be more particularly defined in the section applicable to the work item.

B. Shop Drawings:

1. Provide newly-prepared information, show dimensions and notes which are based on field measure, identify materials and products, indicate compliance with standards, and note any special coordination requirements.
2. Maintain one (1) set of accepted shop drawings at the Project Site. Only shop drawings with the appropriate markings by the Contractor and the Engineer are to be used in connection with the Work.

C. Product Data:

1. Collect the required data into one submittal for each material, product, or system; and mark each copy to show which choices and options are applicable to the project. Include manufacturer's standard printed recommendations for application and use, compliance with standards, application of labels and seals, notation of confirmed field measurements, which have been checked, and special coordination requirements. Maintain one (1) set of product data for each submittal at the Site, available for reference by the County and other authorized representatives.
2. Installer's Copy: Do not proceed with the installation of materials, products, or systems until a copy of the applicable product data, approved by the County, is in the possession of the Installer.

D. Samples:

1. Provide units identical with the final condition of the proposed materials or products for the work. Include "range" samples

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(not less than three (3) units) where variations occur and identify each unit of each set. Provide full set of optional samples where County's selection is required. Prepare samples to match the County's sample where so indicated. Include information with each sample to show generic description, source or product name and manufacturer, limitations, and compliances with standards.

2. Samples are submitted for review and confirmation of color, pattern, texture and "kind" by the County, who will not "test" them (except as otherwise indicated) for other requirements, which are therefore the exclusive responsibility of the Contractor.
  3. Submittal: At Contractor's option, the Contractor may provide a preliminary submittal of a single set of samples for the Engineer's review and "Action". Otherwise, the initial submittal is the final submittal unless it is returned with "Revise" which requires re- submittal. Submit three (3) sets of samples in the final submittal; two (2) sets will be returned.
  4. Quality Control Set: Maintain one (1) of the returned final sets of samples at the project site, in suitable condition and available for quality control comparisons by the County and by other authorized representatives.
  5. Reusable Samples: Samples which are intended or permitted to be returned and actually incorporated in the work are so indicated in the individual work sections but must be in undamaged condition at the time of use.
- E. Inspection and Test Reports:
1. Submittal is classified either as "shop drawings" or "product data", depending upon whether the report is uniquely prepared for the project or a standard publication of regular product or workmanship control testing at the point of production (respectively).

#### 1.04 CONTRACTOR'S REVIEW

- A. Contractor's Review: Before transmitting submittals to the County and Engineer, review submittals to:
1. assure proper coordination of the Work;
  2. determine that each submittal is in accordance with Contractor's desires;

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3. verify that submittal contains sufficient information for Engineer to determine compliance with the Contract Documents.

B. Incomplete or inadequate submittals will be returned without review.

1.05 COUNTY'S ACTION

A. The Engineer will review each submittal and upload it to e-Builder with the action required marked on it.

B. The mark will be a self-explanatory action stamp, marked and executed to indicate whether submittal is accepted or returned for re-submittal.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

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## SECTION 33 05 05

## BURIED PIPING INSTALLATION

PART 1 - GENERAL1.1 DESCRIPTION

## A. Scope:

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

## B. Coordination:

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

## C. Related Sections:

1. Section 31 23 05, Excavation and Fill.
2. Section 09 91 00, Painting.

1.2 REFERENCES

## A. Standards referenced in this Section are:

1. ASME Boiler and Pressure Vessel Code.
2. ASME B31.3, Process Piping.
3. American Society for Non-Destructive Testing (ASNT), ASNT-TC-1A, Recommended Practice, Personnel Qualification, and Certification in Non-destructive Testing.
4. ASTM B32, Specification for Solder Metal.

5. ASTM C12, Practice for Installing Vitrified Clay Pipe Lines.
6. ASTM C425, Specification for Compression Joints for Vitrified Clay Pipe and Fittings.
7. ASTM C828, Test Method for Low-Pressure Air Test of Vitrified Clay Pipe Lines.
8. ASTM C924, Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Test Method.
9. ASTM D2321, Practice for Underground Installation of Thermoplastic Pipe for Sewers and other Gravity-Flow Applications.
10. ASTM D2774, Practice for Underground Installation of Thermoplastic Pressure Piping.
11. ASTM D4174, Practice for Cleaning, Flushing and Purification of Petroleum Fluid Hydraulic Systems.
12. ASTM F1417, Test Method for Installation Acceptance of Plastic Gravity Sewer Lines using Low-Pressure Air.
13. ASTM F2164, Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure.
14. ANSI/AWWA C105, Polyethylene Encasement for Ductile-Iron Pipe Systems.
15. ANSI/AWWA C111, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
16. ANSI/AWWA C206, Field Welding of Steel Water Pipe.
17. ANSI/AWWA C600, Installation of Ductile-Iron Water Mains and Their Appurtenances.
18. ANSI/AWWA C603, Installation of Asbestos-Cement Pressure Pipe.
19. ANSI/AWWA C605, Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
20. ANSI/AWWA C606, Grooved and Shouldered Joints.
21. ANSI/AWWA C651, Disinfecting Water Mains.
22. AWWA M9, Concrete Pressure Pipe.
23. AWWA M11, Steel Water Pipe - A Guide for Design and Installation.
24. AWWA M23, PVC Pipe - Design and Installation.
25. AWWA M41, Ductile-Iron Pipe and Fittings.
26. AWWA M45, Fiberglass Pipe Design.
27. AWWA M55, PE Pipe - Design and Installation.
28. ASCE 37, Design and Construction of Sanitary and Storm Sewers.
29. American Concrete Pipe Association, Concrete Pipe Handbook.
30. Chlorine Institute, Inc., Piping Systems for Dry Chlorine, Pamphlet No. 6.
31. NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances.

### 1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
  1. Comply with requirements and recommendations of authorities having jurisdiction over the Work, including.
    - a. Sarasota County Utilities.
    - b. Florida Department of Environmental Protection (FDEP).
    - c. Florida Department of Transportation (FDOT).
  2. Obtain required permits for Work in roads, rights-of-way, railroads, and other areas of the Work.

#### 1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
  - 1. Shop Drawings:
    - a. Laying schedules for concrete pipe and piping with restrained joints.
    - b. Details of piping, specials, joints, harnessing and thrust blocks, and connections to piping, structures, equipment, and appurtenances.
  - 2. Product Data:
    - a. Manufacturer's literature and specifications, as applicable, for products specified in this Section.
  - 3. Testing Procedures:
    - a. Submit proposed testing procedures, methods, apparatus, and sequencing. Obtain ENGINEER's approval prior to commencing testing.
  
- B. Informational Submittals: Submit the following:
  - 1. Certificates:
    - a. Certificate signed by manufacturer of each product certifying that product conforms to applicable referenced standards.
  - 2. Field Quality Control Submittals:
    - a. Results of each specified field quality control test.
  
- C. Closeout Submittals: Submit the following:
  - 1. Record Documentation:
    - a. Maintain accurate and up-to-date record documents showing modifications made in the field, in accordance with approved submittals, and other Contract modifications relative to buried piping Work. Submittal shall show actual location of all piping Work and appurtenances at same scale as the Drawings.
    - b. Show piping with elevations referenced to Project datum and dimensions from permanent structures. For each horizontal bend in piping, include dimensions to at least three permanent structures, when possible. For straight runs of piping provide offset dimensions as required to document piping location.
    - c. Include profile drawings with buried piping record documents when the Contract Documents include piping profile drawings.
    - d. Conform to Section 01 78 39, Project Record Documents.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
  - 1. Deliver materials to the Site to ensure uninterrupted progress of the Work.
  - 2. Upon delivery inspect pipe and appurtenances for cracking, gouging, chipping, denting, and other damage and immediately remove from Site and replace with acceptable material.
  
- B. Storage:
  - 1. Store materials to allow convenient access for inspection and identification. Store material off ground using pallets, platforms, or other supports. Protect packaged materials from corrosion and deterioration.
  - 2. Pipe and fittings other than PVC and CPVC may be stored outdoors without cover. Cover PVC and CPVC pipe and fittings stored outdoors.

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

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Piping materials are specified in the Buried Piping Schedule at end of this Section. Piping materials shall conform to Specifications for each type of pipe and piping appurtenances in applicable Sections of Division 40, Process Integration.
- B. General:
1. Pipe Markings:
    - a. Factory-mark each length of pipe and each fitting with designation conforming to those on approved laying schedules.
    - b. Manufacturer shall cast or paint on each length of pipe and each fitting pipe material, diameter, and pressure or thickness class.
- C. Cathodic Protection:
1. Bonding Cables: Bonding cable and test lead wires shall be not less than No. 6 AWG, Type CP copper cathodic protection cable, with low density, high molecular weight polyethylene insulation.
  2. Test Lead Stations: Provide test lead stations where shown and indicated in the Contract Documents. Standard connection boxes for test lead stations shall be plastic terminal boxes, 18 inches long and five-inch inside diameter, with locking cast iron lid with "CP TEST" cast into cover. Inside terminal box shall be terminal block with seven terminals. Terminal box shall be manufactured by C.P. Test Services "NM-7" or equal.

### 2.2 BURIED PIPING IDENTIFICATION

- A. Polyethylene Underground Warning Tape for Metallic Pipelines:
1. Tracer tape shall be of inert, acid- and alkali-resistant, polyethylene, four mils thick, six inches wide, suitable for direct burial. Tape shall be capable of stretching to twice its original length.
  2. Message shall read, "CAUTION [insert customized name of pipe service, i.e., "POTABLE WATER", "SANITARY SEWER", "CHLORINE GAS", or other service as appropriate, as indicated in the Buried Pipe Schedule at the end of this Section] PIPE BURIED BELOW", with bold letters approximately two inches high. Messages shall be printed at maximum intervals of two feet. Tape shall be custom colored the same as pipeline colors specified for associated pipe service in Section 09 91 00, Painting.
  3. Manufacturer: Provide products of one of the following:
    - a. Brady Corporation
    - b. Seton Identification Products

- c. Marking Services, Inc.
  - d. Or equal.
- B. Detectable Underground Warning Tape for Non-Metallic Pipelines:
- 1. Tape shall be of inert, acid- and alkali-resistant, polyethylene, five mils thick, six inches wide, with aluminum backing, and have 15,000 psi tensile strength and 80 percent elongation capability. Tape shall be suitable for direct burial.
  - 2. Message shall read, "CAUTION ., SANITARY SEWER, PIPE BURIED BELOW" with bold letters approximately two inches high. Messages shall be printed at maximum intervals of two feet. Tape shall be custom colored the same as the pipeline colors as specified for the associated pipe service in Section 09 91 00, Painting.
  - 3. Manufacturer: Provide products of one of the following:
    - a. Brady Corporation
    - b. Seton Identification Products
    - c. Marking Services, Inc.
    - d. Or equal.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. General:
- 1. Install piping as shown, specified, and as recommended by pipe and fittings manufacturer.
  - 2. In event of conflict between manufacturer's recommendations and the Contract Documents, request interpretation from ENGINEER before proceeding.
  - 3. ENGINEER will observe excavations and bedding prior to laying pipe by CONTRACTOR. Notify ENGINEER in advance of excavating, bedding, pipe laying, and backfilling operations.
  - 4. Minimum cover over buried piping shall be 3 feet, unless otherwise shown or approved by ENGINEER.
  - 5. Earthwork is specified in Section 31 23 05, Excavation and Fill.
  - 6. Excavation in excess of that required or shown, and that is not authorized by ENGINEER shall be filled at CONTRACTOR's expense with granular material furnished, placed, and compacted as specified.
  - 7. Comply with NFPA 24 for "Outside Protection", where applicable to water piping systems used for fire protection.
- B. Separation of Sewers and Potable Water Piping:
- 1. Horizontal Separation:
    - a. Where possible, existing and proposed potable water mains and service lines, and sanitary, combined, and storm sewers shall be separated horizontally by clear distance of at least ten feet.
    - b. If local conditions preclude the specified clear horizontal separation, installation will be allowed if potable water main is in separate trench or on undistributed earth shelf on one side of sewer and with bottom of potable water main at least 18 inches above top of sewer.
    - c. Exception:
      - 1) Where it is not possible to provide minimum horizontal separation described above, construct potable water main of cement-lined

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

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

C. Plugs:

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

D. Bedding Pipe: Bed pipe as specified and in accordance with details on the Drawings.

1. Trench excavation and backfill, and bedding materials shall conform to Section 31 23 05, Excavation and Fill, as applicable.
2. Where pipe is installed in rock excavation, provide minimum of three inches of granular bedding material underneath pipe smaller than four-inch nominal diameter, and minimum of six inches of granular bedding material underneath pipes four-inch nominal diameter and larger.
3. Excavate trenches below bottom of pipe by amount shown and indicated in the Contract Documents. Remove loose and unsuitable material from bottom of trench.
4. Carefully and thoroughly compact pipe bedding with handheld pneumatic compactors.

5. Do not lay pipe until ENGINEER approves bedding condition.
6. Do not bring pipe into position until preceding length of pipe has been bedded and secured in its final position.

E. Laying Pipe:

1. Conform to manufacturer's instructions and requirements of standards and manuals listed below, as applicable:
  - a. Ductile Iron Pipe: ANSI/AWWA C600, ANSI/AWWA C105, AWWA M41.
  - b. Thermoplastic Pipe: ASTM D2321, ASTM D2774, ANSI/AWWA C605, AWWA M23, AWWA M45, AWWA, M55.
  - c. Sanitary and Storm Sewers: ASCE 37.
2. Install pipe accurately to line and grade shown and indicated in the Contract Documents, unless otherwise approved by ENGINEER. Remove and reinstall pipes that are not installed correctly.
3. Slope piping uniformly between elevations shown.
4. Keep groundwater level in trench at least 24 inches below bottom of pipe before laying pipe. Do not lay pipe in water. Maintain dry trench conditions until jointing and backfilling are complete. Keep clean and protect interiors of pipe, fittings, valves, and appurtenances.
5. Start laying pipe at lowest point and proceed towards higher elevations, unless otherwise approved by ENGINEER.
6. Place bell and spigot-type pipe so that bells face the direction of laying, unless otherwise approved by ENGINEER.
7. Place concrete pipe containing elliptical reinforcement with minor axis of reinforcement in vertical position.
8. Excavate around joints in bedding and lay pipe so that pipe barrel bears uniformly on trench bottom.
9. Deflections at joints shall not exceed 75 percent of amount allowed by pipe manufacturer, unless otherwise approved by ENGINEER.
10. For PVC and CPVC piping with solvent welded joints, 2.5-inch diameter and smaller, and copper tubing, snake piping in trench to compensate for thermal expansion and contraction.
11. Carefully examine pipe, fittings, valves, and specials for cracks, damage, and other defects while suspended above trench before installation. Immediately remove defective materials from the Site and replace with acceptable products.
12. Inspect interior of all pipe, fittings, valves, and specials and completely remove all dirt, gravel, sand, debris, and other foreign material from pipe interior and joint recesses before pipe and appurtenances are moved into excavation. Bell and spigot-type mating surfaces shall be thoroughly wire brushed, and wiped clean and dry immediately before pipe is laid.
13. Field cut pipe, where required, with machine specially designed for cutting the type of pipe being installed. Make cuts carefully, without damage to pipe, coating or lining, and with smooth end at right angles to axis of pipe. Cut ends on push-on joint type pipe shall be tapered and sharp edges filed off smooth. Do not flame-cut pipe.
14. Do not place blocking under pipe, unless specifically approved by ENGINEER for special conditions.
15. Touch up protective coatings in manner satisfactory to ENGINEER prior to backfilling.
16. Notify ENGINEER in advance of backfilling operations.

17. On steep slopes, take measures acceptable to ENGINEER to prevent movement of pipe during installation.
18. Thrust Restraint: Where required, provide thrust restraint conforming to Article 3.3 of this Section.
19. Exercise care to avoid flotation when installing pipe in cast-in-place concrete, and in locations with high groundwater.

F. Jointing Pipe:

1. Ductile Iron Mechanical Joint Pipe:

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

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

- h. Bolts and nuts, except those of stainless steel, shall be coated with two coats, minimum dry film thickness of eight mils each, of high build solids epoxy or bituminous coating manufactured by Tnemec, or equal.
  - i. Restrained mechanical joints shall be in accordance with Section 40 05 19, Ductile Iron Process Pipe.
2. Ductile Iron Push-On Joint Pipe:
- a. Prior to assembling joints, thoroughly clean with wire brush the last eight inches of exterior surface of spigot and interior surface of bell, except where joints are lined or coated with a protective lining or coating.
  - b. Wipe clean rubber gaskets and flex gaskets until resilient. Conform to manufacturer’s instructions for procedures to ensure gasket resiliency when assembling joints in cold weather.
  - c. Insert gasket into joint recess and smooth out entire circumference of gasket to remove bulges and to prevent interference with proper entry of spigot of entering pipe.
  - d. Immediately prior to joint assembly, apply thin film of pipe manufacturer’s recommended lubricant to surface of gasket that will

- come in contact with entering spigot end of pipe, or apply a thin film of lubricant to outside of spigot of entering pipe.
- e. For assembly, center spigot in pipe bell and push pipe forward until spigot just makes contact with rubber gasket. After gasket is compressed and before pipe is pushed or pulled in the rest of the way, carefully check gasket for proper position around the full circumference of joint. Final assembly shall be made by forcing spigot end of entering pipe past gasket until spigot makes contact with base of the bell. When more than a reasonable amount of force is required to assemble the joint, remove spigot end of pipe to verify proper positioning of gasket. Do not use gaskets that have been scored or otherwise damaged.
  - f. Maintain an adequate supply of gaskets and joint lubricant at the Site when pipe jointing operations are in progress.
3. Ductile Iron Proprietary Joints:
    - a. Install pipe that utilizes proprietary joints for restraint specified in Section 40 05 19, Ductile Iron Process Pipe, or other such joints, in accordance with manufacturer's instructions.
  4. Ductile Iron Flanged Joints:
    - a. Assemble flanged joints using ring-type gaskets, thickness as recommended by pipe manufacturer but not less than 1/8-inch thick, for raised face flanges. Use full face gaskets for flat face flanges, unless otherwise approved by ENGINEER or recommended by pipe manufacturer. Gaskets shall be suitable for service intended in accordance with manufacturer's ratings and instructions. Gaskets shall be properly centered.
    - b. Bolts shall be tightened as recommended by the manufacturer in sequence that ensures equal distribution of bolt loads.
    - c. Length of bolts shall be uniform. Bolts shall not project beyond the nut more than 1/4-inch when fully tightened. Bolts shall not fall short of the nut when fully taken up. Ends of bolts shall be machine cut and neatly rounded. Do not use washers.
    - d. Prior to assembly, lubricate bolt threads and gasket faces.
    - e. After assembly, coat all bolts and nuts, except those of stainless steel, with two coats, minimum dry film thickness of eight mils each, of high-build epoxy or bituminous coating manufactured by Tnemec, or equal.
  5. Mechanical Coupling Joints:
    - a. Mechanical couplings include: sleeve-type flexible couplings, split flexible couplings, ANSI/AWWA C606 grooved or shouldered end couplings, plasticized PVC couplings, and other mechanical couplings specified.
    - b. Prior to installing and assembling mechanical couplings, thoroughly clean joint ends with wire brush to remove foreign matter.
    - c. For mechanical couplings that incorporate gaskets, after cleaning apply lubricant to rubber gasket or inside of coupling housing and to joint ends. After lubrication, install gasket around joint end of previously installed piece and mate joint end of subsequent piece to installed piece. Position gasket and place coupling housing around gasket and over grooved or shouldered joint ends. Insert bolts and install nuts tightly by hand. Tighten bolts uniformly to produce an equal pressure on all parts of housing. When housing clamps meet

- metal to metal, joint is complete and further tightening is not required.
- d. For plasticized PVC couplings, loosen the stainless steel clamping bands and remove clamps from coupling. Slide coupling over plain ends of pipes to be joined without using lubricants. Place clamps over each end of coupling at grooved section and tighten with torque wrench to torque recommended by manufacturer.
6. HDPE Pipe Joints:
- a. Bell and Spigot Joints:
    - 1) Remove all burrs and provide reference mark at correct distance from pipe end. Place mark such that no more than 1/2-inch of machined spigot surface will be visible outside of bell after pipe has been joined.
    - 2) Clean spigot end and bell thoroughly with soap and water before positioning gasket.
    - 3) Lubricate spigot groove with manufacturer's recommended lubricant. Thoroughly clean gasket and place in spigot groove starting at bottom, ensuring that gasket fins face backwards toward pipe.
    - 4) Thoroughly lubricate gasket with pipe manufacturer's recommended lubricant and equalize stretch in gasket by running screwdriver under gasket around its entire circumference three times. Reposition gasket in groove after stretching.
    - 5) Thoroughly clean and lubricate receiving bell. Align pipe as straight as possible and insert spigot end of pipe carefully into bell until reference mark on spigot is flush with bell.
    - 6) If mechanical means are used to insert spigot end, protect with wood the end of pipe being pushed, to ensure even distribution of pressure.
  - b. Butt Fusion Welded Joints:
    - 1) Install joints in accordance with manufacturer's instructions using hydraulic butt fusion machine or manual machine equipped with torque wrench. Equipment shall be able to achieve and maintain heating tool temperature range of 400 to 450 degrees F and an interface pressure of 60 to 90 psi.
    - 2) Clean interior and exterior of pipe and fitting ends with clean, dry, lint-free cloth.
    - 3) Align ends to be joined in the fusion machine without forcing ends into alignment. Adjust alignment as necessary and tighten clamps to prevent slippage.
    - 4) Place facing tool between ends to be joined and face them to provide clean, smooth, parallel mating surface. If stops are present, face ends down to the stops. Remove all shavings after facing without touching ends.
    - 5) Re-check alignment of ends and check for slippage against fusion pressure. There shall be no detectable gaps between ends. Align outside diameters.
    - 6) Heating tool shall maintain pipe manufacture's recommended temperature range. Place the tool between ends to be joined. Move ends against heating tool to achieve full contact. Hold ends against heating tool without force until the following melt bead size is formed:

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

- 7) Upon forming proper melt bead size, quickly separate ends and remove heating tool. Quickly inspect melted ends and bring ends together applying joining force recommended by manufacturer, using 60 to 90 psi interfacial pressure to form double bead rolled over surface of pipe on both ends.
  - 8) Hold joining force against ends until joint is cool to the touch. Cooling period shall be 30 to 90 seconds per inch of pipe diameter. Heavier wall thicknesses may require longer cooling times as recommended by pipe manufacturer.
  - 9) Upon completing joint, inspect to verify double bead has been formed on both sides, uniformly rounded and consistent in size all around joint. Remove faulty joints and re-joint.
7. HDPE Double Containment Pipe (Containment and Carrier Pipe):
- a. Install joints of double containment piping system in accordance with pipe manufacturer's instructions. Joints shall be butt fusion welded.
- G. Backfilling:
1. Conform to applicable requirements of Section 31 23 05, Excavation and Fill.
  2. Place backfill as Work progresses. Backfill by hand and use power tampers until pipe is covered by at least one foot of backfill.
- H. Connections to Valves:
1. Install valves as shown and indicated in the Contract Documents.
  2. Provide suitable adapters when valves and piping have different joint types.
  3. Provide thrust restraint at all valves located at pipeline terminations.
- I. Transitions from One Type of Pipe to Another:
1. Provide necessary adapters, specials, and connection pieces required when connecting different types and sizes of pipe or connecting pipe made by different manufacturers.
- J. Closures:
1. Provide closure pieces shown or required to complete the Work.

### 3.2 TRACER TAPE INSTALLATION

- A. Polyethylene Underground Warning Tape for Metallic Pipelines:
1. Provide polyethylene tracer tape for buried metallic piping, which includes pipe that is steel, ductile iron, cast iron, concrete, copper, and corrugated metal.
  2. Provide tracer tape 12 to 18 inches below finished grade, above and parallel to buried pipe.

3. For pipelines buried eight feet or greater below finished grade, provide second line of magnetic tracer tape 2.5 feet above crown of buried pipe, aligned along pipe centerline.
  4. Tape shall be spread flat with message side up before backfilling.
- B. Detectable Underground Warning Tape for Non-Metallic Pipelines:
1. Provide polyethylene tracer tape with aluminum backing for buried, non-metallic piping, which includes pipe that is PVC, CPVC, polyethylene, HDPE, FRP, ABS, and vitrified clay.
  2. Provide magnetic tracer tape 12 to 18 inches below finished grade, above and parallel to buried pipe.
  3. For pipelines buried eight feet or greater below finished grade, provide second line of magnetic tracer tape 2.5 feet above crown of buried pipe, aligned along the pipe centerline.
  4. Tape shall be spread flat with message side up before backfilling.

### 3.3 THRUST RESTRAINT

- A. Provide thrust restraint on pressure piping systems where shown or indicated in the Contract Documents.
- B. Thrust restraint may be accomplished by using restrained pipe joints, concrete thrust blocks, or harnessing buried pipe. Thrust restraints shall be designed for axial thrust exerted by test pressure specified in the Buried Piping Schedule at the end of this Section.
- C. Place concrete thrust blocks against undisturbed soil. Where undisturbed soil does not exist, or for projects where the Site consists of backfill material, thrust restraint shall be provided by restrained pipe joints.
- D. Restrained Pipe Joints:
1. Pipe joints shall be restrained by means suitable for the type of pipe being installed.
    - a. Ductile Iron, Push-on Joints and Mechanical Joints: Restrain with proprietary restrained joint system as specified in Section 40 05 19, Ductile Iron Process Pipe; lugs and tie rods; or other joint restraint systems approved by ENGINEER.
    - b. Steel Pipe Joints: Provide butt-welded joints, lap welded joints, flanged joints, or mechanical coupling connections as shown and specified in Buried Piping Schedule in this Section. Provide tie rods connected to lugs welded to the steel pipe for restraint at mechanical couplings.
    - c. Thermoplastic and HDPE Joints: Where bell and spigot-type or other non-restrained joints are utilized, provide tie rods across joint or other suitable joint restraint system, subject to the approval of ENGINEER.
    - d. Prestressed Concrete Cylinder Pipe Joints: Restrain utilizing clamp type restrained joint, snap ring-type restrained joint, or by welding. Concrete pipe requiring restraint shall have sufficient longitudinal steel reinforcement provided to handle thrust forces at maximum design stress of 12,500 psi. Thrust forces in longitudinal must be transmitted directly to steel joint bands using welded connections sufficient to carry stresses involved. No allowance for the concrete

to handle tensile forces is allowed. Thrust restraint shall be in accordance with ANSI/AWWA Manual M9.

- e. Joints for Concrete Pipe Other than Prestressed Concrete Cylinder Pipe: Restrain joints utilizing clamp type restrained joint or snap ring-type restrained joint.

E. Concrete Thrust Blocks:

1. Provide concrete thrust blocks on pressure piping at changes in alignment of 15 degrees or more, at tees, plugs and caps, and where shown or indicated in the Contract Documents. Construct thrust blocks of Class B concrete.
2. Install thrust blocks against undisturbed soil. Place concrete so that pipe and fitting joints are accessible for repair.
3. Concrete thrust block size shall be as shown on the Drawings or as approved by ENGINEER.

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

### 3.4 WORK AFFECTING EXISTING PIPING

A. Location of Existing Underground Facilities:

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

B. Work on Existing Pipelines or Underground Facilities:

1. Cut or tap piping or Underground Facilities as shown or required with machines specifically designed for cutting or tapping pipelines or Underground Facilities, as applicable.
2. Install temporary plugs to prevent entry of mud, dirt, water, and debris into pipe.
3. Provide necessary adapters, sleeves, fittings, pipe, and appurtenances required to complete the Work.
4. Conform to applicable project requirements.

### 3.5 FIELD QUALITY CONTROL

A. General:

1. Test all piping, except as exempted in the Buried Piping Schedule in this Section.
2. When authorities having jurisdiction are to witness tests, notify ENGINEER and authorities having jurisdiction in writing at least 48 hours in advance of testing.
3. Conduct all tests in presence of ENGINEER.
4. Remove or protect pipeline-mounted devices that could be damaged by testing.
5. Provide all apparatus and services required for testing, including:

- a. Test pumps, compressors, hoses, calibrated gages, meters, test containers, valves, fittings, and temporary pumping systems required to maintain OWNER's operations.
  - b. Temporary bulkheads, bracing, blocking, and thrust restraints.
  6. Provide air if an air test is required, power if pumping is required, and gases if gases are required.
  7. Unless otherwise specified, OWNER will provide fluid required for hydrostatic testing. CONTRACTOR shall provide means to convey fluid for hydrostatic testing into piping being tested. CONTRACTOR shall provide fluid for other types of testing required.
  8. Repair observed leaks and repair pipe that fails to meet acceptance criteria. Retest after repair.
  9. Unless otherwise specified, testing shall include existing piping systems that connect with new piping system. Test existing pipe to nearest valve. Piping not installed by CONTRACTOR and that fails the test shall be repaired upon authorization of OWNER. Unless otherwise included in the Work, repair of existing piping or Underground Facilities will be paid as extra Work.
- B. Test Schedule:
1. Refer to the Buried Piping Schedule in this Section for type of test required and required test pressure.
  2. Unless otherwise specified, required test pressures are at lowest elevation of pipeline segment being tested.
  3. For piping not listed in Buried Piping Schedule in this Section:
    - a. Hydrostatically test pipe that will convey liquid at a pressure greater than five psig. Provide process air pipe test for pipe that will convey air or gas under pressure or vacuum, except chlorine gas, which requires separate test.
    - b. Use exfiltration testing, low-pressure air testing, or vacuum testing for other piping.
    - c. Disinfect for bacteriological testing piping that conveys potable water.
  4. Test Pressure:
    - a. Use test pressures listed in Buried Piping Schedule in this Section.
    - b. If test pressure is not listed in Buried Piping Schedule, or if test is required for piping not listed in the Buried Piping Schedule, test pressure will be determined by ENGINEER based on maximum anticipated sustained operating pressure and methods described in applicable ANSI/AWWA manual or standard that applies to the piping system.
- C. Hydrostatic Testing:
1. Preparation for Testing:
    - a. For thermoplastic pipe and fiberglass pipe, follow procedures described in Section 7 of ANSI/AWWA Standard C605.
    - b. For HDPE pipe, follow procedures described in ASTM F2164. Test duration, including time to pressurize, time for initial expansion, time at test pressure, and time to depressurize, shall not exceed eight hours. If re-testing of a test section or pipeline is required, at least eight hours shall elapse between tests.

- c. For steel pipe, follow procedures described in ANSI/AWWA Manual M11. Wetting period is not required for pipe that is not cement-lined.
  - d. For other piping follow procedures described in ANSI/AWWA Manual M9, except that minimum wetting period required immediately prior to testing for asbestos cement pipe shall be 24 hours rather than the 48 hours prescribed for concrete pipe. Wetting period is not required for pipe that is not cement mortar-lined.
  - e. Prior to testing, ensure that adequate thrust protection is in place and joints are properly installed.
  - f. Piping for Hydraulic Fluid, Lube Oil, and Diesel Fuel: Hydrostatically test system using the fluid with which system will function permanently. Allowable leakage is zero. For fluid power systems, pipe manufacturer shall supervise installation and testing of system components, including field piping.
2. Test Procedure:
- a. Fill pipeline slowly to minimize air entrapment and surge pressures. Fill rate shall not exceed one foot of pipe length per second in pipe being tested.
  - b. Expel air from pipe as required. Obtain approval of ENGINEER prior to tapping pipe for expelling air.
  - c. Examine exposed joints and valves, and make repairs to eliminate visible leakage.
  - d. After specified wetting period, add fluid as required to pressurize line to required test pressure. Maintain test pressure for a stabilization period of ten minutes before beginning test.
  - e. HDPE Pipe: After filling pipeline, gradually pressurize pipe to test pressure and maintain required test pressure for three hours for pipe to expand. During expansion, add fluid to maintain required test pressure. Begin timed test period after expansion period and other requirements are met.
  - f. Timed test period shall not begin until after pipe has been filled, exposed to required wetting period, air has been expelled, and pressure stabilized.
  - g. Timed Test Period: After stabilization period, maintain test pressure for at least two hours. During timed testing period, add fluid as required to maintain pressure within five psig of required test pressure. For HDPE pipe, after three hour expansion phase, reduce test pressure by ten psig and do not add liquid. Test pressure shall then remain steady for one hour, indicating no leakage.
  - h. Pump from test container to maintain test pressure. Measure volume of fluid pumped from test container and record on test report. Record pressure at test pump at 15 minute intervals for duration of test.
3. Allowable Leakage Rates: Leakage is defined as the quantity of fluid supplied to pipe segment being tested to maintain pressure within five psi of test pressure during timed test period. Allowable leakage rates for piping are:
- a. No Leakage: Pipe with flanged, welded, fused, threaded, soldered, or brazed joints.
  - b. Rates based on formula or table in ANSI/AWWA Manual M41:
    - 1) Metal and fiberglass pipe joined with rubber gaskets as sealing members, including the following joint types:

- a) Bell and spigot and push-on joints.
    - b) Mechanical joints.
    - c) Bolted sleeve type couplings.
    - d) Grooved and shouldered couplings.
  - c. Rates based on make-up allowance in ANSI/AWWA Manual M9:
    - 1) Prestressed concrete cylinder pipe and other types of concrete pipe joined with O-ring rubber gasket sealing members.
  - d. Rates based on formula or table in ANSI/AWWA C605:
    - 1) Plastic pipe joined with O-ring gasket sealing members.
  - e. Rates based on formula or table in ANSI/AWWA C603:
    - 1) Asbestos-cement pipe.
- D. Exfiltration Testing:
1. Plug and bulkhead ends and lateral connections of pipe segment to be tested and admit fluid until the pipe is full. Admit fluid slowly to minimize air entrapment. Groundwater level shall be below the pipe during exfiltration test.
  2. Before measuring leakage, allow fluid to wet pipe interior for the following period:
    - a. Concrete Pipe: 48 hours.
    - b. Cement Mortar-lined Pipe: 24 hours.
    - c. Asbestos-cement Pipe: 24 hours.
    - d. Other Pipe: Wetting period not required.
  3. Maintain hydrostatic head during test to equal an elevation two feet above present and future maximum groundwater elevation at pipe segment tested. ENGINEER will determine test water surface elevation for each pipe segment.
  4. Provide minimum hydrostatic head during test of two feet above crown of upstream end of pipe segment tested.
  5. Add fluid from test container or from metered supply as required to maintain test water level within three inches of test head throughout the test.
  6. Test duration shall be at least two hours.
  7. Allowable Leakage Rates:
    - a. Leakage is defined as the quantity of fluid that must be supplied to pipe segment tested to maintain hydrostatic head within three inches of test head during the test after pipe has been filled and exposed to required wetting period, plus quantity required to refill to original head at end of test.
    - b. Leakage shall not exceed that allowed by authority having jurisdiction.
- E. Sewer Testing with Low Pressure Air:
1. Plug and bulkhead ends and lateral connections of pipe segment to be tested.
  2. Required test pressure shall be increased by an amount equal to the elevation of groundwater above invert of lowest point of pipe segment being tested.
  3. Test in accordance with requirements of authority having jurisdiction.
  4. If there are no Laws and Regulations covering the test, use test procedures described in the following standards:
    - a. Thermoplastic and HDPE Pipe: ASTM F1417.
    - b. Concrete Pipe: ASTM C924.

- c. Clay Pipe: ASTM C828.
- F. Vacuum Testing:
1. Plug and bulkhead ends and lateral connections of pipe segment or manhole to be tested.
  2. Following set-up of test apparatus, draw vacuum of ten inches of mercury on pipe segment or manhole being tested.
  3. Start test upon reaching specified test vacuum. Test duration shall be 15 minutes.
  4. Record vacuum drop at end of test. If vacuum drop is greater than one inch of mercury, pipe segment or manhole fails the test and shall be repaired and retested. If vacuum drop is less than one inch of mercury, pipe segment or manhole passes the test.
- G. Vertical Deflection Test for Thermoplastic, FRP, and HDPE Pipe:
1. Conduct vertical deflection test at least thirty days after backfill has been placed.
  2. Manually pull pin-type vertical gauge mounted on sled through pipe. Gauge shall be manufactured by Quality Test Products, or equal. Set gauge so that sled will stop if vertical deflection of pipe exceeds five percent. Excavate and re-install piping that fails deflection test, and retest.
  3. Use rigid ball or mandrel for deflection test, which shall have diameter of at least 95 percent of base inside diameter or average inside diameter of piping, depending on which is specified in applicable ASTM standard, including appendix, to which pipe is manufactured. Perform test without mechanical pulling devices. Re-install and retest pipe segments that exceed deflection of five percent.
- H. Examination of Welds:
1. Personnel performing examination of welds shall be qualified to at least Level II in accordance with ASNT SNT-TC-1A.
  2. Conform to ASME Boiler and Pressure Vessel Code Section V and applicable articles for examination of welds.
  3. Visually examine all welds, Category D Fluid Service, in conformance with ASME B31.3.
  4. Examine at least ten percent of welds using liquid penetrant examination.
  5. If defect is detected, all welds shall be examined by liquid penetrant examination.
  6. At conclusion of liquid penetrant examination, remove penetrant test materials by flushing, washing, or wiping clean with applicable solvents.

### 3.6 CLEANING AND DISINFECTION

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

**TABLE 33 05 05-A, BURIED PIPING SCHEDULE**

Service	Diameter (inch)	Material	Interior Lining	Exterior Coating	Pressure Class/ Thickness	Joint	Test	Remarks
SFM	16	PVC	--	--	DR <del>25</del>			
SFM	18	HDPE	--	--	DR 11			
SFM	8	DI	CE	AC	Class 53	FL		Wet well
SFM	8	HDPE	--	--				Wet well
SFM	12	PVC			DR-25			

The following abbreviations are used in the Buried Piping Schedule.

A. Service Abbreviations

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

B. Material Abbreviations

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

C. Lining/Coating Abbreviations

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

D. Joint Abbreviations

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

E. Test Abbreviations

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

+ + END OF SECTION ++

## SECTION 33 05 07.23

## UTILITY BORING AND JACKING

PART 1 - GENERAL1.1 DESCRIPTION

- A. Scope: CONTRACTOR shall provide all labor, materials, equipment, dewatering, supervision and incidentals required to furnish and install casing and carrier pipe as shown on the Drawings and specified herein.
- B. Related Sections
  - 1. Section 33 05 05, Buried Piping Installation
  - 2. Section 40 05 31, Thermoplastic Process Pipe
  - 3. Section 01 51 05, Temporary Utilities

1.2 QUALITY ASSURANCE

- A. Installer's Qualifications and Experience:
  - 1. Installer shall be a specialist in the construction of casing pipes by jacking and boring and shall have at least five (5) years experience in this specialty. Within the past five (5) years, installer shall have personally constructed completely not less than five (5) similar installations, which are comparable in diameter and length to that shown and specified herein.
  - 2. Use only personnel thoroughly trained and experienced in the skills required. The field supervisor of boring operations and the boring machine operator shall have not less than 12 months experience in the operations of the equipment being used.
  - 3. Welds shall be made only by welders, workers and welding operators who have been previously qualified by tests as prescribed by the Structural Welding Society to perform the type of work required. Show proof of certification when requested by the OWNER. Certification shall not be more than 6 months old from the date the work is to be performed.
- B. Requirements of Regulatory Agencies:
  - 1. The OWNER has obtained permission from the applicable authorities for locating the pipeline under the facilities. The CONTRACTOR shall comply with all provisions of these permits at their own expense. All crossings shall be as specified in the Florida Department of Transportation's "Utility Accommodation Manual."
  - 2. The CONTRACTOR shall, in addition to paragraph 1 above, obtain all additional permits, provide insurance, bonds, and guarantees, and all else required by the governing authorities at no additional cost to the OWNER. The CONTRACTOR's responsibility under this paragraph may include, but is not limited to the following:
    - a. Survey and existing utility locates.
    - b. Constructing and removing temporary facilities or structures.
    - c. Providing details of construction methods
    - d. Providing detailed construction schedules.
    - e. Reimbursing the applicable authority for all expenses incurred by them

- in connection with the work.
  - f. Traffic maintenance.
  - g. Necessary clean-up and restoration.
  - h. As-built survey documentation.
- C. Tolerances:
  1. The casing pipes shall be installed on the lines and grades shown in the Drawings and within tolerances required to allow the pipeline to be installed in accordance with the lines and grades shown in the Drawings.
  2. The maximum allowable tolerances are as follows:
    - a. Allowable horizontal tolerance (ft): 0.50
    - b. Allowable vertical tolerance (ft): 0.1
- D. Reference Standards – Comply with the relevant section of the latest revisions of the following standards:
  1. ASTM A139 Grade B, Electric-Fusion (ARC Welded) Steel Pipe.
  2. ASTM A153, Zinc-Coating (Hot Dip) on Iron and Steel Hardware.
  3. ASTM A 276 Standard for stainless and heat-resisting steel bars and shapes
  4. ASTM A307, Low-Carbon Steel Externally and Internally Threaded Standard Fasteners.
  5. ASTM A569, Hot-Rolled Carbon Steel Sheets and Strip, Commercial Quality.
  6. ASTM C 33 Standard specification for concrete aggregates
  7. ASTM C 579 Standard test method for compressive strength of chemical resistant mortars, grouts, monolithic surfacing and polymer concretes
  8. ASTM D 4161 Standard specification for “fiberglass” pipe joints using flexible elastomeric seals
  9. ASTM D 6783 Standard specification for polymer concrete pipe
  10. ASTM F 477 Specification for elastomeric seals (gaskets) for joining plastic pipe
  11. AASHTO, Interim Specification for Steel Tunnel Liner Plates.
  12. AREA Chpt. 1, Part 4, “Jacking Culvert Pipe through Fills.”
  13. AREA Chpt. 1, Part 5, “Specification for Pipelines Conveying Non-Flammable Substances.”
  14. AWS D1.1, Structural Welding Code.
  15. ASTM S252, Welded and Seamless Steel Pipe Piles.
  16. DIN 54815-1&2
  17. OSHA.
  18. State of Florida, Department of Transportation (FDOT) Standards, Utility Accommodation Manual, latest edition.

### 1.3 SUBMITTAL

- A. Installation Methods: Submit surveyed drawings and descriptions showing methods and equipment for the installation of the casing pipes, including sizes and locations of the jacking and receiving pits; sequence of installation by location, etc. for approval by the ENGINEER. Prepare a report of subsurface information, dewatering methods, jacking pit elevations and profile of proposed bore. The report shall be submitted to the OWNER and ENGINEER.
- B. Technical data, test reports, work schedules and other information required by the authority having jurisdiction.

- C. Certificates: Certificate of Conformance in accordance with paragraph 21.1 of ASTM A139.
- D. The CONTRACTOR must submit for approval the following documentation for review by the ENGINEER and any other regulatory agency for each crossing:
  - 1. Noise Reduction Program
  - 2. Solids Control and Drilling Procedures
  - 3. Carrier Pipe Installation, Hydrostatic Testing, and Pigging Procedures
  - 4. Contingency Plans including the CONTRACTOR's proposed responses to the following occurrences:
    - a. Loss of returns/loss of circulation of drilling fluid
    - b. Hydrofracture
    - c. Obstructions encountered during drilling
    - d. Broken drill/auger bit
    - e. Pipe product collapse

#### 1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery:
  - 1. Exercise special care during delivery so as not to damage the casing pipe and carrier pipe.
  - 2. Damaged materials shall be rejected by the OWNER and/or ENGINEER and replaced by the CONTRACTOR at no additional cost to the OWNER.
  - 3. Deliver materials to such locations so as to avoid excessive handling.
- B. Storage:
  - 1. Store casing pipe and carrier pipe on blocking for protection from corrosion until incorporation into the Work in accordance with manufacturer's recommendation.
  - 2. Store in areas approved by the OWNER and ENGINEER.
  - 3. The ENGINEER and OWNER shall be permitted access to inspect the materials in storage areas
- C. Handling:
  - 1. Handle materials in a manner so as to avoid damage.
  - 2. Materials damaged during handling shall be repaired or replaced as ordered by the ENGINEER.

#### 1.5 JOB CONDITIONS

- A. Site information: Refer to Division 0.
- B. Protection: Provide guardrails, fences, signs, lights, barricades, barrels, and all other protective items necessary in accordance with the requirements of all applicable permits, laws, regulations, and ordinances, and as necessary to prevent damage or injury to private or public property or to workmen or the general public.
- C. Adequately support and protect utilities and facilities that are encountered in, or may be affected by the work.
- D. The CONTRACTOR shall observe all necessary and appropriated safety precautions when working on roadway right-of-way or property. To this end,

the CONTRACTOR shall provide a qualified watchmen to warn workmen of the approach of any vehicles or other moving equipment upon the highway, and to keep all workmen or other persons, equipment and materials from the highway including any power, communication, and signal wires, so that there will be no contacts with vehicles. CONTRACTOR shall comply with all regulatory requirements.

- E. Maintain necessary air exchanges in the pipe, when hand excavating, in a condition suitable for the health of the workmen at all times.
- F. Existing Structures: The Drawings show certain existing facilities and surface and underground structures located on or adjacent to the Work. This information has been obtained from existing records. It is not guaranteed to be correct or complete and is shown for the convenience of the CONTRACTOR. The CONTRACTOR shall explore ahead of the required Work to determine the exact location of all structures. They shall be supported and protected from damage by the CONTRACTOR. If they are broken or damaged, they shall be restored immediately by the CONTRACTOR at no additional cost to the OWNER.
- G. Existing Utilities: Locate existing underground utilities in the areas of Work. If utilities are to remain in place, provide adequate means of protection during all operations.
  - 1. Cooperate with the OWNER and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
  - 2. Do not interrupt existing active utilities except when permitted in writing by the OWNER or utility owner and then only after acceptable temporary utility services have been provided.
  - 3. Coordinate with utility companies in writing prior to proceeding with work activities. Any shut downs of services shall be in conformance with Section 01 51 05, Temporary Utilities.

#### 1.6 GUARANTEE

- A. Guarantee of work completed by the CONTRACTOR shall be as specified in the General Conditions, except that longer periods may be required where noted in the permits or specified by authorities have jurisdiction.

#### 1.7 GENERAL PROCEDURES

- A. Install welded steel pipe casings as shown or specified, in accordance with approved jacking and boring methods.
- B. Attend all meetings and provide any necessary data, survey, reports, information, details, and construction schedules as requested by the OWNER.
- C. The scheduling of all construction activities under the highway or railroad right-of-way shall consider traffic patterns in order to minimize the interruption of traffic. The CONTRACTOR shall include the cost for such procedures in the bid prices and shall not be entitled to any change in Contract Amount on account of such procedures.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Casing Pipe:

1. Casing pipe shall be new and unused steel pipe meeting the requirements of ASTM A139, Grade B, leakproof construction capable of withstanding AASHTO HS-20 wheel loading for all crossings at the depths shown. Impact factor shall be 1.5. Pipe shall be seamless or have not more than one longitudinal weld.

Carrier Pipe, Nominal Diameter (in.):	Steel Casing Pipe, Nominal Diameter (in.):	Casing Pipe Minimal Wall Thickness (in.)
4	12	0.188
6	14	0.188
8	18	0.250
12	24	0.469
16	30	0.505

2. If the casing pipe is furnished in sections and the casing pipe requires field welding, then the casing pipe shall be furnished with plain ends, mill beveled for field butt welding. Field welded joints shall be performed by AWS D.1.1 Certified Welders and shall be full penetration single-vee groove, butt type welds around the entire circumference of the pipe. All welding shall receive non-destructive testing. Copies of the test report shall be sent to the ENGINEER.
3. For all work performed within Florida Department of Transportation right-of-way, the casing pipe shall be a minimum of 40-foot lengths.
4. Coatings: The exterior and interior surfaces of the casing pipe shall receive surface preparation conforming to SSPC-SP6. One of the following coating systems shall be applied in the shop:
  - a. Kop-Coat, Carboline Co.
    - 1) Primer: Kop-Coat 340 gold primer – 1 coat, 2 to 4 dry mils.
    - 2) Finish: Bitumastic 300M – 2 coats, 8 to 10 dry mils per coat.
  - b. Tnemec:
    - 1) Primer: 37H Chem-Prime HS - 1 coat, 2.0 to 3.5 dry mils.
    - 2) Finish: Tneme-Tar – 2 coats, 8.0 to 10.0 dry mils per coat.
  - c. Or approved equal.
5. CONTRACTOR may use a mechanical joint type pipe in lieu of welded joints. The pipe joint shall be flush with the inside and outside diameter. The joints shall be manufactured by Permalok or ENGINEER approved equal.
6. Casing pipe shall be in accordance with this Section.

B. Carrier Pipe:

1. Carrier pipe shall be as indicated on the Drawings and in this Section and in accordance with Section 33 05 05, Buried Piping Installation and Section 40 05 31, Thermoplastic Process Pipe.

C. Annular Spacers and End Seals:

1. Carrier pipe within casings installed by microtunneling or bore/jack operations shall be supported within the steel casing by means of annular spacers.
2. Annular spacers shall be a two piece prefabricated unit by a single manufacturer. All casing spacers in a single casing pipe crossing shall be by the same manufacturer. Casing spacers shall have a shell made from either 304 stainless steel, 14 gauge mild steel which has been heat fusion coated with PVC plastic, (PVC coating shall be .01 inch thick over the entire band including the runner studs) or high density polyethylene. Casing spacers on 16 inch and smaller carrier pipe shall have 8 inch wide steel bands and casing spacers on 18 inch and larger carrier pipe shall have 12 inch wide steel bands, except high density polyethylene spacers shall have high density polyethylene bands. All casing spacers for 14 inch and smaller pipe size shall have four 10 gauge or 14 gauge steel risers with runners and casing spacers for 16 inch and larger pipe shall have six 10 gauge or 14 gauge steel risers with runners (two top and four bottom), except high density polyethylene spacers shall have one riser for every diameter inch of carrier pipe. The runners (risers) shall be either glass reinforced plastic, UHMW polymer or high density polyethylene. All nuts, bolts and washers shall be 304 stainless steel. All risers over 2 inches in height shall be reinforced. Wooden skids are not an acceptable.
3. The spacers shall be placed in 6 foot intervals. A spacer shall be placed such that it supports the carrier pipe within 2 feet of the casing ends and a minimum of three spacers per 20-foot pipe section. For pipe sections longer or shorter than 20 feet, follow the manufacturer's instructions and recommendations.
4. The CONTRACTOR shall verify size, position, spacing, and configuration of spacers with manufacturer.
5. The CONTRACTOR shall verify the tolerances of the casing spacer are compatible with the carrier pipes outside diameter including provisions for the pipe to be slightly out-of-round.
6. Manufacturer: Spacers shall be manufactured by the following:
  - a. PSI, C12G-2
  - b. Casey Cascade, CCS-12" Width Minimum
  - c. Or approved equal.
7. Ends of casings shall be sealed around end seal made of 1/8" thickness rubber and stainless steel bands that will completely close both ends of the casings.
8. End seals shall be manufactured by
  - a. Public Works Marketing
  - b. PSI
  - c. Advance Products & Systems, Inc.
  - d. Casey Cascade
  - e. or approved equal

#### D. Sand Backfill

1. Sand shall be dry (water content no more than 6% or less than 3%), free from organic matter, and containing not over 5% by weight of deleterious substances. It shall be hard, dense, durable, clean, sharp, and graded evenly from fine to coarse as follows:

Sieve Size	Percent By Weight
3/8 inch	100
No. 4	97-100
No. 8	79 - 85
No. 16	60-78
No. 50	10-20
No. 100	0-4

2. Sand shall have a fineness modulus per ASTM C 136 of between 2.70 and 3.30.

**PART 3 - EXECUTION**

**3.1 GENERAL**

- A. Installation of the crossings shall be by jacking or boring and shall conform in all respects to the requirements contained herein and other applicable standards.
- B. Lines and Grades: The CONTRACTOR shall be responsible for establishing and maintaining proper line and grade at each crossing.
  1. The CONTRACTOR shall periodically check his line and grade to assure conformance with the line and grade shown on the Drawings.
  2. Extra work required because of the CONTRACTOR'S failure to maintain the proper line and grade, as shown on the drawings, shall be performed, by the CONTRACTOR, at no additional cost to the OWNER.

**3.2 INSPECTION**

- A. As required by the ENGINEER, OWNER, FDOT or regulatory agencies.

**3.3 PREPARATION**

- A. Work pits at each end of the crossings shall be sufficiently large to permit satisfactory installation of the casing pipe or direct jacking pipe. All excavation, backfill, sheeting, shoring, bracing, and dewatering shall comply with the applicable requirements of Section 31 23 05, Excavation and Fill and the requirements of the applicable authorities having jurisdiction.
- B. The CONTRACTOR shall dispose of excess excavated material and drilling mud/cuttings in legal manner.

**3.4 INSTALLATION**

- A. Installation of Casing Pipe by Jacking:
  1. Install in accordance with current Sarasota County, and Florida Department of Transportation specifications, rules and requirements latest editions.
  2. Design bracing and backstops and use jacks of sufficient rating such that jacking can be accomplished in a continuous manner until the leading edge of the pipe reaches the final positions shown on the Drawings.

3. If voids develop around the casing pipe as it is jacked, pump cement grout to fill all such voids.
  4. Fill all voids as specified hereafter as soon as possible after completion of jacking operation.
  5. The installation of pipe and fittings shall be in accordance with the project plans and specifications and the manufacturer's recommended practices.
  6. Textile slings, anchor lifting devices and/or a forklift are recommended.
- B. Installation of Casing Pipe by Boring:
1. The boring method shall consist of pushing the pipe into the fill with a boring auger rotating inside the pipe to remove the soil.
  2. Provide the front of the casing pipe with suitable mechanical arrangements or devices that will positively prevent the auger and cutting head from leading the pipe so that there will be no unsupported excavation ahead of the pipe.
  3. The equipment and mechanical arrangements or devices used to bore and remove the earth shall be removable from within the casing pipe in the event an obstruction is encountered.
  4. The face of the cutting edge shall be arranged to provide reasonable obstruction to the free flow of soft or poor soil.
  5. Do not use water or other liquids to facilitate casing emplacement or spoil removal.
  6. If voids develop around the casing pipe as it is bored, pump cement grout to fill all such voids.
  7. Fill all voids as specified hereafter as soon as possible after computation of boring operation.
  8. The installation of pipe and fittings shall be in accordance with the project plans and specifications and the manufacturer's recommended practices.
  9. Textile slings, anchor lifting devices and/or a forklift are recommended.
- C. Obstruction: If an obstruction is encountered during installation to stop the forward action of the casing pipe, and it becomes evident that it is impossible to advance the pipe, the CONTRACTOR shall remove the obstruction at the leading end of the casing pipe. No blasting shall be permitted.
- D. Installation of the Carrier Pipe:
1. After completion of the casing pipe, the carrier pipe shall be installed and pressure tested by an approved method.
  2. Care shall be taken to prevent undue disturbances of the joints.
  3. The carrier pipe shall be laid on the line and grade shown on the Drawings.
  4. The CONTRACTOR shall repair, replace or take whatever action is deemed necessary by the ENGINEER to correct all disturbed joints at no additional cost to the OWNER.
  5. The carrier pipe shall be restrained its full length.
  6. The CONTRACTOR shall block the carrier pipe in place using casing spacers as shown on the Drawings and specified herein.
- E. Annular Space: The annular space between the carrier pipe and casing pipe shall be filled with sand backfill.
- F. End Seals:
1. After the carrier pipe is installed in the steel casing and successfully pressure tested, construct end seals as shown on the Drawings and as

- specified herein.
2. Prior to the installation of the end seals, the carrier pipe shall be properly and sufficiently secured against flotation and against all movement, which would disturb joints.
    - a. The CONTRACTOR shall be responsible for all joints.
    - b. The CONTRACTOR shall repair, replace, or take whatever action is deemed necessary by the ENGINEER to correct all disturbed joints at no additional expense to the OWNER.

+ + END OF SECTION + +

## SECTION 33 05 13

## MANHOLES AND STRUCTURES

PART 1 - GENERAL1.1 DESCRIPTION

- A. Scope:
1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install all precast, cast-in-place and masonry manholes and structures.
- B. General:
1. Manholes and structures shall conform in shape, size, dimensions, material, and other respects to the details shown or as directed by ENGINEER.
  2. Cast-iron frames, grates and covers shall be the standard frame and grate or cover unless otherwise shown and shall be as specified in Division 5, Metals.
  3. Concrete for cast-in-place manholes and structures and for inverts in precast and masonry manholes and structures shall be Class "A" and shall conform to the requirements specified under Section 03 00 05, Concrete.
  4. All manholes and structures shall be precast construction, unless otherwise shown. All sanitary or process manholes and structures carrying untreated wastewater shall be PVC lines or coated with Sauerlesen or Sewer Shield 100.
- C. Related Sections:
1. Section 03 00 05, Concrete.
  2. Section 05 50 13, Miscellaneous Metal Fabrications.

1.2 REFERENCES

- A. Standards referenced in this Section are listed below:
1. American Society for Testing and Materials, (ASTM).
    - a. ASTM C 32, Specification for Sewer and Manhole Brick (made from Clay or Shale).
    - b. ASTM C 139, Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.
    - c. ASTM C 140, Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
    - d. ASTM C 207, Specification for Hydrated Lime for Masonry Purposes.
    - e. ASTM C 478, Specification for Precast Reinforced Concrete Manhole Sections.
  2. American Water Works Association, (AWWA).
    - a. AWWA C302, Reinforced Concrete Pressure Pipe, Non-cylinder Type, for Water and Other Liquids.

### 1.3 SUBMITTALS

- A. Action Submittals: Submit the following:
  - 1. Shop Drawings:
    - a. Submit drawings showing design and construction details of all precast concrete and cast-in-place manholes and structures, including details of joints between the manhole bases and riser sections and stubs or openings for the connections.

## PART 2 - PRODUCTS

### 2.1 PRECAST CONCRETE MANHOLES AND STRUCTURES

- A. Precast manholes and structures shall conform to the details shown. Provide cast-in-place concrete bases where shown.
- B. Except where otherwise specified precast manhole components shall consist of reinforced concrete pipe sections especially designed for manhole construction and manufactured in accordance with ASTM C 478, except as modified herein.
- C. Precast, reinforced concrete manhole bases, riser sections, flat slabs and other components shall be manufactured by wet cast methods only, using forms which will provide smooth surfaces free from irregularities, honeycombing or other imperfections.
- D. Joints between manhole components shall be the tongue and groove type employing a single, continuous rubber O-ring gasket and shall conform to AWWA C302. The circumferential and longitudinal steel reinforcement shall extend into the bell and spigot ends of the joint without breaking the continuity of the steel. Joints between the base sections, riser sections and top slabs of manholes 72-inches in diameter and less shall be rubber and concrete joints. Joints for manhole components greater than 72-inches in diameter shall be provided with steel bell and spigot rings.
- E. All precast manhole components shall be of approved design and of sufficient strength to withstand the loads imposed upon them. They shall be designed for a minimum earth cover loading of 130 pounds per cubic foot, an H-20 wheel loading, and an allowance of 30 percent in roadways and 15 percent in rights-of-way for impact. Manhole bases shall have two cages of reinforcing steel in their walls, each of the area equal to that required in the riser sections. Wall thickness shall not be less than 5-inches. Concrete top slabs shall not be less than 8-inches thick.
- F. Lifting holes, if used in manhole components, shall be tapered, and no more than two shall be cast in each section. Tapered, solid rubber plugs shall be furnished to seal the lifting holes. The lifting holes shall be made to be sealed by plugs driven from the outside face of the section only.
- G. The point of intersection (P.I.) of the sewer pipe centerlines shall be marked with 1/4-inch diameter steel pin firmly enclosed in the floor of each manhole base and protruding approximately 1-inch above the finished floor of the base.

- H. Mark date of manufacture and name or trademark of manufacturer on inside of barrel.
- I. The barrel of the manhole shall be constructed of various lengths of riser pipe manufactured in increments of one foot to provide the correct height with the fewest joints. Openings in the barrel of the manholes for sewers or drop connections will not be permitted closer than one foot from the nearest joint. Special manhole base or riser sections shall be furnished as necessary to meet this requirement.
- J. A precast or cast-in-place slab or precast eccentric cone, as shown or approved, shall be provided at the top of the manhole barrel to receive the cast iron frame and cover.

## 2.2 MASONRY MANHOLES AND STRUCTURES

- A. Masonry manholes and structures, where shown or otherwise approved by ENGINEER, shall conform to the following:
  - 1. Brick: Brick is not allowed by the County.
  - 2. Concrete Blocks: Concrete blocks shall be machine-made, solid segmental blocks not less than 8-inches wide and shaped so that the completed structure in which they are used will conform to the details shown or otherwise approved. Blocks shall be of compact texture and like blocks shall be uniform in shape and size.
  - 3. Concrete blocks shall conform to ASTM C 139. Testing of blocks shall be done in accordance with the requirements of ASTM C 140.
  - 4. Mortar: The mortar shall be composed of Portland cement, hydrated lime, and sand, in which the volume of sand shall not exceed three times the sum of the volumes of cement and lime.
  - 5. Cement shall be Type II Portland cement as specified for concrete masonry.
  - 6. Hydrated lime shall be Type S conforming to ASTM C 207.
  - 7. The sand shall comply with the Specifications for "Fine Aggregate" for concrete, except that all of the sand shall pass a No. 8 sieve.

## 2.3 MISCELLANEOUS METALS

- A. Metal frames and covers and similar required items shall be provided as shown and in accordance with Division 05, Metals.

## 2.4 DROP CONNECTIONS

- A. Drop connections for manholes and structures shall be constructed where shown or directed by the ENGINEER and shall conform to the design and details shown. Pipe and fittings shall be ductile iron, reinforced concrete, or vitrified clay as shown or otherwise approved. Concrete for pipe encasement shall be Class "B" as specified under Section 03 30 00, Cast-In-Place Concrete. Concrete shall be bonded to manhole in the manner shown or otherwise approved by ENGINEER.

2.5 VORTEX FLOW INSERTS

- A. Definitions:
1. Vortex Flow Insert (VFI) – A hydraulic drop that uses a manufactured VFI, as Specified in these documents. The VFI is comprised of a top form, drop shaft, and energy dissipation chamber for installation within a manhole, vault or other structure. The primary functions of VFIs are to prevent the release of H<sub>2</sub>S and other sewage gases and absorb and dissipate the kinetic energy of the wastewater flowing through the structure.
  2. MGD- Million gallons per day
- B. Vortex low Insert(VFI) – Furnish and install two (2) manufactured VFI units, each with flow capacity of 1.7 MGD and recommended mounting and connection materials, conforming to AWWA C-900, AWWA C-905, and ASTM C-581 standards. The VFI is comprised of a top form, shaft, and dissipation chamber. Provide Vortex Flow Insert (VFI) units by IPEX Inc. or approved equal.
1. Performance – The VFI will function effectively for flows between 15% and 115% of rated capacity unless otherwise specified.
- C. Mounting System – Furnish and install a mounting system to secure the structure in place. All fasteners and supports, including straps, mounting hardware and supports shall meet the following requirements.
1. Materials of Construction – The anchors, strapping and other mounting hardware shall be of 316 stainless steel construction.
  2. Structural Design Basis – Horizontal Support: The mounting system must have capability to withstand a horizontal force of 40 lbf resulting from the flow entering the VFI.

PART 3 - EXECUTION3.1 LAYING MASONRY

- A. For concrete block, the vertical keyways shall be completely filled with mortar.
- B. Each grading ring shall be laid in a full bed of mortar and shall be thoroughly bonded.

3.2 PLASTERING

- A. The outside of brick manholes and structures, brick stacks and grading rings shall be neatly plastered with 1/2-inch of cement mortar as the Work progresses.

3.3 MANHOLE BASES

- A. Cast-in-place bases shall be placed on suitable foundations after the pipes are laid. They shall be cast monolithically to an elevation at least 12-inches above the top of the highest pipe entering the manhole, except where a drop connection is to be installed. Base, walls and bottom shall be at least of the thickness shown and reinforced to withstand the loads to be expected. Connections for sewer pipes shall conform to the details shown in the final project plans.

- B. Precast bases shall be set on a crushed stone or crushed gravel foundation as shown. Precast bases shall be set at the proper grade and carefully leveled and aligned.

#### 3.4 PRECAST MANHOLE SECTIONS

- A. Set sections vertical with steps and sections in true alignment. The base of the bell or groove end at joints between components shall be buttered with 1:2 cement-sand mortar to provide a uniform bearing between components. All joints shall be sealed with cement mortar inside and out and troweled smooth to the contour of the wall surface. Raised or rough joint finishes will not be accepted.
- B. Install sections, joints and gaskets in accordance with manufacturers recommendations.
- C. Lifting holes shall be sealed tight with a solid rubber plug driven into the hole from the outside of the barrel and the remaining void filled with 1 to 2 cement-sand mortar.

#### 3.5 MANHOLE CHANNELS

- A. All invert channels through manholes and structures shall be constructed of Class "A" concrete. Channels shall be properly formed to the sizes, cross sections, grades and shapes shown or as ordered. Benches shall be built up to the heights shown or as directed by the ENGINEER and given a uniform wood float finish. Care shall be taken to slope all benches for proper drainage to the invert channel.

#### 3.6 GRADING RINGS

- A. Grading rings shall be used for all precast and masonry manholes and structures, where required. Stacks or grade rings shall be a maximum of 12-inches in height, constructed on the roof slab or cone section on which the manhole frame and cover shall be placed. The height of the stack or grade rings shall be such as required to bring the manhole frame to the proper grade.
- B. Each grade ring shall be laid in a full bed of mortar and shall be thoroughly bonded.

#### 3.7 STUBS FOR FUTURE CONNECTIONS

- A. As shown or required for connections, cast iron sleeves, bell end tile, ductile iron or reinforced concrete pipe stubs with approved watertight plugs shall be installed in manholes and structures. Where pipe stubs, sleeves or couplings for future connections are shown or directed by the ENGINEER, CONTRACTOR shall provide all materials and labor in order to complete the Work.

3.8 GRADING AT MANHOLES AND STRUCTURES

- A. All manholes and structures in unpaved areas shall be built, as shown or directed by the ENGINEER, to an elevation higher than the original ground. The ground surface shall be graded to drain away from the manhole. Fill shall be placed around manholes to the level of the upper rim of the manhole frame, and the surface evenly graded on a 1 to 5 slope to the existing surrounding ground, unless otherwise shown or directed by the ENGINEER. The slope shall be covered with 4-inches of topsoil, seeded and maintained until a satisfactory growth of grass is obtained.
- B. Manholes and structures in paved areas shall be constructed to meet the final surface grade. In paved areas on State Highways, all manholes and structures shall be 1/2-inch below final wearing surfaces. Manholes and structures shall not project above finished roadway pavements to prevent damage from snowplows.
- C. CONTRACTOR shall be solely responsible for the proper height of all manholes and structures necessary to reach the final grade at all locations. CONTRACTOR is cautioned that ENGINEER'S review of Shop Drawings for manhole components will be general in nature and CONTRACTOR shall provide an adequate supply of random length precast manhole riser sections to adjust any manhole to meet field conditions for final grading.

3.9 MANHOLE WATERTIGHTNESS

- A. All manholes and structures shall be free of visible leakage. Each manhole shall be tested for leaks and inspected, and all leaks shall be repaired in a manner subject to ENGINEER'S approval. Manhole testing shall conform to the requirements of Section 33 05 05, Buried Piping Installation.

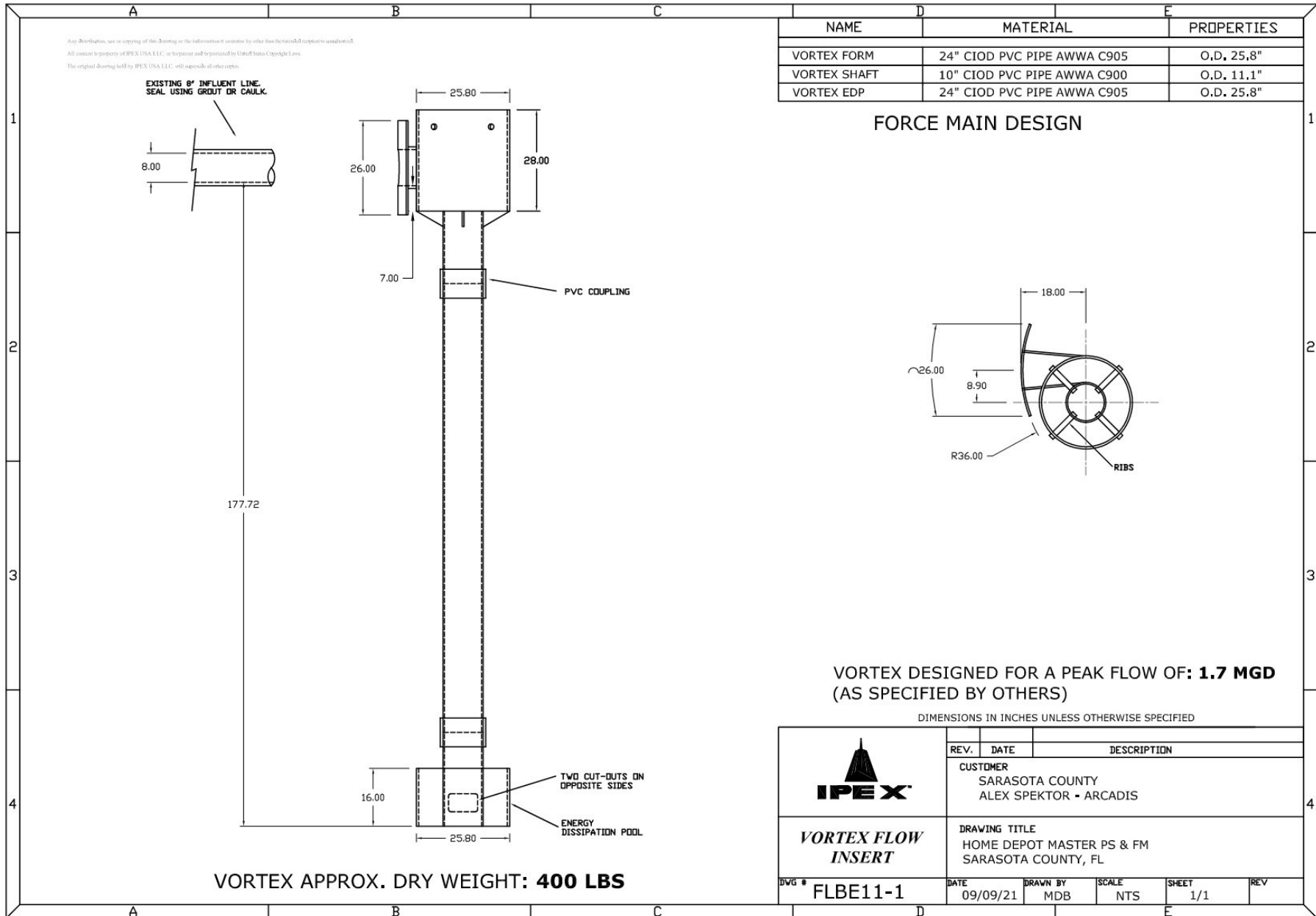
3.10 FLEXIBLE PIPE JOINT AT MANHOLE BASE

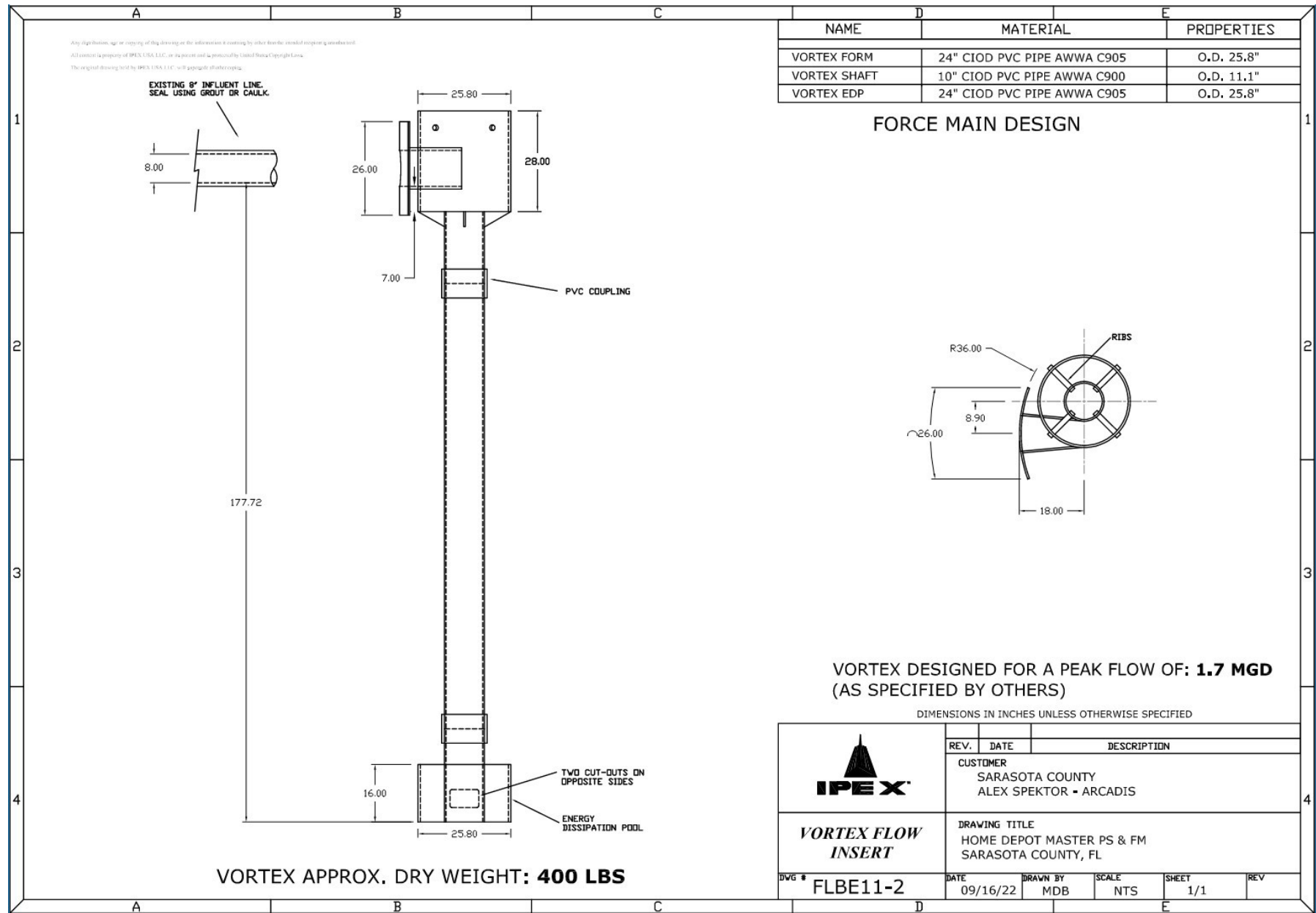
- A. An approved flexible joint shall be provided between each pipe entering and exiting the manhole. This may be accomplished by the installation in the manhole base of the bell end of a pipe or by other means subject to approval of ENGINEER. Joints shall be similar to the approved pipe joints. The joint into the manhole base shall be completely watertight.

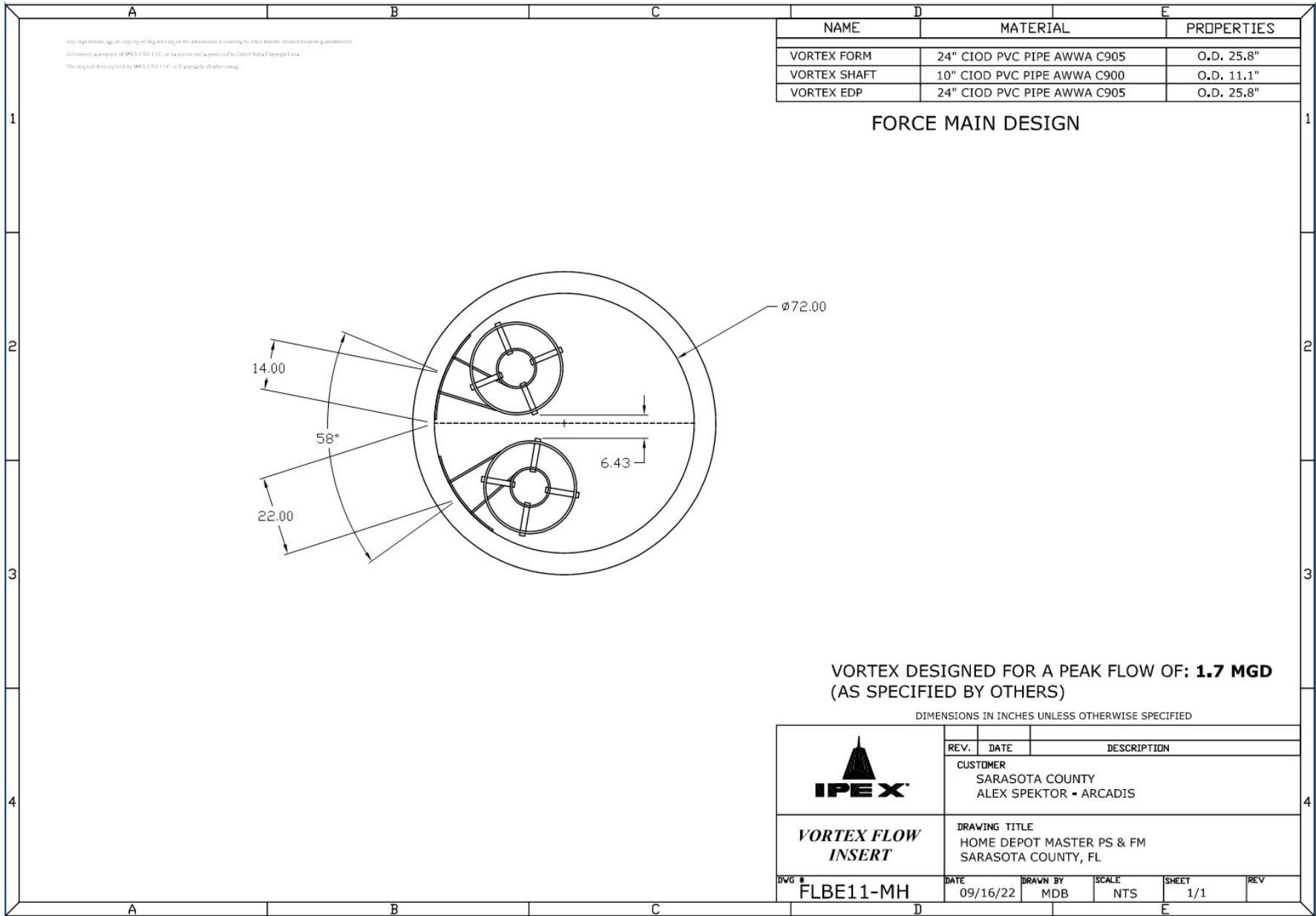
3.11 VORTEX FLOW INSERT INSTALLATION

- A. Install VFI and associated mounting system according to the plans and specifications, and in general conformance to the manufacturer's recommendations. This includes, but is not limited to aligning, anchoring, spacer placement, and use of temporary and permanent support systems. Provide a watertight connection between the device and influent pipe through use of non-shrink sealant or grout, as approved by the engineer.
- B. The quantities of vortex energy dissipation inserts will be measured on a unit basis (ea.).
- C. See attached cut sheets for detailed design of VFI

+ + END OF SECTION + +







## SECTION 40 05 31

## THERMOPLASTIC PROCESS PIPE

PART 1 – GENERAL1.1 DESCRIPTION

- A. Scope:
1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install thermoplastic piping and fittings.
  2. Extent of piping is shown and shall be in accordance with piping schedules in Section 33 05 05, Buried Piping Installation, and Section 40 05 05, Exposed Piping Installation.
- B. Coordination:
1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before thermoplastic piping Work.
- C. Related Sections:
1. Section 33 05 05, Buried Piping Installation.
  2. Section 40 05 05, Exposed Piping Installation.

1.2 REFERENCES

- A. Standards referenced in this Section are:
1. AASHTO, Standard Specifications for Highway Bridges.
  2. ASTM D1784, Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
  3. ASTM D1785, Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120.
  4. ASTM D2464, Specification for Threaded Poly (Vinyl Chlorinated) (PVC) Plastic Pipe Fittings, Schedule 80.
  5. ASTM D2466, Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
  6. ASTM D2467, Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
  7. ASTM D2513, Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
  8. ASTM D2564, Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
  9. ASTM D2665, Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
  10. ASTM D683, Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
  11. ASTM D3034, Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
  12. ASTM D3035, Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
  13. ASTM D3139, Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.

14. ASTM D3212, Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
15. ASTM D3222, Unmodified Poly (Vinylidene Fluoride) (PVDF) Molding Extrusion and Coating Materials.
16. ASTM D3261, Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
17. ASTM D3311, Specification for Drain, Waste and Vent (DWV) Plastic Fittings Patterns.
18. ASTM D3350, Specification for Polyethylene Plastic Pipe and Fittings Materials.
19. ASTM D4101, Specification for Polypropylene Injection and Extrusion Materials.
20. ASTM F437, Specification for Threaded Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
21. ASTM F438, Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40.
22. ASTM F439, Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
23. ASTM F441/F441M, Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.
24. ASTM F442/F442M, Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR).
25. ASTM F477, Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
26. ASTM F656, Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
27. ASTM F679, Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
28. ASTM F714, Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
29. ASTM F1055, Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.
30. ASTM F1336, Specification for Poly (Vinyl Chloride) (PVC) Gasketed Sewer Fittings.
31. ASTM F1674, Standard Test Method for Joint Restraint Products for Use with PVC Pipe.
32. ASTM F1760, Specification for Coextruded Poly (Vinyl Chloride) (PVC) Non-Pressure Plastic Pipe Having Reprocessed-Recycled Content.
33. AWWA C900, Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In.-12 In. (100 mm-300 mm), for Water Transmission and Distribution
34. AWWA C901, Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm), for Water Service.
35. AWWA C905, Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In.-48 In. (350 mm-1,200 mm).
36. AWWA C906, Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) Through 63 In. (1,600 mm), for Water Distribution and Transmission.
37. AWWA C907, Injection-Molded Polyvinyl Chloride (PVC) Pressure Fittings, 4 In. Through 12 In. (100 mm Through 300 mm).
38. NSF 14, Plastic Piping Systems Components and Related Material.
39. ANSI/NSF 61, Drinking Water System Components - Health Effects.
40. Standards of U.S. Food and Drug Administration.

### 1.3 QUALITY ASSURANCE

- A. Qualifications:
1. Manufacturer: Shall have a minimum of five years experience producing thermoplastic pipe and fittings substantively similar to the materials specified, and shall be able to submit documentation of satisfactory service in at least five completed installations in operation for at least five years each.
  2. Installer:
    - a. Engage a single pipe installer who shall be responsible for all thermoplastic pipe Work, and who shall employ only tradesmen with specific skills and experience in the type of Work required.
    - b. Installer shall have a minimum of five years experience installing thermoplastic pipe and fittings substantively similar to the materials specified and substantively similar to or larger than the scope of thermoplastic piping Work on the Project, and shall be able to submit documentation of satisfactory experience in at least five completed installations in operation for at least five years each.
- B. Component Supply and Compatibility:
1. Obtain all materials included in this Section, regardless of component Supplier, from a single thermoplastic pipe Supplier. All pipe of each material type shall be furnished by the same manufacturer.
  2. Thermoplastic pipe Supplier shall review and approve to prepare all Shop Drawings and other submittals for all materials furnished under this Section.
  3. Materials shall be suitable for specified service conditions and shall be integrated into overall assembly by thermoplastic pipe Supplier.

### 1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
1. Shop Drawings:
    - a. Submit piping layout Shop Drawings in accordance with Section 33 05 05, Buried Piping Installation, and Section 40 05 05, Exposed Piping Installation.
  2. Product Data:
    - a. Submit product data on pipe, fittings, gaskets, hardware, and appurtenances sufficient to demonstrate compliance with the Contract Documents.
- B. Informational Submittals: Submit the following:
1. Certificates:
    - a. Submit manufacturer's certificate of compliance standards referenced in this Section.
  2. Source Quality Control Submittals:
    - a. When requested by ENGINEER, submit results of source quality control tests.
  3. Qualifications Statements:
    - a. Submit qualifications of manufacturer when requested by ENGINEER.
    - b. Submit qualifications of installer when requested by ENGINEER.

## 1.5 DELIVERY, STORAGE AND HANDLING

- A. Refer to Section 33 05 05, Buried Piping Installation, and Section 40 05 05, Exposed Piping Installation.

## PART 2 – PRODUCTS

### 2.1 SERVICE CONDITIONS

- A. General:
  - 1. Pipe materials shall be suitable for services intended. Refer to piping schedules in Section 33 05 05, Buried Piping Installation, and Section 40 05 05, Exposed Piping Installation.
  - 2. Pipe shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, and other defects. Unless otherwise shown or indicated, pipe shall be uniform in color, opacity, density, and other physical properties.
  - 3. Comply with NSF 14.
  - 4. Buried pipe shall be capable of withstanding external live load, including impact, equal to AASHTO H-20 loading, with cover shown or indicated on the Drawings.

### 2.2 POLYVINYL CHLORIDE (PVC) PIPING

- A. PVC Pipe – General Applications: Unless otherwise shown or indicated, PVC pipe shall comply with the following:
  - 1. Manufacturers: Provide products of one of the following:
    - a. Ipex, Inc.
    - b. Spears Manufacturing Company.
    - c. Or equal.
  - 2. Material: Unless otherwise specified, comply with the following:
    - a. Type and Grade: Type 1, Grade 1.
    - b. Wall Thickness: Exterior, underground, direct-buried conduit shall be schedule 80 and exterior, underground, concrete-encased conduit shall be schedule 40 complying with ASTM D1784 and ASTM D1785, and US Product Service PS 21-70 as having same outside diameter dimension as cast-iron pipe.
    - c. Temperature Rating: Rated for temperature to 140 degrees F.
    - d. Color: White or gray.
  - 3. Fittings: Type, grade, schedule, and color of fitting shall match the associated pipe.
    - a. Solvent Weld: Comply with ASTM D2466 for Schedule 40 and ASTM D2467 for Schedule 80.
    - b. Threaded: Threaded fittings shall comply with ASTM D2464.
    - c. Flanged: Provide flanged fittings with Neoprene gaskets.
  - 4. Joints:
    - a. Solvent Weld: Use primer and solvent cement recommended by PVC pipe manufacturer for the application. Primer shall be in accordance with ASTM F656, and solvent cement shall be in accordance with ASTM D2564.
    - b. Threaded: Use 100 percent virgin polytetrafluoroethylene (Teflon or PTFE) tape for threaded fittings. Pipe shall not be threaded.

- c. Flanged: Provide with backup flange minimum 1/8-inch thick. Backup flanges and connecting bolts shall be Type 304 stainless steel.
- B. Buried PVC Gravity Sewer Pipe.
- 1. Manufacturers: Provide products of one of the following:
    - a. Ipex, Inc.
    - b. Diamond Plastics Corp.
    - c. Or equal.
  - 2. Material:
    - a. Pipe shall comply with ASTM D3034.
    - b. Wall Thickness and Pipe Stiffness: Pipe stiffness shall be determined in accordance with test methods in ASTM D3034.
      - 1) Main Line: SDR 35, with minimum ring stiffness of 46 psi.
      - 2) Service Laterals: SDR 28, with minimum ring stiffness of 90 psi.
  - 3. Fittings:
    - a. Injection-molded, gasketed fittings shall comply with ASTM F1336, and ASTM D3034.
    - b. Fabricated fittings shall comply with ASTM F1336.
    - c. Unless otherwise shown or indicated, saddle wyes are unacceptable.
  - 4. Joints:
    - a. Provide bell and spigot joints. Bell shall consist of an integral wall section to hold securely in place (and prevent displacement during assembly of joint) elastomeric O-ring gasket.
    - b. Jointing lubricant shall be as recommended by pipe manufacturer.
    - c. Provide elastomeric gaskets complying with ASTM F477, and ASTM D3139 or ASTM D3212.
- C. Buried PVC Pressure Pipe:
- 1. Manufacturers: Provide products of one of the following:
    - a. Ipex, Inc.
    - b. Diamond Plastics Corp.
    - c. Or equal.
  - 2. Material:
    - a. Pipe shall comply with AWWA C900 or AWWA C905 (as applicable).
    - b. Material shall comply with ASTM D1784.
    - c. Wall Thickness: SDR 25.
    - d. Fabricate pipe with cast-iron pipe equivalent outside diameter.
  - 3. Fittings:
    - a. Comply with AWWA C900, AWWA C905, or AWWA C907, as applicable.
  - 4. Joints:
    - a. Provide bell and spigot joints. Bell shall consist of an integral wall section to hold securely in place (and prevent displacement during assembly of joint) elastomeric O-ring gasket.
    - b. Jointing lubricant shall be as recommended by pipe manufacturer.
    - c. Provide elastomeric gaskets complying with ASTM F477 and ASTM D3139.
    - d. Restrained Joints: Provide restrained joints where shown or indicated.
      - 1) Comply with Section 33 05 05, Buried Piping Installation.
      - 2) Proprietary Joint Systems: Comply with ASTM F1674. Provide restrained joint system by one of the following for bell and spigot joint PVC piping:

- a) Ebaa Iron Sales, Inc.: Series 1500 and Series 1600 Restraint Harness for C900 Pipe; Megalug Series 2500, 2800, and 1100HV Restraint Harness for C905 Pipe.
  - b) PV-LOK Series, by Sigma Corp.
  - c) Or equal.
- D. PVC Drain, Waste, and Vent (PVC-DWV) Pipe.
- 1. Manufacturers: Provide products of one of the following:
    - a. Chemtrol, manufactured by Nibco, Inc.
    - b. Spears Manufacturing Company.
    - c. Or equal.
  - 2. Material: In accordance with ASTM D1784. Unless otherwise shown or indicated, PVC-DWV pipe shall be:
    - a. Type and Grade: Type 1, Grade 1.
    - b. Wall Thickness: Schedule 40.
    - c. Color: White.
  - 3. Fittings: Manufactured in accordance with ASTM D2665 and ASTM D3311.
    - a. Solvent weld.
    - b. Spigot.
  - 4. Joints:
    - a. Solvent weld.
    - b. Threaded.

### 2.3 IDENTIFICATION

- A. Pipe material identification requirements are in Section 33 05 05, Buried Piping Installation, and Section 40 05 05, Exposed Piping Installation.

### 2.4 SOURCE QUALITY CONTROL

- A. Shop Tests:
  - 1. Pipe manufacturer shall maintain continuous quality control program.
  - 2. Where applicable and when requested by ENGINEER, submit results of source quality control tests specified in reference standards.
  - 3. CPVC plastic molding materials used for manufacturing pipe and fittings under this Section shall be tested for compliance with ASTM D1784.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Inspect pipe materials for defects in material and workmanship. Verify compatibility of pipe and fittings.

### 3.2 INSTALLATION

- A. For buried piping installation, refer to Section 33 05 05, Buried Piping Installation.
- B. For exposed piping installation, refer to Section 40 05 05, Exposed Piping Installation.

+ + END OF SECTION + +

## SECTION 46 41 24

## CONDITIONING PUMP

PART 1 - GENERAL1.1 DESCRIPTION

## A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install a conditioning pump complete and operational. A complete system will be provided including pumps, motors, and nozzle assemblies. The Contractor unless otherwise required in this specification section, shall supply discharge piping to nozzles, piping supports, valves, anchor bolts, gauges and other specialties. Pump suction pipe, if shown in the drawings, shall also be supplied by the Contractor. All performance and warranty requirements shall also be the responsibility of the approved manufacturer.
2. Included are motors, pumps, housings, propellers, nozzles systems and all appurtenances.

## B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before the conditioning pump work.

## C. Related Sections:

1. Section 01 65 00, Product Delivery Requirements.
2. Section 01 78 23, Operation and Maintenance Data.
3. Section 05 05 33, Anchor Systems.
4. Section 09 91 00, Painting.
5. Section 26 29 33, Control Stations.
6. Section 26 29 37, Low-Voltage Combination Magnetic Motor Starters

1.2 REFERENCES

## A. Standards referenced in this Section are listed below:

1. American Bearing Manufacturers Association, (ABMA).
2. American Gear Manufacturers Association, (AGMA).
3. American Institute of Steel Construction, Inc., (AISC).
  - a. AISC 303, Code of Standard Practice for Steel Bridges and Buildings.
  - b. AISC S326, Design, Fabrication and Erection of Structural Steel.
4. American National Standards Institute, (ANSI).
5. American Society for Testing and Materials, (ASTM).
  - a. ASTM A 36/A 36M, Specification for Carbon Structural Steel.
  - b. ASTM A 48/A 48M, Specification for Gray Iron Castings.
6. American Welding Society, (AWS).
  - a. AWS D1.1/D1.1M, Structural Welding Code-Steel.
7. Institute of Electrical and Electronics Engineers, (IEEE).
8. National Electrical Code, (NEC).
9. National Electrical Manufacturers Association, (NEMA).

### 1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
  - 1. Manufacturer shall have a minimum of five years experience producing substantially similar equipment and shall be able to show evidence of at least five installations in satisfactory operation for at least five years.
- B. Component Supply and Compatibility:
  - 1. Obtain all equipment included in this Section regardless of the component manufacturer from a single sludge mixing tank mixer manufacturer.
  - 2. The mixer manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this specification.
  - 3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the conditioning pump manufacturer.

### 1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
  - 1. Shop Drawings:
    - a. Manufacturer's literature, illustrations, specifications, and engineering data including materials, dimensions, weights, performance data, and part lists for all components in sufficient detail to allow an item by item comparison with the Contract Documents.
    - b. Pump and Motor test reports for furnished Pump and motors or for a previously manufactured electrically duplicate pump and motor that was tested, including running light current, locked rotor current, winding resistance measurement, high potential test, bearing inspection, and efficiency at 1/2, 3/4, and full load.
    - c. Drawings showing fabrication methods, assembly, accessories, installation details, and wiring diagrams.
    - d. List of deviations from the Contract Documents.
    - e. Listing of conveyor components and materials.
    - f. Provide a copy of the manufacturer's standard warranty for parts and labor.
    - g. For all components of a conditioning pump as appropriate, including setting drawings and instructions for installation of anchor bolts and gear reducer, including tolerances.
- B. Informational Submittals: Submit the following:
  - 1. Support Design Information:
    - a. Weight of the complete assembly.
    - b. Certificates
  - 2. Source Quality Control Submittals:
    - a. Submit results of performance tests and cable insulation tests.
  - 3. Site Quality Control Submittals:
    - a. Submit a written report giving the results of required field tests.
    - b. Submit written report of results of each visit by a manufacturer's serviceman, including purpose and time of visit, tasks performed and results obtained.

- C. Closeout Submittals: Submit the following:
  - 1. Operation and Maintenance Manuals:
    - a. Submit complete Installation, Operation and Maintenance Manuals, including, test reports, maintenance data and schedules, description of operation, and spare parts information.
    - b. Furnish Operation and Maintenance Manuals in conformance with the requirements of Section 01 78 23, Operation and Maintenance Data.
- D. Maintenance Material Submittals: Furnish the following:
  - 1. Spare Parts:
    - a. Furnish all required spare parts as specified in Part 2 of this specification.
  - 2. Tools:
    - a. Furnish all required special tools as specified in Part 2 of this specification.

## 1.5 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling and Unloading:
  - 1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices which are to be embedded in cast-in-place concrete in ample time to prevent delay of that Work.
- B. Storage and Protection:
  - 1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
  - 2. Comply with Section 01 65 00, Product Delivery Requirements.
- C. Acceptance at Site:
  - 1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to equipment or components. Replace loss and repair damage to new condition in accordance with manufacturer's instructions.

## PART 2 - PRODUCTS

### 2.1 SERVICE CONDITIONS

- A. Description:
  - 1. Provide one (1) conditioning system consisting of one (1) wall mounted mixing nozzles with associated chopper pump as described herein and shown in the drawings. The nozzles shall be designed and positioned to produce rotation within the tank, which effectively suspends organic and inorganic material. The pattern shall produce a homogeneous concentration not to exceed +/- 10% of the total suspended solids geometric mean. The conditioning pump manufacturer shall be responsible for determining mixing assembly quantity, location, and appropriate nozzle angles.

- B. Performance Criteria:
1. Schedule of Service Conditions:
    - a. Location: Bottom of Wet Well
    - b. Designation: Conditioning Pump
    - c. Total Number of Units: 1 Pump and 1 mixing nozzle.
    - d. Motor Horsepower and RPM: 10 HP, 1170 RPM
    - e. Type of Waste: Raw Wastewater
    - f. Mixer Primary Pumping Rate: 650 GPM.

## 2.2 MANUFACTURERS

- A. Manufacturers: Provide equipment of one of the following:
1. Vaughan Co , Inc.
  2. Flygt Corporation
  3. Anderson Pumps
  2. Or equal.

## 2.3 DETAILS OF CONSTRUCTION

- A. Nozzle:
1. Nozzles: Shall be glass-lined cast ductile iron, with 1.0" nominal wall thickness to protect against abrasive conditions, and a long straight taper length of at least 10 inches.
  2. Assembly Fittings: Shall be glass-lined cast ductile iron, with 150 lb. flanged piping connection.
  3. Assembly Base: Shall be fabricated carbon steel, with ¾" mounting holes for 5/8" anchor bolts.
- B. Conditioning Pump:
1. The Conditioning Pump shall be a submersible chopper pump design. The pump shall be specifically designed to pump and agitate waste solids at heavy consistencies. Materials shall be macerated and conditioned by the pump as an integral part of the pumping action. The pump must have demonstrated the ability to chop through, mix and pump high concentrations of solids such as plastics, heavy rags, grease and hair balls, wood, paper products and stringy materials without plugging, both in tests and field applications.
  2. Casing, Back Pull-Out Adapter Plate and Wear Plate: The pump casing shall be of semi-concentric design, with the first half of the circumference being cylindrical beginning after the pump outlet, and the remaining circumference spiraling outward to the 150 lb. flanged centerline discharge. Back pull-out adapter plate shall allow removal of pump components from above the casing and allow external adjustment of impeller-to-cutter bar clearance. Wear plate shall be integral to the back pull-out plate and shall include an internal cutter for stringy materials caught between the wear plate and the pump-out vanes on the back of the impeller. Casing and adapter plate shall be ductile cast iron with all water passages to be smooth, and free of blowholes and imperfections for good flow characteristics. Wear plate shall be heat-treated steel plate.

3. Impeller: Shall be semi-open type with pump out vanes to reduce seal area pressure. Chopping/maceration of materials shall be accomplished by the action of the cupped and sharpened leading edges of the impeller blades moving across the cutter bar at the intake openings, with a maximum set clearance between the impeller and cutter bar of .020"-.030" cold. Impeller shall be cast steel, heat treated to minimum Rockwell C 60 and dynamically balanced. The impeller shall be threaded to the shaft and shall have no axial adjustments and no set screws.
4. Cutter Bar: Shall be recessed into the pump bowl and shall contain at least 2 shear bars extending diametrically across the intake opening to within 0.010-0.015" of the rotating external cutter tooth, for the purpose of preventing intake opening blockage and wrapping of debris at the shaft area. Chopper pumps utilizing individually mounted shear bars, and/or which do not have a rotating external cutter extending through to the opposite side of the shear bar to prevent intake opening blockage, shall not be acceptable. Cutter bar shall be T1 plate steel heat-treated to minimum Rockwell C 60.
5. Cutter Nut: The cutter nut shall be used to affix the impeller to the shaft, and to eliminate binding or wrapping of stringy materials at the pump inlet. The cutter nut shall consist of a hex head sufficiently sized for ease of removal and shall include an integral cast anvil which shears against the adjacent surface of the segment bars on the cutter bar. The cutter nut shall be cast steel heat treated to a minimum 60 Rockwell C Hardness. Due to the solids handling demand in this application, nuts, bolts, or other impeller securing devices that lack the ability to cut debris from the pump suction shall not be allowed on this project.
6. Upper Cutter: Shall be threaded into the back pull-out adapter plate above the impeller, designed to cut against the pump-out vanes and the impeller hub, reducing and removing stringy materials from the mechanical seal area. Upper cutter shall be cast steel, heat treated to minimum Rockwell C 60.
7. Stainless Steel Nameplates: Shall be attached to the pump giving the manufacturer's model and serial number, rated capacity, head, speed and all pertinent data.
8. Guide Rail System: Provide a non-sparking guide rail system consisting of two stainless steel guide rails, cast bronze pump guide bracket, cast ductile iron discharge elbow with mounting feet and 125 lb. flanges, upper guide rail mounting bracket, and intermediate guide brackets every 10 feet. System design shall prevent spark ignition of explosive gases during pump installation and removal.
9. Moisture and Thermal Sensor Relay: The pump manufacturer shall supply a control relay to monitor both moisture and temperature in the submersible motor. The relay shall be rated 120 VAC with an operating temperature range of -20 degrees C to +65 degrees C. The relay shall be sent to the control panel supplier for installation into the control panels.

#### C. Motors

1. The submersible motor shall be U/L listed and suitable for Class I, Group D, Division I hazardous locations, rated at 20 HP maximum, 1170 RPM, 460 volts, 60 Hertz and 3 phase, with a 1.15 service factor and Class F insulation. The motor shall be rated for 15 minutes of in-air operation. Motor shall have dual moisture sensing probes, and two normally closed automatic resetting thermostats connected in series and imbedded in adjoining phases. Motor frame shall be cast iron, and all hardware and shaft shall be stainless steel.
  2. Motors shall comply with the latest ANSI, NEMA, ABMA and IEEE Standards as a minimum.
  3. Locked rotor current shall be as specified in NEMA standards.
  4. Motor thrust bearings shall be adequate to carry continuous thrust loads under all conditions of service, and shall have a minimum B-10 life of 30,000 hours.
  5. Motors shall have a stainless steel nameplate which shall provide the following: type, frame, insulation, class, Hp, full load current, RPM, centigrade degree rise, manufacturer's name and serial number, model number, voltage, locked rotor KVA code, bearing numbers and a connection diagram.
  6. Mechanical Seals: Motor shall have tandem mechanical seals. Lower pump seal shall be stainless steel 20 welded metal bellows type fitted with silicon carbide seal faces to provide long life expectancy in the presence of grit and abrasive solids. The seal shall ride on a 400 series stainless steel motor shaft, with the seal bellows tension set by 3 set screws. Seals shall be tested for flatness within 2 Helium light bands under a Helium light source and optical flat.
- D. Shafts:
1. Propeller shaft: Stainless steel, ANSI 431.
  2. Motor shaft: Stainless steel, ANSI 431.
- E. Shaft Bearings:
1. Mixer motor shaft shall rotate on two permanently lubricated bearings. Inner bearing shall be a single row deep groove ball bearing and outer bearing a two-row angular contact ball bearing or a single row deep groove ball bearing.
  2. Propeller shaft shall be supported by two single-row, deep-groove ball bearings.
- F. Power Cable:
1. Provide submersible hypalon jacketed, Type SPC cable (power plus ground plus control), UL listed and labeled. No splices will be allowed in the cable.
  2. Size conductors in accordance with NEC Standards.

- G. Control Panel:
  - a. Provided under Section 26 29 37, Low-Voltage Combination Magnetic Motor Starter, and Section 26 29 33, Control Stations.

#### 2.4 ANCHOR BOLTS

- A. Furnish anchor bolts and nuts of ample size and strength for the purpose intended, sized by the equipment manufacturer. Provide hooked anchor bolts for direct embedment during placement of concrete. Anchor bolt material shall be Type 316 stainless steel conforming to the requirements of Section 05 05 33, Anchor Systems.

#### 2.5 TOOLS AND SPARE PARTS

- A. Furnish and deliver the following boxed and labeled:
  - 1. The conditioning pump shall be furnished with the following spare parts and tools.
    - a. (1) Impeller
    - b. (1) Cutter bar
    - c. (1) Cutter nut
    - d. (1) Set of pump bearings
    - e. (1) Pump mechanical seal
- B. Spare parts shall be packed in sturdy containers with clear indelible identification markings and shall be stored in a dry, warm location until transferred to the Owner at the conclusion of the Project.
- C. Manufacturer shall furnish a list of additional recommended spare parts for an operating period of one year. The list shall describe each part, the quantity recommended, and the unit price of the part.

#### 2.6 SURFACE PREPARATION AND PAINTING

- A. Mixers, pumps, motors, frames, ferrous metal surfaces, appurtenances, etc., shall receive shop primer coating conforming to the requirements of Section 09 91 00, Painting. The pump exterior shall be solvent washed, sandblasted, and coated with minimum 30 MDFT Tnemec Perma-Shield PL Series 431 epoxy
- B. Surface preparation and painting shall conform to the requirements of Section 09 91 00, Painting.

- C. All gears, bearing surfaces, machined surfaces and other surfaces which are to remain unpainted shall receive a heavy application of grease or other rust-resistant coating. This coating shall be maintained during storage and until the equipment is placed into operation.
- D. Contractor shall certify, in writing, that the shop primer and finish coating system conforms to the requirements of Section 09 91 00, Painting.
- E. Nozzle Assemblies shall be SSPC-SP5 commercial sandblasted and finished with Fusion Bonded Epoxy Coating resistant to wastewater, hydrocarbons, and harsh chemicals, with a long history in sewage service and certified for potable water. All fasteners shall be 316 stainless steel

## 2.7 LUBRICANTS

- A. Furnish all oil and grease required for initial operation. Use products as recommended by the manufacturer.

## 2.8 SOURCE QUALITY CONTROL

- A. Shop Tests:
  - 1. Perform a motor and cable insulation test for moisture content or insulation defects.
  - 2. Prior to submergence, run the unit dry to establish correct rotation and mechanical integrity.
  - 3. Run the mixer for 30 minutes submerged.
  - 4. After initial operating test, stop motor and wait 30 minutes while still submerged, then perform the insulation test again with the motor still submerged.
  - 5. Each test shall be witnessed by a Registered Professional Engineer, who may be an employee of the manufacturer. The Registered Professional Engineer shall sign and seal the required tests were performed. The test results shall show the serial numbers of all equipment tested.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Inspection:
  - 1. Inspect and verify that structures or surfaces on which equipment will be installed have no defects which will adversely affect installation.
  - 2. Inspect all equipment prior to installation.
  - 3. Promptly report defects which may affect Work to Engineer.

### 3.2 INSTALLATION

- A. General: Install in a manner and to the tolerances recommended by the equipment manufacturer and approved Shop Drawings.
- B. Manufacturer's representative shall check and approve the installation prior to operation. Manufacturer's representative shall field test and calibrate the equipment to assure that the system operates to the Owner's satisfaction.

3.3 FIELD PAINTING

- A. Field painting shall conform to the requirements of Section 09 91 00, Painting.

3.4 START-UP AND FIELD TEST

- A. Perform operating tests to demonstrate that the equipment operates without excessive vibration.
- B. Make adjustments required to place equipment in proper operating condition.
- C. Mixing Tests:
  - 1. Tests shall verify that contents of each tank are thoroughly mixed and that mixer is capable of continuous operation at completely unsubmerged conditions for not less than two hours.
  - 2. Submit proposed test program and test procedures, method of measurement, and criteria for acceptance to be used to Engineer for approval before start of tests.
  - 3. Submit report of test results.

3.5 FIELD QUALITY CONTROL

- A. All equipment will be given running tests by Contractor at the job Site following installation of the equipment and controls. Should the tests indicate any malfunction, Contractor shall make any necessary repairs and adjustments. Such tests and adjustments shall be repeated until, in the opinion of the Engineer, the installation is complete and the equipment is functioning properly and accurately, and is ready for permanent operation.
- B. A factory trained representative shall be provided for installation supervision, start-up and test services and operation and maintenance personnel training services. The representative shall make a minimum of 2 visits, minimum 8 hours on-Site for each visit, to the Site. The first visit shall be for assistance in the installation of equipment. Subsequent visits shall be for checking the completed installation, start-up and training of the system. Manufacturer's representative shall test operate the system in the presence of the Engineer and verify that the equipment conforms to the requirements. Representative shall revisit the Site as often as necessary until all trouble is corrected and the installation is entirely satisfactory.
- C. All costs, including travel, lodging, meals and incidentals, for additional visits shall be at no additional cost to the Owner.

+ + END OF SECTION + +