

# **Supplemental Contract Documents**

for

## **MPS 308 Forcemain Special Conditions Measurement & Payment Supplemental HDD Specification Bid Tabulation**

For:

**Collier County Public Water Sewer District  
3339 Tamiami Trail East  
Naples, FL 34112**

Engineer:

**Agnoli, Barber & Brundage, Inc.  
7400 Trail Blvd., Suite 200  
Naples, FL 34108**

**ABB PN #10-0023  
August 6, 2018**

 **AGNOLI  
BARBER &  
BRUNDAGE, INC.**  
Professional Engineers, Planners & Surveyors



## SECTION 01011

### PROJECT SUMMARY, SPECIAL CONDITIONS AND SCHEDULE

#### PART 1 GENERAL

##### 1.1 PROJECT DESCRIPTION

- A. This project consists of a new 20" force main beginning at the site of a new proposed MPS 308 and connecting to an existing force main north of Davis Boulevard near East Naples Middle School. Directional bores occur at Airport Pulling Rd in accordance with Collier County, and Davis Blvd in accordance with FDOT. Refer to materials list to be supplied by Collier County. Materials supplied by Collier County is provided with bid tabulation.
- B. The proposed pipeline transverses existing neighborhood roads and crosses a major county road (Airport Road) and a state road (SR84, Davis Boulevard).
- C. Much of the installation is to occur within the limit of existing paved roadways, therefore pavement restoration quantities are significant.
- D. Several connections to existing force mains are proposed including hot taps as well as cut in cold taps which will require pump station shut down and pumper trucks.
- E. This main will be a complete HDPE DR-11 installation with no ductile iron (DI) fittings permitted. Many deflections may be warranted, it is preferred that the deflections be accomplished without fittings by deflecting the pipeline. Connection to existing MPS 308 is to be made, and provision for connection to a replacement MPS 308 is also included in the scope.
- F. All disturbed areas (roads, driveways, grass, landscaped areas) will be restored to pre-construction or better condition.

##### 1.2 SPECIAL CONDITIONS

- A. The governing specifications for the construction of this work are listed on the plan cover sheet and include but are not limited to the FDOT utility accommodation guide, Collier County Right-of-Way Ordinance and Collier County Technical Specifications.
- B. Section 330523.13, concerning the HDD process is additional to the standard specification. Notwithstanding the testing requirements of section 330523.13, the entire pipeline shall be subject to hydrostatic testing in accordance with section 330502.3.10 of the Collier County Technical Specifications.

- C. No work will be permitted in the East Naples Elementary School entrance until school is on summer break.
- D. Owner will provide the following permits: FDOT utility permit for crossing Davis Blvd; Collier County Right-of-Way permit, however, contractor is responsible for payment of lane closures; FDEP main extension.
- E. Portions of the work may require dewatering. Contractor is required to apply to SFWMD for a no notice dewatering permit if dewatering is needed.
- F. Contractor is required to maintain red line record drawings which detail all underground construction updated on a daily basis. This information will be provided to engineer upon completion. This is in addition to the surveyed record drawing requirement.
- G. Contactor is required to prepare a contingency plan for shut downs for tie-ins to active lines. Collections will have to review and approve prior to work.
- H. Contractor is required to provide detailed MOT plan signed and sealed by a Florida Professional Engineer. This plan is to be provided to design engineer for submission to Collier County to obtain the Right-of-Way Permit.
- I. Wherever feasible, contractor is encouraged to deflect HDPE pipe without the use of HDPE fittings by rolling the pipe in accordance with manufacturer specifications.

### 1.3 SCHEDULE

Timing is of the essence for this project as construction will occur near two public schools, cross two heavily travelled streets and disrupt residents along several residential streets. The project will commence upon notice to proceed (NTP) from the County and be in effect until completion of the project as follows.

- Substantial completion must be reached for all aspects of the project no later than two hundred and thirty (230) days from the issued Notice to Proceed.
- Final completion must be reached for all aspects of the project no later than two hundred and ninety (290) days from the issued Notice to Proceed.

## SECTION 012000

### MEASUREMENT AND PAYMENT

Applies to Collier County Public Utilities Projects or Works and Utilities Portions of Collier County Transportation Projects, but not to Private Developments

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Explanation and Definitions
- B. Measurement
- C. Payment
- D. Schedule of Values

##### 1.2 EXPLANATION AND DEFINITIONS

- A. The following explanation of the Measurement and Payment for the Bid Schedule items is made for information and guidance. The omission of reference to any item in this description shall not, however, alter the intent of the Bid Schedule or relieve the CONTRACTOR of the necessity of furnishing such as a part of the Contract. Measurement and payment for all the Contract items shall be made in accordance with this section or as modified by the Supplemental Terms and Conditions.

##### 1.3 MEASUREMENT

- A. The quantities set forth in the Bid Schedule are approximate and are given to establish a uniform basis for the comparison of bids. The COUNTY reserves the right to increase or decrease the quantity of any class or portion of the work during the progress of construction in accord with the terms of the Contract.

##### 1.4 PAYMENT

- A. Make payment for the items listed on the Bid Schedule on the basis of the work actually performed and completed, such work including but not limited to, the furnishing of all necessary labor, materials, equipment, transportation, clean up, restoration of disturbed areas, and all other appurtenances to complete the construction
- B. Unit prices are used as a means of computing the final figures for bid and Contract purposes, for periodic payments for work performed, for determining value of additions or deletions and wherever else reasonable.

## 1.5 SCHEDULE OF VALUES

- A. Approval of Schedule: Submit for approval a preliminary schedule of values, in duplicate, for all of the Work. Prepare preliminary schedule in accordance with the Supplemental Terms and Conditions. Submit preliminary schedule of values within 10 calendar days after the Effective Date of the Agreement. Submit final schedule of values in accordance with the Supplemental Terms and Conditions.
- B. Format: Utilize a format similar to the Table of Contents of the Project Specifications. Identify each line item with number and title of the major specification items. Identify site mobilization, bonds and insurance. Include within each line item, a direct proportional amount of Contractor's overhead profit.
- C. Revisions: With each Application for Payment, revise schedule to list approved Change Orders.

## PART 2 PRODUCTS

Not used

## PART 3 MEASUREMENT AND PAYMENT

- A. Make payment on the basis of work actually performed completing each item in the Bid, such work including, but not limited to, the furnishing of all necessary labor, materials, equipment, transportation, cleanup, and all other appurtenances to complete the construction and installation of the work to the configuration and extent as shown on the drawings and described in the specifications. Payment for each item includes compensation for cleanup and restorations.

## SECTION 1 GENERAL REQUIREMENTS

- 1. Mobilization/Demobilization: Payment for mobilization and demobilization will be made at the Contract lump sum price. Payment for mobilization shall include all necessary meetings for the project, including but not limited to: all meetings deemed necessary by Collier County, and all other public meetings required to complete the project in accordance with the contract documents, preparatory work and operations in mobilizing for the beginning work on the Project and demobilizing for ending work on the Project. The Contractor shall submit invoices substantiating the cost of mobilization with each pay request. This payment cannot exceed more than 10% of the total base bid.
- 2. Maintenance of Traffic: Payment for Maintenance of Traffic in accordance with the COUNTY Maintenance of Traffic Policy will be made for at the Contract lump sum price. Payment shall be prorated by dividing the lump sum price by the total number of contract days, times the number of days in a particular pay request.

3. Project Sign: Payment for Project Sign will be made for at the Contract lump sum price in accordance with the Collier County specifications.
4. Survey Layout & As-Built Drawings: Payment for providing all survey and as-built drawings will be made at the Contract lump sum price in accordance with the Collier County specifications. A digital AutoCAD file of the as-built survey shall be provided to the Engineer of Record.
5. Erosion and Sedimentation Control: Payment of the lump sum amount bid for erosion control shall be full compensation for all erosion and sedimentation control per Collier County and FDOT standards and as specified herein. Includes silt fence around entire disturbed area as appropriate.
6. Pre & Post Construction Video: Measurement for various items covered under Pre-Construction Video & Photographs will not be made for payment, and all items shall be included in the contract lump sum price. Payment for providing pre-construction videos and photographs will be made at the full lump sum contract price for the item, which price and payment shall be full compensation for a minimum of three pictures per lot to document pre-construction conditions, including, but not limited to, sod type and driveway condition; a wet weather video (in addition to a dry weather video) to document flood conditions that will take place during normal business hours. Additional preconstruction videos and pictures must be provided to the County a minimum of 10 days prior to beginning construction. Pre-construction videos and pictures will be taken individually for each block just prior to commencement of construction in the corresponding block, if deemed necessary by the County due to changes to the existing conditions.
7. General Restoration: Measurement for various items covered under General Restoration will not be made for payment, and all items shall be included in the contract lump sum price. Payment for general restoration will be made at the appropriate Contract Unit price per lump sum, and will be prorated based on percent complete. This item includes all labor and materials required for complete ROW to ROW restoration including clearing and grubbing, clean-up, grading (outside of swales), replacement of grass, sod, landscaping, and other surface materials not specifically designated in the Bid. This line item shall include all sodding required for ROW to ROW restoration including swales. Sod type shall be determined by the type of sod that constitutes 50% or more of the property to be restored. Please note that the Contractor is responsible for the upkeep and maintenance of all sod and landscaping during construction, including maintaining existing public and private irrigation systems in service. New sod and landscaping which is damaged or destroyed during construction shall be replaced at no additional cost to Collier County. All landscaping damaged or removed as part of the Contractor's operations must be replaced unless directed otherwise in writing by Collier County. Additionally, the Contractor must repair and replace all private and public irrigation facilities that are damaged or destroyed during construction. Any and all costs incurred by private parties from damaged irrigation lines shall be paid for by the Contractor.

8. Remove and Replace Driveway: Payment for removing and replacing driveway will be made at the appropriate Contract Unit per square yard for each driveway acceptably removed and replaced as shown on the Plans to be removed and replaced for force main construction. All gravel drives shall be replaced with concrete. Replace driveways to match existing elevations and materials of construction. Include surface restoration required for driveway removal and replacement in this item.
9. Road Restoration: Payment for Road Restoration (installing 1" Asphalt overlay Type S-3) will be made at the appropriate Contract unit price per square yard for each item installed in the work. Asphalt overlay will be completed in accordance with the Collier County Specifications.
10. Open-Cut Trench Restoration: Payment for Open-Cut Trench Restoration will be made at the appropriate Contract unit price per linear foot of each item installed in the work. Trench restoration items are located in detail G-2B (sheet 17).
11. Remove, Dispose, and Replace Sidewalk: Payment for removing, disposal, and replacing asphalt and concrete sidewalks shall be made at the appropriate Contract unit price and payment shall be full compensation for removal and disposal of existing material, adjustment, furnishing subgrade and stabilizing material, furnishing and installing of concrete sidewalk per FDOT Standard Index 310 or the Flexible Pavement Design Manual for bike lines per ADA requirements, and testing as specified herein. Pedestrian access and transit shall be provided at all times during construction.
12. Detectable Warnings: Payment for installing detectable warning strips shall be made in accordance with the bid schedule for each installed warning mat.
13. Sod: Payment for sod will be made at the appropriate Contract unit price per square yard of sod installed.
14. Signing and Striping: Payment for signing and striping will be made at the appropriate Contract unit price per lump sum.
15. Sidewalk and Lane Closure Fees: Payment for sidewalk and lane closure fees will be made at the appropriate Contract unit price per day. Sidewalk and lane closure fees will be paid by the Contractor to Collier County Growth Management Department (CCGMD) in accordance with the Right-of-Way Permit Fee Schedule. The Contractor is responsible for coordinating sidewalk and lane closure with CCGMD inspectors.

## SECTION 2 DRAINAGE SYSTEM

16. Furnish and Install Drainage Pipes: Payment for furnishing and installing drainage pipes (15" RCP and 18x30" ERCP) will be made at the Contract unit price per linear foot for the pipe in place. This item includes clearing and disposal of trees

and bushes, labor, equipment for the laying of the pipe and dewatering, compaction and density testing, backfilling, sheeting, excavation of all material encountered, including rock, backfill, unsuitable material, replacement of grass, clearing and grubbing, landscaping, mailboxes, culverts, storm sewers, and other surface materials not specifically designated in the Bid.

17. Furnish and Install Inlets: Payment for furnishing and installing inlets (Type C) will be made at the Contract unit price per each inlet acceptably installed.
18. Furnish and Install Mitered End Section: Payment for furnishing and installing mitered end section will be made for at the Contract Unit price per each mitered end section acceptably installed.
19. Swale Restoration: Payment for swale restoration will be made at the appropriate Contract Unit price per linear foot. This item includes all labor and materials included for complete restoration including clearing and grubbing, clean-up, grading, sod, landscaping, and other surface materials not specifically designated in the Bid.

### SECTION 3 SANITARY SEWER SYSTEM

20. Install Sanitary Sewer Pipelines (Labor Only): Payment for installing sanitary sewer pipelines (20", 12" and 10" HDPE, fittings included) will be made at the Contract unit price per linear foot for the pipe in place. Pipe installation bedded and backfilled in accordance with these specifications will be paid for at a maximum of 75% of the contract unit price for pipelines prior to testing, and the remaining 25% of the contract unit price will be paid after successful hydrostatic and leakage testing. This item includes clearing and disposal of trees and bushes, all necessary fittings, pipe coatings and linings, labor, equipment for the laying of the pipe, dewatering, compaction and density testing, pipe bedding, backfilling, sheeting, restrained joint piping, detectable tape, clamps, harnessing, plugs and caps, adapters, excavation of all material encountered, sod, clearing and grubbing, landscaping, mailboxes, culverts, storm sewers, and other surface materials not specifically designated in the bid. Also includes coordination with other contractors, stubs and valves for future connections to existing pipes, clean-up, disinfection and sterilization, temporary facilities for blow-offs and testing. Measure pipe to the nearest foot along the centerline including the lengths of valves and fittings. Measure linear footage horizontally. Pipe material to be purchased by Collier County for this item. The contractor is responsible for any fittings not provided on the material list provided at the time of the bid.
21. Install Plug Valves and Boxes (Labor Only): Payment for installing 20", 12" and 10" plug valves will be made at the appropriate Contract unit price per each valve acceptably installed. This item includes the labor only to install Plug Valves, and all labor and materials to install boxes, the vault or housing, concrete work, operators, incidentals, and all necessary materials and equipment for installation, including valve stem, valve box extensions and adjustments. This item also



includes the installation of base material below the valve in accordance with the detail shown in the Plans. Plug valve to be purchased by Collier County for this item.

22. Install Air Release Valves (Labor Only): Payment for air release valves (3-inch Pedestal Type) will be made at the Contract price per each air release valve acceptably installed in accordance with the Collier County Standard Details and details shown on the Plans. Air release valves to be purchased by Collier County for this item. Incidental items such as piping, isolation valve and saddles to be supplied by Contractor.
23. Install Hot & Cold Tap & Valve (Labor Only): Payment for installing Hot Tap & Valve (16", 12") and Cold Tap & Valve (10" & 12") will be made at the appropriate Contract unit for each tap & valve acceptably installed. Hot & Cold Tap & Valve to be purchased by Collier County for this item.
24. Connect to Existing Force Main and Master Pump Station: Payment for furnishing and installing the pipeline connection to the existing force main and MPS will be made at the appropriate Contract unit for each connection acceptably installed. This item includes all labor, equipment and materials to install all necessary pipe, fittings, connections, , field measurements, protection of existing facilities, excavations, pipe bedding, dewatering, compaction, surface restoration, testing, cleanup and all other work for a complete installation.
25. Horizontal Directional Drill (HDD): Payment for Horizontal Directional Drill (HDD) shall be made at the Contract lump sum price for each successfully completed HDD. Seventy five percent (75%) payment shall be made for successful installation with the remaining 25% paid after successful hydrostatic testing. This pay item shall include compensation for labor, excavation (including rock), dewatering, drainage, fittings, joints, jointing material, low pressure air testing, annular pressure report, geotechnical investigation and testing, pot holing, tracking and locating wire.
26. Vertical Deflections: Pipe and material for vertical deflections are to be supplied by Collier County. Payment for vertical deflections shall be made for the installation labor and shall be made after successful installation in accordance with the percentages in pay items 26a & 26b for pipelines. Pay items 26a & 26b are intended to be used for unanticipated deflections.
27. Field Adjustment of existing Sanitary Sewer Laterals in conflict with new Forcemain: Payment shall be made on a lump sum basis for each sanitary sewer lateral adjusted due to conflict with the new Force/Water Main, and shall include clearing, grubbing, existing pavement removal and disposal, excavation, pipe and fittings installation, fill, backfilling, compacting, trench and pavement restoration, pipe, pipe fittings and restrained joint materials, dewatering, trench safety measures, existing utility protection, cleaning and leakage testing of the pipeline, grading and sod installation in non-pavement areas, curb, sidewalk, and driveway removal and replacement in kind, temporary pavement, erosion and sedimentation

control, other appurtenant and incidental work, the quantity of adjustments to the existing sanitary sewer laterals may vary.

28. Sewage Pumper Truck: Payment for pumper trucks shall be made on an hourly basis. Hours will be based on actual time spent on the jobsite whether or not pumping occurs.
29. Linestops: Payment for furnishing and installing linestops (10" and 12"), shall be made at the appropriate Contract unit price per each linestop acceptably installed. Linestops are a last resort if isolation valves do not work and the line cannot be emptied.
30. Allowance: An allowance is established to cover unanticipated costs associated with the general requirements, including but not limited to additional landscaping (not covered under any pay item) within the ROW. (No additional payment shall be made for landscaping disturbed outside of the right-of-way). Use of Allowance must be approved by the Collier County prior to execution of the work. All work must be billed on a time and material, lump sum, or unit price basis as agreed upon by the Contractor, County, Engineer of Record, and CEI.

## SECTION 330523.13

### HORIZONTAL DIRECTIONAL DRILLING

#### PART 1 GENERAL

##### 1.1 DESCRIPTION OF REQUIREMENTS

- A. Provide all necessary tools, materials, labor, supervision and equipment to successfully complete the installation of directionally drilled piping as specified herein and shown on the drawings. The CONTRACTOR shall be responsible for the final constructed product, and for furnishing the qualified labor and superintendence necessary for this method of construction.
- B. Furnish all items necessary to perform the horizontal directional drilling operation and construct the pipe to the lines and grade shown on the drawings. Project work tasks include completion of the drilling, pulling operations, horizontal directional drilling installation pressure testing, and final connection of piping installed as part of the horizontal directional drilling to open-cut piping. Horizontal directional drilling shall include the following work elements:
1. Drilling of the pilot hole and the reaming of the hole sufficient to install the HDPE pipe.
  2. Provide, assemble, and install HDPE pipe including:
    - a. Thermal fusion welding the HDPE pipe sections for temporary staging.
    - b. Pulling the HDPE fused pipe stringout, in a continuous pullback operation with one fuse pipe cartridge.
  3. Following HDPE pipe pullback, cut the HDPE pipe stubouts and install a temporary thermal fusion welded HDPE cap on both ends of the HDPE pipe stubouts, and perform pressure testing with water to verify pipeline integrity in accordance with the requirements of Section 022501 for HDPE product pipe material.
- C. Use techniques of creating or directing a borehole along a predetermined path to a specified target location. Use mechanical and hydraulic deviation equipment to change the boring course and use instrumentation to monitor the location and orientation of the boring head assembly along a predetermined course.
1. Develop, provide, and operate a Drill Fluid Loss Monitoring Program as follows:

- a. Drill Fluid Loss Monitoring Program shall insure the following:
    - 1) Site specific storm water control measures meet the requirements of the FDEP Best Management Practices guidelines. Storm water control measures shall include, as a minimum, onsite silt fence and sandbags or other mechanical means located between the construction operations and any adjacent water body. Storm water control measures shall provide positive containment of uncontrolled fluids on the site resulting from spills or overtopping of drill pits from heavy rainfall and prevent the fluids from reaching adjacent water body, or bodies.
    - 2) Positive containment of uncontrolled fluids on the site resulting from spills or overtopping of drill pits from heavy rainfall.
    - 3) Fluids are prevented from reaching the adjacent water bodies, per FDEP ERP permit requirements.
  - b. Drill Fluid Loss Monitoring Program shall include the following:
    - 1) Observations along the drill path during drilling and reaming operations;
    - 2) Equipment for spill control remediation including, but not necessarily limited to, vac trucks, sand bags, and pumps; emergency spill and leakage control materials and equipment including diapers, absorbent material and other fuel and oil spill containment and cleanup materials;
    - 3) Drill fluid loss monitoring and containment including downhole verification of annular drill fluid pressure with continual and immediate reading capability of the pressure monitor;
    - 4) Drill rig instrumentation, including remote-monitoring electronic data recording features, to monitor drill fluid pressures and volumes and rates at pits, tanks, pumps, and drill rig operations;
    - 5) Drill fluid properties measuring equipment; and
    - 6) Trained field engineer to monitor and maintain the instrumentation.
  - c. Provide drill fluid Loss Circulation Materials (LCM's) on site ready for use if needed.
2. Equipment shall be in functional order during all drilling operations.
  3. Data shall be provided to the OWNER's representative daily or on request and a complete package of the recorded data will be provided to the OWNER following completion of the drill.

- D. Accomplish drilling with fluid-assist mechanical cutting. Use a mixture of bentonite and water or polymers and additives. Use bentonite sealants and water to lubricate and seal the mini-tunnel. Use minimum pressures and flow rates during drilling operation as not to fracture the sub-grade material around and or above the bore.
- E. Utilize small diameter fluid jets to fracture and mechanical cutters to cut and excavate the soil as the head advances forward.
- F. Install an offset section of drill stem that causes the cutter head to turn eccentrically about its centerline when it is rotating for steering. When steering adjustments are required, rotate the cutter head offset section toward the desired direction of travel and advance the drill stem forward without rotation. Control of tunnel line and grade shall meet the requirements of this section.
- G. The mobile drilling system shall be capable of being launched from the surface at an inclined angle and drilling a pilot hole with a diameter appropriate to the size, length, and configuration of the directional drill. The pilot hole shall then be enlarged with reamers as required.
- H. Develop and provide certified as-built plans, signed and sealed by a Professional Land Surveyor licensed in the State of Florida, in accordance with this Section

## 1.2 REFERENCE STANDARDS

- A. See Section 330502 for casing and carrier pipe diameter requirements.
- B. American Association of State Highway and Transportation Officials (AASHTO).
- C. Occupational Safety and Health Administration (OSHA).
- D. ASTM Standards:
  - 1. ASTM D 3261 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
  - 2. ASTM F 1962 Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings

## 1.3 DEFINITIONS

- A. CONTRACTOR's Construction Drawings shall be defined as drawings by which the CONTRACTOR proposes to construct, operate, build, etc., the

referenced item. Submit Construction Drawings for the sole purpose of providing the sufficient details to verify that the CONTRACTOR's work in progress is in accordance with the intent of the design.

#### 1.4 SUBMITTALS

- A. The ENGINEER will base the review of submitted details and data on the requirements of the completed work, safety of the work in regards to the public, potential for damage to public or private utilities and other existing structures and facilities, and the potential for unnecessary delay in the execution of the Work. Such review shall not be construed to relieve the CONTRACTOR in any way of his responsibilities under the contract. Do not commence work on any items requiring CONTRACTOR's Construction Drawings or other submittals until the drawings and submittals are reviewed and accepted by the ENGINEER.
- B. The CONTRACTOR shall:
1. Submit for review complete construction drawings in plan and profile view identifying details of the proposed method of construction and the sequence of operations to be performed during construction only if deviations from the contract plans are proposed. The drawings shall be sufficiently detailed to demonstrate to the ENGINEER whether the proposed materials and procedures will meet the requirements of the Contract Documents.
  2. Submit manufacturer's data for the HDPE pipeline, as outlined in Section 330502 for HDPE product pipe material.
  3. Submit the directional boring locating equipment proposed for use, method of locating to be used, and the proposed sequence and method of construction, for approval by the ENGINEER in accordance with the plans and specifications. Include information on how the bore is to be steered, the information recorded, and the pipe location verified for record drawings. Include proposed pilot bore tunnel size, proposed drilling fluid composition and Material Safety Data Sheets (MSDS), proposed viscosities, proposed pre-ream procedures, and final tunnel size. Submit proposed Temporary Traffic Control (MOT) plans for FDOT right-of-way work and for Collier County DOT right-of-way work.
  4. Submit a work sequence and schedule. Provide a list of key personnel for the project including superintendent, driller, and tracking specialists.
  5. Prior to approval for directional boring, the CONTRACTOR shall submit the names of supervisory field personnel and historical information of directional boring experience.
  6. Drill Method Submittal: Submit a minimum of 45 days before starting drilling for review and approval. This submittal shall include the following information:

- a. Drawings. Submit scaled plan showing the following: the work zone equipment configuration at each end of the drill; staging and storage areas; and the location of drill fluid, HDPE pipe, water supply for drilling, cuttings, pit spoil handling areas; and storm water containment measures, devices and locations.
  - b. Drilling Procedure. It is recognized and accepted that the CONTRACTOR may need to adjust drilling procedures and equipment as new information is developed during the drill. The intent of this requirement is to provide the CONTRACTOR's initial approach to the project specific subsurface and permit conditions.
  - c. Maximum Pipe Pull-back Forces: Submit anticipated maximum pipe pull-back forces based on proposed drill path plan and profile.
  - d. Drill Fluid Loss Monitoring/Frac-Out Plan. Submit materials list including bentonite and bentonite additives for the project along with respective MSDS for all materials used on the site.
7. Tracking Coordination Submittal: Provide this submittal a minimum of 45 days prior to drilling. The intent of this submittal is to coordinate the contractor activities with the tracking specialist. Include manufacturer's data sheets and calibration on the tracking equipment and sample data recording log sheets.
  8. Cuttings, Bentonite Slurry, and Pit Spoil Disposal Submittal: Provide within 30 days of completion of the drills a list of volumes of all cuttings, bentonite slurry, pit spoil disposed of off-site and the location of the disposal area and the actual original delivery tickets from the disposal operation.
  9. The CONTRACTOR shall bring to the attention of the ENGINEER any known design issues based on CONTRACTOR's proposed drilling methods and/or procedures. This shall be stated in writing to the ENGINEER no later than the preconstruction meeting.
  10. CONTRACTOR's construction drawings shall be submitted on the following items only if deviations from the Contract plans are proposed.
    - a. Proposed contingency plans for critical phases and areas of directional drilling.
    - b. Any proposed deviations from the Contract construction plans.
    - c. Any proposed deviations from the Contract construction specifications.
  11. Quality Control Methods. CONTRACTOR shall submit a description of his quality control methods he proposes to use in his operations to the ENGINEER. The submittal shall describe:

- a. Procedures for controlling and checking line and grade.
- b. Equipment specifications for checking line and grade.
- c. Field forms for establishing and checking line and grade.
- d. Actual product pipe pullback forces.

## 1.5 DRILLING CONTRACTOR EXPERIENCE

- A. The Drilling Contractor must demonstrate expertise in trenchless methods by providing a list of 10 utility references for whom similar work has been performed in the last five years and have completed at least two directional drill projects of minimum of 2,000 linear feet which include at least a 16” diameter product pipe pullback. The Drilling Contractor must also have completed at least two directional drill projects using wireline tracking (or equally accurate steering and tracking method) over the past five years. The Drilling Contractor must also confirm that they have at least two directional drill projects which have used a directional drill rig rated to at least 500,000 lbs of thrust, including employment of down-hole mud pressure monitoring equipment package to monitor annular pressures. The references should include a name and telephone number where contact can be reached to verify the Drilling Contractor’s capability. The Drilling Contractor must provide documentation showing successful completion of the projects used for reference. Conventional trenching experience will not be considered applicable.
- B. The Drilling Contractor’s supervisor assigned to this project must be experienced in work of this nature and must have successfully completed similar projects using Horizontal Directional Drilling in the last three years. As part of the bid submission, the Drilling Contractor shall submit a description of such project(s), which shall include, at a minimum, a listing of the location(s), date of project(s), owner, pipe type and size, length of installation, steering and tracking system employed, type and manufacturer of equipment used and other information relevant to the successful completion of the project.
- C. The Drilling Contractor shall provide on-site supervisory personnel which shall be experienced and competent, thoroughly familiar with the equipment and type of work being performed, and shall be in direct charge and control of the operation at all times.

## 1.6 QUALITY CONTROL

- A. Low Pressure Air Test. Before the OWNER accepts the installation of each HDD, the CONTRACTOR shall perform a low-pressure air test of each of the HDPE fused pipe string-out cartridges prior to pipe pullback. Low pressure testing of the above ground pipes to be 10 psig for 60 minutes duration, soap all joints to



test for leaks, and test pressure to remain within 5% of original applied pressure for acceptance.

- B. Annular Pressure Monitoring. Annular pressure shall be monitored and recorded using equipment constructed for that purpose, and shall include a fully-instrumented remote-monitoring data recording package, such as PASON or equal. Annular pressures shall be monitored and recorded in the Annular Pressure Report. Annular pressure shall be recorded during active drilling of the pilot hole and during the first ream pass. The minimum and maximum annular pressure experienced during the joint shall also be recorded; the minimum and maximum pressures are not necessarily the pressures recorded at the start, middle and end of each joint, but shall be maximum values as measured throughout the whole joint. The time of each recorded measurement shall be recorded. The annular pressure measurements shall be indexed to the rod being drilled. The trends of the circulating pressure information will be assessed and corrective action shall be taken when appropriate. Drilling shall be stopped when required to prevent excess annular pressure. Drilling may resume once the cause of the excess down-hole pressure has been identified and corrected.
- C. Pipe Pull-back Forces. Force applied to pipe during pull-back shall not exceed the values shown on the Drawings.
- D. ENGINEER Authority for Directional Drilling. Directional drilling shall be performed in accordance with approved submittals. ENGINEER will have the authority to interpret and make decisions with respect to drilling activities should specification interpretation be required or unanticipated conditions occur.

## 1.7 JOB CONDITIONS

- A. Safety Requirements
  - 1. Perform work in a manner to maximize safety and reduce exposure of men and equipment to hazardous and potentially hazardous conditions, in accordance with applicable safety standards.
  - 2. Whenever there is an emergency or stoppage of work which is likely to endanger the excavation or adjacent structures, operate a full work force for 24 hours a day, including weekends and holidays, without intermission until the emergency or hazardous conditions no longer jeopardize the stability and safety of the work.
- B. Air Quality.
  - 1. Conduct directional drilling operations by methods and with equipment, which will positively control dust, fumes, vapors, gases or other atmospheric impurities in accordance with applicable safety requirements.
- C. Geotechnical Investigation

1. Make any geotechnical investigations deemed necessary to determine actual site conditions.

D. Unanticipated Conditions

1. Notify ENGINEER of unexpected subsurface conditions and discontinue work in affected area until notified by ENGINEER to resume work.
2. Take emergency measures as required to protect persons and improvements.

1.8 UTILITY PROTECTION

- A. Utility lines and structures indicated on the drawings, which are to remain in service, shall be protected by the CONTRACTOR from any damage as a result of their operations. Where utility lines or structures not shown on the drawings are encountered, the CONTRACTOR shall report them to the ENGINEER before proceeding with the work. The CONTRACTOR shall bear the cost of repair or replacement of any utility lines or structures, which are broken or damaged by their operations.
- B. All utilities that may be impacted by the HDD shall be exposed through a "pot-hole" or other opening, in accordance with state utility locate laws and regulations, to ensure, through visual inspection, that the drill, reamer, or product pipe will not cause damage to the utility.

1.9 PERMITS

- A. Obtain any and all other permits required for prosecution of the work.

PART 2 PRODUCTS

2.1 GENERAL

- A. Refer to Section 330502 for HDPE pipe material.
- B. Use a high quality bentonite drilling fluid or equivalent to ensure hole stabilization, cuttings transport, bit and electronics cooling, and hole lubrication to reduce drag on the drill pipe and the product pipe. Oil based drilling fluids or fluids containing additives that can contaminate the soil or groundwater will not be considered acceptable substitutes. Composition of the fluid shall comply with all federal and local environmental regulations.
  1. Disposal of drilling fluids shall be the responsibility of the CONTRACTOR and shall be conducted in compliance with all relative environmental regulations, right-of-way and workspace agreements and permit requirements.

2. Drilling fluid returns can be collected in the entrance pit, exit pit, or spoils recovery pit. The CONTRACTOR shall immediately clean up any drilling fluid spills or overflows from these pits.

## PART 3 EXECUTION

### 3.1 GENERAL

- A. The CONTRACTOR shall be responsible for his means and methods of directional drilling construction and shall ensure the safety of the work, the CONTRACTOR's employees, the public, and adjacent property, whether public or private.
- B. Obtain locations of all existing utilities within the horizontal directional drilling project area, whether shown on the plans or not, in coordination with the owners of such utilities. Be responsible for protection of such utilities from damage, and repair of any utilities damaged during or as a result of construction.
- C. Anticipate that portions of the drilled excavation will be below the groundwater table.
- D. Comply with all local, state and federal laws, rules and regulations at all times to prevent pollution of the air, ground and water.
- E. A pilot hole shall be drilled such that the required vertical clearances from ditch, river, or wetland bottoms and utilities and horizontal clearances from jurisdictional or buffer lines and utilities are maintained. If the pilot hole exits in jurisdictional or buffer areas they shall be responsible to grout hole to satisfaction of the environmental regulators and the ENGINEER.
- F. The boring hole shall then be reamed to be 120% to 150% oversized than the HDPE product pipe OD. Drilling mud, usually fluidized bentonite clay, shall be used to stabilize the hole and remove soil cuttings. The CONTRACTOR shall monitor and record the reamed hole location and depth at the same intervals as the bore hole.
- G. During the entire drilling and reaming operations, monitoring of the drilling processes will be critical. Pit Volumes for all mud tanks, SPM sensors for pumps, drilling fluid flow and pressures, rotary torque, hook load sensor, depth and azimuth tracking and monitoring sensors, shall be monitored and recorded.
- H. The pull-back operations shall include pulling the entire pipe stringout, in one segment back through the reamed hole and drilling mud. The pull-back operations shall include filling the product pipe with water to reduce the buoyancy and to reduce the pull-back forces required to pull-back the product pipe in the borehole. Proper pipe handling, cradling, bending minimization, surface

inspection, and fusion welding procedures (for HDPE) shall be followed in accordance with this specification and Section 330502. Note that anticipated pullback speed is typically 1 to 2 feet per minute. Pull-back operation shall be continuous with no stoppage.

- I. CONTRACTOR shall provide a breakaway device or “weak-link” at the leading end of the PE pipe during pullback operations to protect the pipe from damage if the pulling load gets too high. The breakaway strength for the weak-link device shall be set so that the allowable tensile load of the product pipe cannot be exceeded. Alternative methods for ensuring that the pull loads will not exceed the product pipe allowable tensile load may be considered.
- J. Any soil borings required for the CONTRACTOR’s detailed designs shall be included in the bid. The CONTRACTOR is fully responsible to obtain this information.
- K. CONTRACTOR shall be responsible for design and construction of the drill entrance and exit pits. Supports may be required to maintain safe working conditions, ensure stability of the pit, minimize loosening, and minimize soil deterioration and disturbance of the surrounding ground.
- L. CONTRACTOR shall be required to locate all utilities prior to start of excavation or drilling. All utilities crossed or approached within 48 inches in a lateral direction shall be exposed to verify location. In addition, visual verification shall be required that the drill, reamer, or product pipe has missed the utility as it passes. Damage to utilities shall be the responsibility of the CONTRACTOR.
- M. Immediately upon completion of work, all rubbish and debris shall be removed from the job site. All construction equipment and implements of service shall be removed and the entire area involved shall be left in a neat, clean, and acceptable condition.
- N. “Frac-outs” or “Blow holes” of drilling fluid to the surface shall be immediately reported to the ENGINEER and the OWNER’s representative, and shall be cleaned up immediately and the surface area washed and returned to original condition. All drilling fluids, spoils, and separated material shall be disposed of in compliance with federal and local environmental regulations.
- O. If, during boring, an obstruction is encountered which prevents completion of the bore in accordance with the design location and specification, and the product pipe is abandoned in place and taken out of service, the failed bore shall be filled with cement grout. The record drawings shall show the failed bore path along with the final bore path on the as-built plans. Should the HDD crossing be lost or damaged while the CONTRACTOR is engaged in the performance of the work, all such lost or damage to the hole shall be borne by the CONTRACTOR. Failure to complete the crossing or partially completed crossing by directional drilling or as approved by ENGINEER and OWNER will result in forfeiture of all payment.

### 3.2 EQUIPMENT

- A. Diesel, electrical, or air-powered equipment will be acceptable, subject to applicable federal and state regulations.
- B. Any method or equipment that the CONTRACTOR can demonstrate will produce the specified results will be considered.
- C. Employ equipment that will be capable of handling the various anticipated ground conditions. In addition, the equipment shall:
  - 1. Be capable of minimizing loss of ground ahead of and around the machine and providing satisfactory support of the excavated face at all times.
  - 2. Provide a system to indicate whether the amount of earth material removed is equivalent to that displaced by the advance of the machine such that the advance rate may be controlled accordingly.
- D. Provide adequate secondary containment for any and all portable storage tanks.
- E. Provide down-hole annular pressure monitoring equipment, including remote monitored electronic data recording package, such as PASON, or equal.

### 3.3 DIRECTIONAL DRILLING DATA

- A. Submit daily logs of construction location, progress and events, including observations on the following:
  - 1. Drill thrust pressure.
  - 2. Drill pullback pressure.
  - 3. Annular pressure.

### 3.4 CONTROL OF THE TUNNEL LINE AND GRADE

- A. Construction Control.
  - 1. Establish and be fully responsible for the accuracy of control for the construction of the pipeline to be installed, including structures, tunnel line and grade.

2. Establish control points sufficiently far from the tunnel operation so as not to be affected by construction operations.
3. Maintain daily records of alignment and grade and submit three copies of these records to the ENGINEER. However, the CONTRACTOR remains fully responsible for the accuracy of his work and the correction of it, as required.
4. Check, monitor, and record control for the bore alignment against an above ground undisturbed reference at least once each hour and at least once for each drill rod length interval. CONTRACTOR shall immediately report bore alignment location to ENGINEER after each control check. The location shall be reported based on the approved bore alignment, i.e. horizontal distance and direction from approved bore alignment and vertical distance and direction from approved bore alignment length from the entry or exit point along the bore path, and horizontal distance from the entry or exit point.
5. The pilot hole shall be drilled on bore path with no deviations greater than 2 percent of depth of the bore path as shown on the Drawings or approved CONTRACTOR submittal drawings. In the event that pilot hole deviates from bore path more than 2 percent of depth, CONTRACTOR shall notify ENGINEER and ENGINEER may require CONTRACTOR to pull-back and re-drill from the location along bore path before the deviation. The depth of the bore path is the vertical distance from the drill head to the surface of the earth, i.e. ground, pavement, water surface. An example would be if the bore is to be 70 feet in depth at a particular location then the drill head should be between 71.4 and 68.6 feet in depth. Any deviations greater than 2 percent shall be reviewed by the ENGINEER. Excessive deviation may be grounds for rejection of the bore.
6. Pilot hole shall be drilled on bore path with no deviations greater than 0.5 percent of horizontal location shown on the plans or approved CONTRACTOR submittal drawings over the length of the pipe from the entry or exit point. In the event that pilot hole does deviate from bore path more than 0.5 percent of horizontal location shown on the plans or CONTRACTOR submittal drawings over the length of the pipe from the entry or exit point, CONTRACTOR shall notify ENGINEER and ENGINEER may require CONTRACTOR to pull-back and re-drill from the location along bore path before the deviation. For example, a bore 2,000 feet in length should have a maximum horizontal deviation of 5.0 feet in the center and a maximum of 2.5 feet horizontal deviation 500 feet from either the entry or exit point, whichever is closer. Any deviations greater than 0.5 percent shall be reviewed by the ENGINEER. Excessive deviation may be grounds for rejection of the bore. Regardless of the tolerance achieved, right-of-way and easement restrictions shall take precedence over the listed tolerances. Listing of tolerances does not relieve CONTRACTOR from responsibility for safe operations or damage to adjacent utilities and structures.

7. Record survey of the pilot hole shall be submitted within 24 hours of completion of pilot hole, in State Plane Coordinate system using NAVD 1988 datum.

### 3.5 INSTALLATION OF TRACKING/LOCATING WIRE

- A. Install all facilities such that their location can be readily determined by electronic designation after installation. For non-conductive installations, attach a minimum of two (2) separate and continuous conductive tracking (tone wire) materials, either externally, internally or integral with the product. The ends of the tone wire shall be stubbed up through a one-inch (1") diameter SCH 80 PVC pipe which shall be installed in the concrete valve pad adjacent to the valve box on both sides of the directional drill. Use either a continuous green-sheathed solid conductor copper wire line (minimum #12 AWG for external placement or minimum #14 AWG for internal placement in the conduit/casing) or a coated conductive tape. Conductors must be located on opposite sides when installed externally. Connect any break in the conductor line before construction with an electrical clamp, or solder, and coat the connection with a rubber or plastic insulator to maintain the integrity of the connection from corrosion. Clamp connections must be made of brass or copper and of the butt end type with wires secured by compression. Soldered connections must be made by tight spiral winding of each wire around the other with a finished length minimum of three (3) inches overlap. Test conductors for continuity. Each conductor that passes must be identified as such by removing the last six (6) inches of the sheath. No deductions are allowed for failed tracking conductors. Conductor ends must be wound into a small coil and left for future attachment to isolation valve boxes.

### 3.6 DEWATERING

- A. Where such effort is necessary, cost for groundwater control during the course of the directional drilling work shall be included in the unit contract price for the work.
- B. Dewatering required during the course of the project to lower water table, to remove standing water, surface drainage seepage, or to protect ongoing work against rising waters or floods shall be considered incidental to the work being performed.

### 3.7 DISPOSAL OF EXCESS MATERIAL

- A. Dispose of excess material, including, but not necessarily limited to, drill fluid, casing water, cuttings and pit spoil, off of the project site.
- B. Non-hazardous waste meeting the requirements of a Class III Waste shall be disposed of in a FDEP permitted Class III Landfill.

- C. Non-hazardous waste meeting the requirements of a Class I or II waste shall be disposed of in a FDEP permitted Class I or Class II landfill.

### 3.8 DOCUMENTATION REQUIREMENTS OF RECORD DRAWINGS

- A. Provide the ENGINEER a complete set of As-Built Plans showing all bores (successful and failed) within 30 calendar days of completing the work. Ensure that the plans are dimensionally correct copies of the Contract plans and include utility and/or topography plan and profile, cross-section, boring location and subsurface conditions as directed by the ENGINEER. As-Built Plans shall show appropriate elevations and be referenced to two permanent benchmarks as shown on the drawings, and in a State Plane grid system and NAVD 88 datum, as designated on the Contract plans. As-Built Plans shall be same scale in black ink on white paper, of the same size and weight as the Contract Drawings. Submittal of electronic plans data in addition to hard copy plans is required and shall be compatible with the industry standard CAD software. As-Built Plans shall be signed and sealed by a Professional Land Surveyor licensed in the State of Florida. Specific plans content requirements include but may not be limited to the following:
  1. The Contract plan view showing the center line location of each facility installed, or installed and placed out of service, to an accuracy of 0.1 feet at the ends and other points physically observed in accordance with the bore path report.
  2. As directed by the ENGINEER, provide a plan and profile for each bore path. Show the ground or pavement surface and center line elevation of each facility installed, or installed and placed out of service, to an accuracy of within 0.1 feet at the ends and other exposed locations. Each bore path shall be depicted on the Contract plans using the same datum as the Contract plans.
  3. Show the top elevation, diameter and material type of all utilities encountered and physically observed during the subsoil investigation. For all other obstructions encountered during a subsoil investigation or the installation, show the type of material, horizontal and vertical location, top and lowest elevation observed, and note if the obstruction continues below the lowest point observed.
  4. Include bore notes on each plan stating the final bore path diameter, product pipe diameter and type, drill entry and exit angles, and installed bore path radius for each pipeline installed by HDD.



3.9 CLEANING

- A. General. Directional drilling operation site cleaning shall meet the requirements of Section 017423 Cleaning.
- B. Spillage. Clean spillage, on adjacent streets, from construction operations on a daily basis, if spillage occurs.

END OF SECTION