## Appendix A - Technical Specifications

## 067-19 Gate Pkwy – Glen Kernan to T-Line – Trans – New – Reclaimed Water Main

### 901. Scope of Work

JEA is soliciting Bids from construction contractors (hereinafter referred to as "Company") for Construction of the Gate Pkwy – Glen Kernan to T-Line – Trans – New – Reclaimed Water Main

The Scope of work specified herein the installation of approximately 5,028 LF of 30-inch DIP reclaimed water main (RWM) (via open cut), 60 LF of 30-inch DIP reclaimed water main (via Auger Boring), 1,860 LF of 18-inch HDPE reclaimed water main (via two (2) horizontal directional drills), 6,652 LF of 16-inch PVC reclaimed water main (via open cut), 133 LF of 16-inch PVC water main relocation (via open cut), 16 LF of 18-inch PVC reclaimed water main (via open cut), and 291 LF of 8-inch PVC reclaimed water main (via open cut). The 30-inch portion of the reclaimed water main will connect to an existing 30-inch connection stub out north of Glen Kernan Parkway North, continue south along Northbound Kernan Boulevard, and connect to an existing 30-inch stub out connection south of 1st Coast Technology Parkway (south). The 16-inch portion of the reclaimed water main will connect to a 16-inch stub in a JEA easement west of Kernan Boulevard just outside of the FDOT right-of-way (ROW) south of J. Turner Butler Boulevard, continue west/south in a JEA easement that parallels the JTB/I-295 interchange, crosses under I-295 north of Gate Parkway, and connects to an existing 16-inch stub out west of I-295.

The proposed work is within Kernan Boulevard COJ Right-of-Way, I-295 FDOT Right-of-Way, and JEA easements.

All Work shall be done in accordance with the January 2019 Edition of JEA Water & Wastewater Standards Manual. The following is a link to the JEA Water and Sewer Standards:

https://www.jea.com/Engineering_and_Construction/Water_and_Wastewater_Standards/

The following scope of work will be defined as the base bid for this contract and shall include, but is not necessarily limited to, the following:

- Installation of approximately 5,028 LF of 30-inch DIP reclaimed water main (RWM) (via open cut), 60 LF of 30-inch DIP reclaimed water main (via Auger Boring), 1,860 LF of 18-inch HDPE reclaimed water main (via two (2) horizontal directional drills), 6,652 LF of 16-inch PVC reclaimed water main (via open cut), 133 LF of 16-inch PVC water main relocation (via open cut), 16 LF of 18-inch PVC reclaimed water main (via open cut), and 291 LF of 8-inch PVC reclaimed water main (via open cut) within COJ ROW, FDOT ROW, and JEA Easements
- Mobilization/demobilization, general requirements, and insurance
- Installation of Maintenance of Traffic (MOT) signs, devices, striping and measures to construct the project including temporary pavement and temporary signalization
- Coordination with JTA for temporary relocation of the bus stop just south of First Coast Technology Parkway North; see MOT plans
- Installation/maintenance of erosion & sediment control devices/measures (E&SC) & other aspects of the storm water pollution prevention plan (SWPPP)
- Site work
- Clearing, grading, seeding, and sodding
- Repaving of the northbound outside lane of Kernan Boulevard throughout the project limits
- Repaving of all open cut crossings of Kernan Boulevard in accordance with COJ and JEA standards

and details
- Milling and resurfacing of the northbound lanes of Kernan Boulevard throughout the project limits
- Restoration of COJ Right of Way including traffic loops
- Installation of isolation valves and appurtenances as per the construction drawings
- Installation of connection to existing reclaimed water mains
- Performance of all testing and swabbing required during construction
- Performance of all permits necessary to complete the work
- Performance of all site restoration to preconstruction (or better) condition

**902. General Conditions**

The General Conditions Lump Sum price shown on the Bid Form shall be compensation to complete the Work as required in this contract (except for items listed separately on the bid form), including but not limited to, Payment Bond, Performance Bond, Safety, Quality Control, Preparation of Daily Reports, Maintenance of Traffic, Attendance at Meetings, Scheduling, Testing (if not included elsewhere). Payment of the General Conditions Lump Sum Price shall be based upon the percentage of Work completed: however, if the Company executed bond(s) accompany the first pay request then the amount paid will be deducted from the associated subtotal. Also, the Company shall include the cost for performing survey of the existing roadway horizontal alignment (prior to initiating any construction or MOT) in their initial General Conditions payment. In the event that changes to the work are required that are covered under the Supplemental Work Authorization account, the General Conditions Lump Sum Price will not be increased unless the total value of the SWA exceeds the original SWA account provided in the original contract bid.

**903. Permits and Plan Approvals**

JEA will provide the following permits/Approvals for the Project:

• COJ Plan Approval; CDN 4161.252, issued March 5, 2019.

• FDEP Environmental Resource Permit; Permit No. 16-0370238-EG, issued December 28, 2018

• FDOT Utility Permit No. 2018-H-00603, issued January 3, 2019

• USACE Nationwide Permit 12; Permit No. SAJ-2018-02571, issued November 8, 2018

Prior to commencing Work the Company is responsible for obtaining the following permits, including but not limited to:

• City of Jacksonville (COJ) Right-of-Way Permit

• FDEP NOI to Use NPDES Generic Permit for Stormwater Discharge from Large and Small Construction Activities (CGP) – Form 62-621.300(4)(b)

• FDOT General User Permit (for MOT signage and detours utilizing FDOT right-of-way)

• SJRWMD Notice to District of Dewatering Activity – Form 40C-2-900-12.

• SJRWMD Individual Consumptive Use Permit if unable to qualify for general permit under Rule 40C-2.042(9).

All costs associated with obtaining such permits shall not be paid for separately but shall be included in the cost of the associated item of work in the Bid Form. The Company shall comply with all conditions of permits issued for the Work, either directly or indirectly, issued by federal, state, or local governmental agencies.

**904. Work Restrictions**

The Company shall only access the construction sites through the existing gate at the south end of Kernan Boulevard or the existing gate at Gate Parkway (just east of the northbound entrance ramp to I-295). No staging of equipment, personnel or materials shall be allowed outside the COJ ROW, FDOT ROW or JEA easement unless the Company acquires a separate written agreement from the property owner.

**905. JEA Easement Trail Road Restoration**

The Company shall provide all necessary labor, materials and equipment to restore any disturbed portions of the JEA Easement Trail Road to match preconstruction conditions and width. The manner in which this is accomplished shall be left to the discretion of the Company, subject to the requirements of the Contract and the prior approval of the JEA Representative. The JEA Engineer approval in no way relieves the Company of any responsibilities or liabilities resulting from the restoration method chosen.
Stone aggregate (lime rock) aggregate shall be used to provide a final driving surface for the restored portions. All costs associated with this work shall be included in the associated line item in the Bid Form.

**906. Permit Coordination Meetings**

Company shall be responsible for being thoroughly familiar with all permit requirements prior to mobilizing and starting work associated with a particular permit. If a permit requires a notification or meeting with the issuing agency prior to starting work, Company shall be responsible for arranging said meeting and informing the JEA Representative. The following shall be attended by, but not limited to, the Company's Project Manager, Company's Site Superintendent, Permitting Agency Representative, JEA Project Engineer and JEA Inspector.

**907. FDOT Utility Permit**

The Company shall comply with all requirements and instructions of the latest edition of FDOT's Standard Specifications for Road and Bridge Construction and FDOT Utility Permit including, but not limited to, the following:
• Dewatering Plan signed and sealed by a Florida licensed professional engineer prior to commencing work.
• Shoring Plan signed and sealed by a Florida licensed professional engineer prior to commencing work.

**908. Maintenance of Traffic**

Payment for maintenance of traffic shall be the lump sum price set forth on the Bid Form and shall include, but not be limited to, mobilization; excavation and embankment directly associated with temporary pavement; temporary pavement; sod; pavement marking removal; temporary pavement tape; temporary reflective pavement markers; work zone signs; portable changeable message signs; temporary barrier wall; temporary crash cushions; channelizing devices; pedestrian channelizing devices; milling existing asphalt pavement; removal of all MOT components; restoration of the Kernan Boulevard Right-of-Way to existing conditions; cleaning up the site; furnishing all material, labor, tools, and equipment; and all incidental and related work required to complete the work of the item. Maintenance of traffic shall be in accordance with the approved maintenance of traffic drawings and plan. Payment shall be made for the MOT mobilization and installation based upon the overall project percentage of completion multiplied by the MOT lump sum price.

**909. Phasing**

Any COJ standard pavement repair shall be completed within 10 calendar days or when 500 LF of roadway is disturbed after completion of the utility installation. All mobilization/demobilization required for rework/regrading of lime rock base, dust control, including asphalt paving shall not be paid for separately

but shall be included in the cost of the associated items in the Bid Form.

## 910. FDOT Pavement Marking Requirements

Temporary and permanent pavement markings should be placed as shown on the plans and detail sheets. If no specific striping is noted on the drawings, the Company shall replace damaged/removed striping due to construction activities with like striping and/or reflectors all in accordance with FDOT requirements.

• Any required temporary markings shall be in place before opening lanes to traffic. Temporary pavement markings are not paid for separately but are included in the associated item of paving.

• The removal of existing pavement markings shall be considered an incidental item with no additional compensation provided.

• All permanent pavement markings shall be extruded thermoplastic and meet FDOT standard specifications, latest edition.

• Thermoplastic pavement markings shall be placed no sooner than 30 calendar days after the completion of the final pavement layer.

• A bituminous reflective pavement marker (RPM) adhesive meeting current FDOT specifications shall be used on asphalt roadways.

• Reflective pavement markers that do not conflict with permanent (thermoplastic) markings shall be placed on all final asphaltic concrete surfaces immediately after the temporary permanent striping (“final paint”) is in place.

## 911. COJ Pavement Marking Requirements

• Temporary and permanent pavement markings shall be placed as shown on the plans and detail sheets. If no specific striping is noted on the drawings, the Company shall replace damaged/removed striping due to construction activities with like striping and/or reflectors.

• Any required temporary markings shall be in place before opening lanes to traffic. Temporary pavement markings are not paid for separately but are included in the associated item of paving.

• The removal of existing pavement markings shall be considered an incidental item with no additional compensation provided.

• All permanent pavement markings shall be extruded thermoplastic and meet current City of Jacksonville specifications and FDOT standard specifications, latest edition.

• Thermoplastic pavement markings shall be placed no sooner than 30 calendar days after the completion of the final pavement layer.

• A bituminous reflective pavement marker (RPM) adhesive meeting current City of Jacksonville and/or FDOT specifications shall be used on asphalt roadways.

• The Company shall use 4”x4” CLASS –B reflective pavement markers (RPMs) installed to meet current City of Jacksonville specifications and/or FDOT standard specifications. Acceptable examples are: Ennis Paint Co., Model 911; Ray-O-Lite, Model AA-ARCII-FH; Apex, 921AR.

• Reflective pavement markers that do not conflict with permanent (thermoplastic) markings shall be placed on all final asphaltic concrete surfaces immediately after the temporary permanent striping (“final paint”) is in place.

• The Company SHALL contact the Pavement Marking Inspector (Danny Howard - 904-255-7550) 48 hours PRIOR to installing any pavement markings of any City of Jacksonville roadway or streets.

## 912. Roadway Restoration

Company shall perform survey of existing roadway horizontal alignment and vertical grade and of the existing structures and appurtenances for the Work area prior to initiating any construction. No separate payment shall be made, but all costs shall be included in the lump sum cost of the General Conditions line items. Intent is to restore existing roadway, structures and appurtenances to existing alignment, width, and grade to match existing elevations after construction is performed. Damage to existing features, including but not limited to asphalt, sidewalks, curb and gutter, drives, fencing, signs, and lights, will be replaced at the Contractor's expense unless otherwise authorized by JEA.

**913. Traffic Signage**

Costs incurred by the Company to provide new signage and pavement markers, or remove and replace existing signage as necessary to accomplish the work shall not be paid for separately but shall be merged with the cost of the associated item of work. Damaged signage shall be replaced with new signage. All signage and pavement markers shall be in accordance with the drawings and COJ and FDOT requirements..

**914. Swale and Ditch Construction/Regrading**

The Company shall regrade all existing swales and ditches as necessary to restore the swales and ditches to their pre-construction (or better) condition. No separate payment shall be made for regrading or construction of new drainage ditches as required for restoration, but shall be included in the associate item on the Bid Form.

**915. Company's Use of Premises**

Company shall have complete use of the premises for the performance of the Work. Prior to mobilization, the Company's Work Plan shall address its staging, storage, pipe stringing, pipe installation, and limits of disturbance areas within JEA's Easements, FDOT ROW, and COJ ROW. Also, the Company shall coordinate activities with any other Company who will be performing work in the same general area.

All work shall take place within the FDOT ROW, COJ ROW and JEA Easements.

The Company is responsible for securing and obtaining any additional off site storage areas necessary.

Coordinate uses of premises with JEA, COJ, FDOT and other entities with vested interest.

Company shall assume full responsibility for security of all its and its subcontractors' materials and equipment stored on the site.

If directed by the JEA or ENGINEER, move any stored items which interferes with operations of FDOT, COJ or other contractors.

Company is responsible for obtaining and paying for the use of additional storage or work areas if needed to perform the work.

**916. Company's Staging, Storage and Stockpile Area**

No additional staging, storage, and stockpile will be made available by the JEA along the project site. The Company is not allowed to store any equipment or materials outside the right-of-way and JEA's designated easement limits. The location will be agreed to upon and discussed at the pre-construction meeting.

## 917. Updated Surveying

In addition to the Surveying requirements set forth elsewhere in this solicitation, the Company shall be responsible for surveying and staking the project stationing, permanent easements, temporary construction easements, and/or right-of–way boundaries. The survey datum used for this project is NAVD 1988. Staking shall be maintained throughout construction, including resurveying and restaking if the stakes are damaged or removed. All surveying shall be performed by a Professional Surveyor and Mapper (PSM) licensed in the State of Florida.

## 918. Existing Utilities

Known surface and subsurface utilities are shown or noted on the drawings as accurately available information will permit. JEA does not guarantee the information shown or noted or that utilities other than those indicated (on the drawings) do not exist. It is the responsibility of the Company to notify each of the utilities at least (15) fifteen working days prior to construction and request that the location of their respective utility or material be located and staked in the field. Should the Company encounter unidentified utility, work in the immediate area shall promptly cease and the JEA representative shall be advised. JEA shall investigate the condition and propose remedial action. The Company is reminded of the laws of Florida requiring notification of Gas Company, at least four (4) working days in advanced of any digging operation. The Company shall call the Sunshine State One-Call of Florida (811) to request location of all facilities owned by utilities that participate in the locate program. Failure by the Company to contact Sunshine State One-Call of Florida prior to digging shall obligate the Company for damages to participating utility Company and associated repair cost.

In order to reduce the disruption and cost of utility damages occurring in the FDOT Right of Way, COJ Right of Way, and JEA Easements, the Company shall prevent damages to existing utilities caused by its work through field verification of the location of existing utilities. In the case of open excavation, verification may be performed during the Company's work.

Company shall verify the location of existing utilities as needed to avoid contact. Existing utilities shall be exposed using detection equipment or other acceptable means. Such methods may include but shall not be limited to "soft dig" equipment and ground penetrating radar (GPR). The excavator shall be held liable for damages caused to the city's infrastructure and the existing facilities of other utility companies.

## 919. Coordination of Construction with Existing Utilities

Company shall verify size and type of existing pipe at each connection prior to ordering materials for connections. All costs associated with connections to existing water and sewer utilities shall not be paid for separately, but shall be included in the cost of the associated line items shown on the Bid Form.

The Company shall establish liaison with and coordinate work with (including; but, not limited to) JEA, AT&T, TECO/Peoples Gas, and Comcast to prevent interference with overhead and buried electrical, telephone, and television cables. AT&T, TECO/Peoples Gas, Comcast and others will need time to relocate their facilities.

The Company shall at all times conduct his operation so as to interfere as little as possible with the existing utilities. The Company shall develop a program in cooperation with JEA and interested representatives of Utilities and City agencies, which shall provide for the construction of, and putting into service, the new work in the most orderly manner possible. This program shall be adhered to, except as deviations there from are expressly permitted. All work of connecting with, cutting into, and reconstructing existing pipes and structures shall be planned so as not to interfere with the operation of the existing utility.

**920. Tie-In Connections Sequencing Constraints**

The following tie-in connection sequencing constraints are to emphasize critical tasks related to connection to existing system for the work in this Contract. It is not a complete list of all work to be completed.

- Indicate required interruptions of existing operations on progress schedule. Interruptions will be permitted to the extent that existing operation of any pump stations will not be jeopardized and identified constraints are satisfied.
- The Company shall give a minimum of 5 working days advance written notice to the JEA of each component proposed for shutdown, tie-in, or disruption, all of which shall be subject to JEA's approval and limitations. The request shall include, but not be limited to, point of connection, fittings to be used, method of flushing, and estimated construction time for connection.
- Connection and tie to the existing system and transfer of services shall be performed by the Company under the JEA's direction. The Company shall not operate any valves in the existing system.
- The JEA reserves the right to postpone connection to existing utilities due to operational and/or weather related concerns.
- Connection to the existing system may depend on the closure of certain valves. The existing valves may be not be operable or may not seal properly. The Company shall coordinate with the JEA in advance of connections to determine condition of existing valves.
- Interruption of service is not allowed during peak flow periods or holidays.
- Work shall proceed continuously to complete connections in the minimum time. Minimize shutdown times by thorough advanced planning. Have required equipment, materials, and labor on hand at time of shutdown.
- Water main to be relocated as shown on sheet C-2.01 prior to construction of the reclaimed water main in the area shown. Coordinate water main outage and tie-in connection with JEA, as indicated in this technical specification.

Company shall anticipate performing the water main relocation tie-in work within a 6-hour maximum shutdown time.

**921. Structural Concrete Slab**

Payment for the installation of the structural concrete slab shall be at the square yard unit price set forth in the Contract Documents and shall include preparation and construction of the structural slab including furnishing and placing the concrete, forming and vibrating (if required), Styrofoam, and rebar. Payment for the structural concrete slab shall be the actual square yards of structural concrete slab installed as shown on the Contract Drawings.

**922. Remove and Relocate RWM ARV Manhole**

Measurement for payment of Remove and Relocate RWM ARV Manhole will be at the unit price set forth in the Contract for the actual number of RWM ARV Manholes removed and relocated. Payment will be compensation in full for the removal and relocation of the existing manhole and ARV assembly (including piping, valving, and appurtenances) and disposal of the debris. Payment shall include furnishing and installing the new stainless steel offset piping and connections (in accordance with JEA standards) between the existing piping and the relocated ARV pipe connection, including all required removal of grassing; excavation; de-watering; backfilling; all sheeting, shoring and bracing; protecting existing structures, utilities and property; placing and removing all traffic signs and barriers and maintaining traffic; cleaning up the site; installing silt fence and other erosion, sedimentation protection and control devices; furnishing all labor, materials, tools and equipment for the construction of the relocated manhole complete, including relocating manhole frames, covers, ARV piping and valving, and all work appurtenant thereto.

### 923. Valve and Locate Wire Box Identification Markers

The Company shall furnish and install fiberglass identification markers at all gate valve and locate wire box locations as directed by the JEA Representative. All costs associated with this work shall be included in the associated line item in the Bid Document.

### 924. Dewatering

If the Company encounters groundwater, the Company shall be responsible for utilizing a dewatering system(s) to remove water from the excavations. Prior to beginning any dewatering activities, the Company shall comply with all requirements listed in Florida Department of Environmental Protection (FDEP) Dewatering Regulations.
Additionally, prior to any dewatering, the Company shall apply for a St. Johns River Water Management District (SJRWMD) Generic Permit for Short Term Dewatering, and comply with all SJRWMD requirements.
If the above requirements are not followed, the Company shall be held liable for any fines and/or violations incurred by JEA.

### 925. Landscaping

Except for trees designated for removal and/or replacement and areas within the designated limits of clearing on the drawings, the Company shall be responsible for protection and preservation of all trees, palms, shrubs, Irrigation systems, landscaping, signs, and etc. along the route of the proposed work including hand digging, removal and storage of such and subsequent replacement to the fullest extent possible of the pre-existing condition. No trees shall be removed in the FDOT Right-of-Way or the COJ Right of Way unless designated for relocation on the construction drawings. All costs associated with such shall not be paid for separately but shall be included in the cost of the associated item of work shown on the Bid Form.

### 926. Clearing and Grubbing

Payment for clearing and grubbing shall not be paid for separately, but shall be included in the cost of the associated item of work. Payment will be compensation in full for all clearing and grubbing required for the roadway right-of-way and for any other clearing and grubbing indicated or required for the construction of the entire project area including area of excavated trenches and where trenchless operations are required, including all necessary hauling, furnishing equipment, equipment operation, furnishing any areas required for disposal of debris, leveling of terrain and the landscaping work of trimming, etc. as required.

## 927. Grassing/Sodding

Disturbed areas within the FDOT Right of Way and COJ Right of Way must be restored to original or better conditions using sod which complies with FDOT and COJ requirements and specifications. All disturbed areas shall be restored by resodding (if grass was established pre-construction) or seeding and mulching in accordance with Section 441 of the JEA Water and Wastewater Standards Manual, titled, Grassing.

## 928. Dust Control

The Company shall utilize a water spray truck to mitigate dusty conditions when roadways are unpaved and construction areas have a lack of vegetative cover.

## 929. Earthwork

It shall be the sole responsibility of the Company to evaluate the geotechnical findings and recommendations along with the construction drawings to determine the quantity of soil to be managed or removed/disposed and replaced in order to meet the requirements of the Contract Documents. No separate payment shall be made for stockpiling, managing, mixing, and/or removal, disposal, importation and placement of A-3 sand required for backfill and/or over-excavation (bedding) material for the pipeline(s) and structures, but all costs shall be merged with the associated item of work shown in the Bid Form. Excess and/or unsuitable material shall become the property of the Company and shall be disposed of outside of the right-of-way and easements.

## 930. Updated As Builts

Upon submission of each payment application, Company shall furnish to the JEA Engineer a photocopy "redline" set of drawings identifying those field changes made to the Work to date, along with a photocopy set of the associated field notes. Revisions and recording of information on the photocopy set of drawings shall be done in scale in red ink clearly and accurately identifying those changes in the Work by a competent drafter. All "As-Built" information shall be recorded and kept current during the progress of the Work. The JEA Engineer may review and comment on the drawings which shall be incorporated into the next month's as-built submittal. Failure to incorporate changes the following month may result in denial of pay application request. These requirements only supplement the requirements of the General Conditions.

When the payment of application submitted includes associated items of final restoration for a project, or a portion of the project thereof, then the associated final as-builts shall be submitted as a "redline" marked photocopy set of drawings for that pay period. The Project Engineer may review and comment on the drawings with the view toward final as-built submittal. The subsequent month submittal made with the payment application shall incorporate a photocopy set of CADD drawing final as-builts. The JEA Engineer shall review and comment on the photocopy set of CADD drawings which shall be incorporated into the final as-built submittal. These requirements only supplement the requirements of the General Conditions.

## 931. Quality Control and Quality Assurance

The Company shall provide Quality Control to ensure the Work is performed in accordance with the Contract. Quality Control shall be appropriate for the nature of the Work, and shall be conducted in a manner consistent with sound quality management and industrial engineering principles. The Company shall have only personnel trained in Quality Control techniques and experienced with the nature of the

Work perform the Quality Control function.

JEA may perform Quality Assurance activities. Such activities whether performed or not, do not in any way limit or reduce the Company's requirements. JEA may become aware of quality related problems during its performance of Quality Assurance, but has no obligation to notify the Company of its findings. The Company shall provide access to all areas of Work, including the Company's facilities, for JEA Quality Assurance personnel and JEA Representatives. JEA will conduct Quality Assurance activities so as not to excessively interfere with the Work, however, where JEA Quality Assurance personnel request specific actions of the Company, the Company shall comply with the request and agrees that such compliance is included as part of its Contract Price.

## 932. Reporting

The Company shall provide daily reports and other reports as defined in the Contract Documents.

Where the reporting frequency is daily, reports shall be submitted by noon of the following workday. Where the reporting frequency is weekly, reports are due by Monday at noon, covering the prior workweek. Where Monday is a Holiday, the reports are due at noon on the next workday. Where reports are due monthly, reports are due by noon on the first business day of each month. Sample forms for reports may be included in the Contract Documents. Where they are included they are to be used. Where they are not included, the Company shall provide a sample of its proposed report format for each report to the Contract Administrator at least one-week prior to its initial due date. The JEA Engineer will review and either approve or reject use of the report. Where proposed report is rejected, Company shall resubmit revised report formats, until JEA Engineer approves format. Reporting cycle shall begin upon PO date, or, if used, date of Notice to Proceed.

## 933. Responsible Bidders List (RBL) GC-11 Locate Line Verification

Upon request by JEA, Company shall identify which subcontractor on JEA's RBL GC-11 Locate Line Verification listing will be utilized for the installation of locate wire on PVC piping. Company may obtain a list of prequalified persons and/or companies by contacting the JEA Procurement Bid Office, 21 W. Church Street, Customer Center 1st Floor – Room 002, Jacksonville, FL 32202, (904) 665-6740, or by fax (904) 665-7294, or online at JEA.com.

## 934. JEA Company / Subcontractor Safety Requirements

Company and Subcontractors must be prequalified under JEA's safety prequalification program. Bids from Companies not prequalified under the safety program will not be opened. Subcontractors do not need to be safety prequalified at time of bid opening, but must prequalified before they step on the jobsite. To inquire as to status of safety prequalification, contact Jerry Fulop, JEA, 21 W. Church Street, Jacksonville, FL 32202, (904) 665-5810, e-mail: fuloje@jea.com.

Company agrees to abide by all JEA's Safety Rules and Regulations in accordance with JEA Company Safety Requirement. In addition, ALL Company employees will be required to attend and successfully complete Company's orientation and supervisor's training at Company's expense prior to the start of any work activities. This is a condition of employment for Company and Subcontractors who perform work for JEA. There will be at least four (4) categories of training mandated. 1) Orientation, 2) Supervisor, 3) Competent Person, and 4) Certified Flagger.

ORIENTATION - Required one day training class for ALL personnel working at JEA's sites. Acceptable training will be EITHER attendance at an OSHA 10 hour class in the last two years (will require an OSHA

issued card for proof) or attend the NCCER (National Center for Construction Education and Research) 8 hour Orientation. Company personnel utilizing the OSHA 10 Hour class must also attend the JEA 2-Hour Operation specific training. This training must be completed prior to starting work on a JEA job site.

SUPERVISOR - Orientation and the JEA Safety Leadership Development (SLD) Class. This requirement is for ALL employees paid as a foreman, general foreman, superintendent or any employee that will direct or may be expected to direct work.

CERTIFIED FLAGGER – All Company's performing any construction to or on City of Jacksonville, or State of Florida streets and highways shall provide certified flaggers to direct traffic in accordance with the approved MOT of the project.

NOTE: OSHA ten (10) hour classes are available from the following: Trained and Certified OSHA Instructors, Consultants, Safety Councils, etc. Other training mandated by JEA has been developed and approved by the NCCER. This training will be available from Certified Master Instructors, JEA, Northeast Florida Safety Council or other approved sources and will be tracked in the form of an individual transcript for each employee by NCCER.
Company may request exemption for specialty work based on task to be performed, hazard involved, and duration of work.

**935. Customer Service Plan**

The Company's Customer Service Plan to achieve customer satisfaction requirements as determined by JEA Project Outreach shall include, but is not limited to the following:

- Name of Company's Customer Service Representative
- Office phone number
- Cell phone number
- Email address
- Fax number
- Detailed flow chart outlining how the Company will handle customer concerns
- Preemptive customer satisfaction control measures (such as door hangers provided by JEA, and neighborhood meetings in conjunction with JEA staff)
- Company's plan for notification of affected property owners, homeowner's association(s), residents and apartment management companies of proposed road closures and detours as shown in the project plans (First Coast Technology Parkway)
- Construction best practices that eliminate damage to customers' property including, but not limited to, blocking customers' access to driveways, cutting customers' services during tie-in, excessive noise from construction equipment, and elimination of dust during construction Work.
- Providing access for business and home owners, mail delivery, and garbage/yard debris/bulk pick-up.

**936. Auger Boring (Jack and Bore)**

The quantity to be paid for will be the actual number of linear feet of each size casing and method of installation actually installed in accordance with Technical Specification Section 02342. Measurement shall be made along the horizontal projection of the center line of the casing. Payment for work will be made at the Contract Unit Price and shall be full compensation for the items of work, complete, including steel casing pipe; casing spacers; pipe joint restraints and total restraining system required on the carrier pipe (reclaimed water main); locate wiring; installation and removal of geotechnical instrumentation and

monitoring equipment including, but not limited to, Deep Settlement Monitoring Points (DMPs) and Piezometers in accordance with Section 02344; cellular concrete backfill in accordance with Section 02350; excavation; de-watering; as-builts; and all incidental work required to complete the work including all materials, labor, tools, and equipment.

## Supplemental Auger Boring Specifications (Prepared by Jacobs Engineering Group)

PART 1 GENERAL

1.01 SUMMARY

A. The work specified in this Section includes furnishing labor, equipment and material to install casing by auger boring, and to install carrier pipe within the casing, at the locations shown on the Drawings. Auger boring may be referred to in the Contract Documents as “Jacking and Boring” or “Jack and Bore.”

B. Stabilized excavations, supported by an engineered shoring system, are required at each end of the auger bores in order to perform the work, referred to in this Section as the jacking and receiving pits. Retain a qualified Engineer to design pit shoring systems, as required to construct the pits in accordance with this Section and applicable regulations.

C. A dewatering system is required to lower the groundwater table at the jacking and receiving pits, and along the auger bore alignment. The Contractor shall install, operate, and maintain the dewatering system as required to perform the work covered by this Section, and to achieve the performance requirements of this Section. Retain a qualified Engineer to design the dewatering system.

D. The Contractor shall select auger boring equipment and construction methods to achieve specified performance, subject to the requirements of this Section. This Section includes performance requirements for achieving line and grade tolerances, dewatering, and for limiting settlement and disturbance to adjacent structures and utilities.

1.02 RELATED SECTIONS

A. Section 02344, Geotechnical Instrumentation and Monitoring.

B. Section 02350, Cellular Concrete Backfill.

1.03 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM A139 - Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe.

2. ASTM C150 – Standard Specification for Portland Cement. B. American Welding Society (AWS): D1.1/D1.1M, Structural Welding Code for Steel.

1.04 DEFINITIONS

A. Auger boring: The process of jacking a casing pipe into the ground using a system of hydraulic jacks, while simultaneously excavating the ground at the opposite end of the casing by means of a rotating cutting head fitted to a helical auger string, extending continuously through the casing. Excavated soil and rock fragments are conveyed from cutting head to the open end of the casing by rotation of the augers within the casing.

B. Obstruction: Any buried object encountered by the casing that acts as a physical impediment to auger boring, such that it prevents the auger bore from being advanced forward.

C. Casing: Protective steel pipe installed to support the auger bore excavation. Casing is advanced by jacking, and is designed to withstand all anticipated jacking loads, static loads, and imposed loads with appropriate factors of safety.

D. Face: The excavation surface exposed by the cutting head.

E. Jacking pit: Excavation from which the auger bore is advanced by jacking, supported by a shoring system, or graded to provide stable slopes, as evaluated and designed by the Contractor's Engineer.

F. Receiving pit: Excavation into which the auger bore is advanced, supported by a shoring system, or graded to provide stable slopes, as evaluated and designed by the Contractor's Engineer.

G. Cutting head: Device fitted with excavation tools and attached to the front of the casing and/or to the casing head that rotates to excavate the face.

H. Jacking frame: A steel frame housing the hydraulic cylinders used to propel the casing string, designed to transmit jacking loads between the casing and the thrust block or reaction frame.

I. Thrust block: An engineered structure that distributes the jacking force from the jacking frame to the ground or to the excavation support structure.

J. Backstop: Jacking reaction frame, anchored into the ground in the jacking pit.

K. Spoil: Excavated soil or rock, also referred to as "muck."

L. Allowable jacking load: Maximum jacking load that can be applied to the casing pipe, allowing for an appropriate factor of safety. The allowable jacking load is determined by the casing pipe designer, considering the capacity of the casing pipe to withstand loads imposed by the jacking process.

M. Over-excavation: Excavation of a volume of ground greater than the volume filled by the casing.

N. Water jetting: Use of a stream of water to erode soil, and/or to create a slurry of water and soil.

O. Flowing ground: A mixture of sand, or sandy soil, and water that flows as a viscous fluid into the face of the bore, or into the excavation.

P. Running ground: Granular soil with minimal cohesion that runs into an excavation until the slope flattens to the angle of repose.

1.05 QUALITY CONTROL

A. The Contractor's staff shall include a Project Superintendent assigned to oversee auger boring at all times throughout construction. The Project Superintendent shall have at least three years of auger boring experience, including at least two projects with ground conditions comparable to those described in the Contract Documents, using methods and equipment comparable to those proposed.

B. Personnel operating the pipe jacking equipment shall have completed a minimum of five drives or 500 feet with equipment similar to the proposed work.

C. All casing pipe welding shall be performed by qualified welders in accordance with the requirements of ANSI/American Welding Society (AWS) D1.1/D1.1M.

D. Retain a Professional Engineer to design the casing. The casing design engineer shall estimate the anticipated pipe jacking loads and design the thrust block. The engineer shall be registered in Florida, and shall have at least three years of related design experience, including design for at least two comparable projects.

E. Retain a Professional Engineer to evaluate requirements for safely stabilizing and shoring the proposed pits, and to design the pit shoring, as required. The shoring design engineer shall estimate the anticipated earth loads and thrust loads, and all other potential loads on the shoring system, and shall design the shoring system for the anticipated loads. The engineer shall be registered in Florida, and shall have at least three years of related design experience, including engineering for at least two comparable projects.

F. Retain a Professional Engineer to design the carrier pipe installation, including pipe blocking, as required, and sequencing cellular concrete backfilling as specified in Section 02350, to secure the pipe at the design line and grade, prevent floatation of the carrier pipe, and prevent damage to the carrier pipe during construction. The engineer shall be registered in Florida, and shall have at least three years of related design experience, including engineering for at least two comparable projects.

G. Retain a Professional Engineer or Professional Geologist to design the dewatering system. The dewatering system designer shall be registered in Florida, and shall have at least three years of related design experience, including design for at least two comparable projects.

H. Survey and layout for auger boring and casing installation shall be performed by an experienced surveyor or survey technician with training and experience determined to be acceptable by the JEA Project Representative. Survey and layout control points shall be located and installed by a Professional Land Surveyor, registered in Florida, having experience with comparable auger boring projects, as determined to be acceptable by the JEA Project Representative.

I. The carrier pipe manufacturer shall review the proposed work plan for pipe installation and blocking, including the Contractor's proposed work plans for backfilling the casing with cellular concrete as specified in Section 02350, prior to commencing auger boring.

J. The carrier pipe manufacturer shall furnish the services of a competent factory representative to inspect the storage, handling, and installation of pipe during initial pipe installation. The factory representative shall be provided at no additional cost to the Owner.

K. Perform condition assessments of the following existing utilities and structures crossed by the alignment:

1. 18-inch diameter RCP stormwater pipe.

2. Two (2) 72-inch wide x 48-inch high concrete box culverts. L. Locate utilities within 30 feet of the auger bore alignment and within 30 feet of the required excavations.

M. For each pit, the Contractor's shoring design Engineer shall perform a minimum of two (2) site visits during pit construction to observe ground conditions and verify that the excavation methods and support comply with the design and are appropriate for the conditions encountered.

N. For the auger bore, the Contractor's casing design Engineer shall perform a minimum of one (1) site visit during bore construction to observe ground conditions and verify that the boring procedures and casing are appropriate for the conditions encountered.

1.06 DESIGN CRITERIA

A. The following geotechnical report has been prepared for the Project, and is included as a reference to the Contract Documents:

B. "Geotechnical Exploration and Evaluation Report – JEA Gate Parkway – Glen Kernan to T-Line New Reclaimed Water Transmission Main – Jacksonville, Florida", prepared by CSI Geo, Inc. (geotechnical data).

C. This geotechnical report includes geotechnical data collected during the subsurface investigation for the Project, and presents factual information about the observed ground and groundwater conditions at the test boring locations, and interpretations of geotechnical parameters for design.

D. The Contractor shall develop their own interpretation of the subsurface conditions and ground behavior in response to the Contractor's means and methods of construction. However, the Contractor shall expect to encounter flowing ground at some locations during auger boring, and shall select their equipment and means and methods of construction to stabilize the face of the bore when flowing ground is encountered, as required to achieve the requirements of this Section.

E. The Contractor's Engineer shall evaluate anticipated stability conditions at the launch and receiving pits, and shall provide signed and sealed recommendations for excavation configuration and stabilization measures, and shall provide a shoring design including signed and sealed drawings and design calculations.

F. The Contractor's Engineer shall estimate the maximum anticipated jacking load, and provide sealed calculations to verify the suitability of proposed backstops and thrust blocks.

G. The Contactor's Engineer or Geologist shall design dewatering systems for each pit based on the information provided in the geotechnical report.

H. The Contractor's Engineer shall evaluate the anticipated jacking loads, and shall design the casing pipe based on these loads, considering the Contractor's proposed equipment, construction means and methods, and the requirements of this Section. Pipe shall be designed to withstand the maximum earth and

groundwater loads, and jacking loads without cracking, breaking, deflection, or suffering other damage. The Contractor's Engineer shall determine the allowable jacking load and select safety factors to address potential effects of eccentric and/or concentrated loading on the pipe, and potential reductions in effective surface contact area.

1.07 PERFORMANCE CRITERIA

A. Monitor settlement in accordance with Section 02344, Geotechnical Instrumentation and Monitoring. Limit settlement of utilities and the ground surface to ½-inch or less.

B. If ground or structure settlement exceeds ½-inch, develop and implement a detailed plan to drill, intersect, and fill all voids under adjacent structures and utilities within 20 feet either side of the auger bore centerline with cementitious grout acceptable to the JEA Representative. Furnish and inject cementitious grout for settlement remediation, at no additional cost to the Owner.

C. The Contractor shall repair all damage to adjacent structures, utilities, roadways, and walkways resulting from settlement or any other disturbance caused by auger boring. For each incidence of damage, develop and implement a written work plan for repairing the damage as required to restore the affected structure, utility, roadway, or walkway to the original, pre-construction condition, to the satisfaction of the JEA Project Representative. Furnish materials and perform repairs at no additional cost to the Owner.

D. Install a dewatering system to lower the groundwater table elevation on a continuous basis throughout pit construction and auger boring, in order to maintain the excavations in a dry state until all work is complete. The dewatering system shall draw the water table down to a minimum depth of 2 feet below the bottom of the casing and the bottom of the auger boring pits, as indicated by measurement of the water level in the piezometers installed as shown on the Drawings.

E. Installation Tolerances:

3. The maximum deviation of the casing from the design alignment shown on the Drawings, at the recovery pit shall not exceed 18 inches.

4. The maximum deviation of the casing from the design grade shown on the Drawings, at any point along the casing shall not exceed 6 inches.

5. The installed carrier pipe flowline shall be within ± two (2) inches of the design invert elevation, as shown on the Drawings.

1.08 SUBMITTALS

A. Provide statements of qualifications for the auger boring crew or subcontractor, supervisory personnel for auger boring work, and supervisory personnel in charge of carrier pipe installation. Include resumes, project lists, and reference contact information, as required to demonstrate compliance with the Quality Assurance requirements, and as required by the JEA Project Representative.

B. Provide a written auger boring work plan including narratives, descriptions, shop drawings, sketches, and cut sheets, to address the items listed below.

1. Site layout showing equipment layout, power and water supply, access and egress, and existing utilities.

2. Descriptions of the auger boring equipment, including manufacturer's specifications and cut sheets, and photographs and drawings of the equipment. Include the make, model, size, guidance and steering system, power system, lubrication pump and distribution system, bits, augers, track configuration and setup, and spoil handling system.

3. Description of the pipe jacking system, including cylinder sizes and jacking capacities, jacking frame and/or backstop configuration, thrust ring configuration and dimensions, and power unit(s). Indicate location, type, and calibration of pressure monitoring devices and readouts, including pressure vs. load relationship for jacking cylinder gauges. Describe configuration and dimensions of interfaces between pipes and auger boring equipment, including the thrust ring and bearing surfaces.

4. Auger boring methods and procedures, addressing:

a. Jacking procedures, including procedures for operating the jacks concurrent with boring, and procedures for monitoring jacking pressures to prevent exceeding the allowable jacking load for the casing pipe.

b. Auger operation procedures to excavate and remove spoil from the face.

5. Equipment configurations and operation procedures to control face stability, prevent over-excavation, and limit settlement during pipe jacking, as required to achieve the maximum settlement limits and prevent voids from developing above the bore. Describe the proposed methods for monitoring the soil volume removed, and for identifying potential over-excavation. Describe equipment and measures to address the potential to encounter flowing and/or running ground, for example: sand augers; sand cutting head; overcut band at front of lead casing; operation with the cutting head recessed inside the casing, etc.

6. Methods and materials to maintain face stability and prevent loss of ground and erosion of fines, when jacking is temporarily stopped, and in case of a prolonged stoppage of several days.

7. Methods and procedures for line and grade control, as required to achieve the design line and grade within the specified tolerances. Address the following:

a. Survey control and benchmarks for the pits and auger bore.

b. Layout to set up the track and initial casing position in the launch pit.

c. Measures and procedures for monitoring the lead casing position and grade continuously throughout jacking, and procedures for making adjustments to the lead casing orientation.

d. Measures for checking the casing alignment and position regularly during auger boring.

8. Spoil handing plan, including location of proposed on-site storage areas, and haulage routes.

9. Groundwater and construction water control plan including drainage provisions, and details for the pumping, treatment, and disposal of ground and construction water. Address methods of drainage and water control in the bore and in the pits.

10. Work schedule, identifying all major construction activities as independent items. Summarize construction sequence, number and duration of shifts planned and daily sequence of operations.

11. Methods of sealing the pit break out and break in openings, including portal seals and/or ground improvement measures to prevent ground and groundwater inflows when portals are opened in the pit shoring system, and during jacking.

12. Plans for storage and handling of casing and carrier pipe.

13. Dewatering plan. Include drawings showing the proposed well or wellpoint types, configuration, and locations in plan, and bottom depths. Include description of the proposed pumps and other equipment, including pumping wells or educator wells, and describe the header and water treatment system. Provide signed and sealed calculations supporting the dewatering plan.

C. Provide a casing design, prepared and signed and sealed by the Contractor's Engineer, including calculations, descriptions, shop drawings, sketches, and cut sheets addressing the following:

1. Report of predicted jacking loads, and casing pipe and pipe joint design calculations, stating the allowable jacking load and basis for the design, prepared and sealed by the Contractor's Engineer.

a. Description of casing products and materials, including specifications and shop drawings showing the pipe wall thickness, steel grade, and the maximum allowable axial force. Provide cut sheets and shop drawings from the casing manufacturer.

b. Plan and schedule for inspecting the casing after installation.

c. Certifications for casing pipe segments demonstrating that the materials meet the requirements of the specifications. D. Prepare contingency plans, describing measures that the Contactor will be prepared to employ in the event of the following conditions:

1. An obstruction is encountered in the face. Describe plan for supporting face once augers have been removed, and providing ventilation required for entry of the casing.

2. Flowing or running ground encountered at the face.

3. Settlement in excess of the specified criteria, and/or volume of excavated spoil exceeding the volume of the casing installed, or other indications of voids. Describe the plan to mobilize drilling and grouting equipment. Describe measures to monitor and control grout injection rates, and to prevent damage due to grouting pressures. E. Provide a carrier pipe installation work plan including narratives, descriptions, shop drawings, sketches, and cut sheets. Coordinate the carrier pipe installation work plan with submittal requirements for cellular concrete backfill specified in Section 02350. Address the items listed below:

1. Schematic profile along bore axis showing proposed layout for carrier pipe installation.
2. Description of survey and layout procedures, including as-built profile of the casing prior to installing the carrier pipe.
3. Carrier pipe installation and blocking plan:
a. Narrative describing procedures for installation of the carrier pipe, spacers, and blocking.
b. Sections perpendicular to the bore axis showing proposed casing spacers and additional blocking.
c. Product descriptions of the casing spacers and blocking materials. Include cut sheets, specifications, and shop drawings provided by the manufacturer.
d. Carrier pipe blocking design, including calculations and sketches, prepared and signed and sealed by the Contactor's Engineer.
e. Written statement verifying that the carrier pipe manufacturer has reviewed the proposed work plan for pipe installation and blocking.
F. Provide a written report of utility locates in accordance with ASCE 38-02 Quality Level A, within five (5) days after completing the observations, for utilities within 30 feet of the auger bore alignment and within 30 feet of the required excavations.

G. Visual condition assessment reports and electronic files. Provide a written report summarizing conditions observed, and observed areas of damage identified by the assessments, and digital copies of the culvert and stormwater pipe CCTV inspection video, within five (5) days after completing the observations.

H. Prepare as-built drawings and records in accordance with JEA Standard Specification Section 501.

I. Submit shift reports for each shift within 24 hours of the end of each shift, including the following:

1. Hours worked per shift.
2. General description of work performed each shift.
3. Summary of equipment and crew.
4. Weather conditions.
5. Jacking reports including, as applicable:
a. Time of reading.
b. Cutting head position including: station and elevation.
c. Thrust and torque readings (per casing joint).
d. Individual thrust jack pressures, and total thrust on the casing.
e. Start/end time for each jacking cycle.
6. Volume of spoil removed.
7. Seepage and pumping rates, description of ground encountered, and observations of lost ground or ground movement.
8. Description of unexpected conditions or events, and operation shut-down periods or other interruptions in the work, including reasons for shut-down.

1.09 PRE-CONSTRUCTION MEETING
A. Hold a pre-construction meeting at least one week prior to the start of auger boring work. The Contractor is responsible for scheduling and holding the meeting after the submittals have been reviewed. The meeting shall include the Contractor, the auger boring subcontractor, the Engineer, and the JEA Project Representative.

B. Review at least the following information at the pre-construction meeting:
1. Pipe jacking and boring work plan.
2. Quality control plan.
3. Grade and alignment control procedures.
4. Spoil and water management plan.
5. Safety plan.
6. Plan for daily coordination of geotechnical instrumentation monitoring with boring and jacking positions, and procedures for settlement control.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Select, furnish, and operate auger boring equipment appropriate to complete the work shown on the Drawings and to comply with the requirements of this Section, suitable for the range of subsurface conditions indicated in the Contract Documents.

B. The auger boring equipment shall incorporate a water line system with a grade indicator in the shaft to monitor the grade at the cutting head at all times. The Contractor may propose alternative means to continuously monitor the elevation of the lead casing, for review by the JEA Project Representative.

C. The auger boring equipment shall incorporate a steering can consisting of a steerable lead casing segment with steering cylinders and control rods. The Contractor may propose an alternative steerable boring head configuration, for review by the JEA Project Representative.

D. The cutting head and augers shall cover 100% of the casing face, and augers in the lead section of casing shall fill the casing. The cutting head and augers shall be configured to control the ingress of excavated ground at the face to prevent over-excavation.

E. The cutting head and/or casing banding shall not result in an overcut greater than 1 inch beyond the outside diameter of the casing.

F. Provide sump pumps and discharge lines for each pit, with appropriate pumping capacity as required to maintain equipment in a dry condition during rainfall events.

2.02 STEEL CASING

A. Furnish steel casing pipe conforming to ASTM A139 per JEA Water and Sewer Standards Specification Section 350, Paragraph II.1.3, and Steel Casing Detail as shown on the Drawings.

B. Casing joints shall be prepared in accordance with JEA Water and Sewer Standards Specification Section 350, Paragraph II.3.5.

C. The Drawings show the casing diameter and minimum thickness requirements. The Contractor may propose an alternative, larger diameter casing, subject to review by the JEA Project Representative.

D. Casing pipe shall be designed by the Contractor’s Engineer for the requirements and conditions described in the Contract Documents, and the Design Criteria included in this Section.

E. Straightness: The maximum straightness deviation in any 10-foot length shall be 1/8 inch.

2.03 CARRIER PIPE

A. Furnish carrier pipe complying with JEA Water and Sewer Standards Specification Section 350, and as shown on the Drawings.

B. Polyethylene encasement of the carrier pipe is required prior to inserting the ductile iron pipe into the casing, in accordance with JEA Water and Wastewater Standards Manual Section 350, Paragraph II.4.4.

2.04 CASING SPACERS

A. Casing spacers shall conform to the requirements of JEA Section 350, Paragraph II.5.3.

B. Casing spacers shall be configured to prevent metal-to-metal contact between the carrier pipe and the spacer and/or the casing wall.

2.05 BACKFILL GROUT

A. Grout used to fill voids under structures shall be a water/cement grout. Contractor may propose admixtures, subject to review by the JEA Project Representative.

B. Cement used in backfill grout: normal Portland, Type I, II, or I/II conforming to ASTM C150.

PART 3 EXECUTION

3.01 GENERAL

A. Perform the work in accordance with the approved work plans.

B. Perform geotechnical instrumentation monitoring in accordance with Section 02344 and as shown on the Drawings.

C. The Contractor shall ensure the safety of the work, construction personnel, the public, and adjacent third parties.

D. Protect adjacent existing structures, utilities, roadways, walkways, and vegetation from damage due to construction operations.

E. Repair all damage to adjacent existing structures, utilities, roadways, walkways, and vegetation from damage due to construction operations, in accordance with the requirements of this Section.

F. Conduct site operations so that trucks and other equipment do not track dirt or debris onto the streets. Immediately clean any dirt or debris from the roadway.

G. Obtain and provide all services required to perform the work, including electrical power and water.

H. Locate all utilities and other buried facilities within 30 feet of the auger bore alignment and 30 feet of the limits of each pit excavation. Contact Sunshine 811 prior to starting work at the site, allowing for time to expose and verify locations of each utility within 30 feet of each pit and the auger bore alignment. Hand dig or vacuum excavate to expose all utilities within 30 feet of each pit to verify locations, prior to starting construction at the site.

I. Perform all excavation within the easements and rights-of-way shown on the Drawings.

J. Provide and maintain barricades, fences, and other means to prevent entry to the pits and casing during non-working hours.

K. Control entry to pits, and limit entry to personnel essential for performance of the work.

L. Prevent entry into the casing, except in the case of Contractor’s personnel with appropriate training for safe working inside the casing. The Contractor’s personnel shall only enter the casing if appropriate safety measures are in place, as determined by the Contractor, and in accordance with the applicable regulations.
M. Wherever there is a condition which may endanger the stability of the excavation or any adjacent structures and utilities, operate with a full crew continually for 24 hours per day, including weekends and holidays, until the conditions no longer jeopardize the stability of the excavations.

N. Complete the following work prior to setting up the auger boring equipment:

1. Submittals have been made and JEA has reviewed and accepted the submittals.

2. Locate utilities within 30 feet of the auger bore alignment and within 30 feet of the required pit excavations.

3. Install all geotechnical instrumentation and obtain baseline readings.

4. Complete construction of the jacking and receiving pits.

5. Dewater the pits and confirm that groundwater levels have been lowered to a minimum of 2 feet below the base of the pits and casing invert. O. Prior to starting auger boring, install soil anchors or other measures, as required to prevent the auger boring equipment from overturning during operation.

3.02 ASSESSMENT OF EXISTING STRUCTURE CONDITIONS

A. Prior to commencing pit excavation, excavate to the top of the 18-inch RCP stormwater pipe to mark and survey the top of the pipe. Following completion of the auger boring work, re-excavate to the top of the 18-inch RCP stormwater pipe to observe conditions on the pipe and to survey the mark established previously.

B. Perform visual condition assessments of the following existing utilities and structures, extending 200 feet each side of the auger bore centerline:

C. Two (2) 72-inch wide x 48-inch high concrete box culverts.

D. 18-inch diameter RCP stormwater pipe.

E. The objectives of the condition assessments are to characterize the general condition of the structures, and to identify existing damage or degraded structural conditions, such as apparent joint displacement, degradation of concrete, etc.

F. Perform condition assessments at least 1 month prior to mobilization for auger boring.

G. Perform the visual condition assessment of the box culverts and stormwater pipe using closed circuit television (CCTV) equipment that tracks and records the position of the image obtained ±6 inches. Provide means to equate the recorded position to the auger bore centerline.

H. Review the video obtained from the CCTV within two (2) days after completion of the observations. Notify the JEA Project Representative of any areas identified to show signs of damage or degraded structural conditions, such as apparent joint displacement, degradation of concrete, etc. Submit records and observations to the JEA Project Representative.

3.03 DEWATERING SYSTEMS

A. Design, install, maintain, and operate dewatering systems for each pit, and along the length of the auger bore alignment. Dewatering systems shall have sufficient capacity to remove groundwater on a continuous basis throughout pit construction and auger boring, in order to maintain the excavations in a dry state until all work is complete.

B. Dewatering systems shall be designed to prevent removal of soil particles.

C. Dewatering systems shall discharge into a settlement pond or frac tank.

D. Decommission dewatering wells and/or wellpoints by filling with cementitious grout, approved by the JEA Project Representative.

E. Furnish and operate a backup electrical power supply for the dewatering systems that can be activated to provide power to the systems within one (1) hour following a loss of power from the primary power source.

3.04 JACKING AND RECEIVING PITS

A. Design and construct jacking and receiving pits at the locations shown on the Drawings. Contractor to determine actual jacking and receiving pit dimensions. Any changes to the pit locations as shown on the Drawings shall be reviewed and approved by the City of Jacksonville and the JEA Project Representative.

B. Provide surface drainage during the period of construction to protect the work and avoid affecting adjoining property. Prevent surface runoff from entering the launch and receiving pits.

C. Operate and maintain sump pumps in each pit, to maintain the auger boring equipment in a dry condition during rainfall events.

D. The Contractor’s Engineer shall provide signed and sealed designs of pit shoring systems in accordance with the requirements of this Section.

E. Prevent voids from developing and prevent settlement around the jacking and receiving pits. If voids or settlement are detected, immediately implement measures to prevent further ground loss and settlement.

Meet with the JEA Project Representative and provide a plan to prevent further ground loss and settlement, and to completely backfill any voids with cementitious grout or flowable fill.

F. Perform all pit excavation and support in accordance with applicable regulations, and in accordance with the design and recommendations provided by the Contractor's shoring design engineer.

G. Place sheeting and shoring so that the maximum unsupported height of pit excavations shall not exceed four (4) ft.

H. Design and install a backstop, jacking frames, and thrust blocks as required to transfer jacking loads to the ground without excessive deflection of shoring or disturbance to adjacent structures or utilities.

I. Once carrier pipe connections are completed within the pits, remove pit sheeting and shoring, backstops, and thrust blocks, and backfill the pits in accordance with the specified backfilling and compaction requirements for the Project.

3.05 AUGER BORING

A. Verify the alignment and grade of the launch cradle, tracks, or other casing supports prior to starting jacking, and verify the directions of the first and second casing pipe joints.

B. The Contractor shall ensure that all personnel tasked with operating equipment are trained in the safe and appropriate operation of the equipment, in accordance with the equipment manufacturer's recommendations and guidelines, and the Contractor's safety plan.

C. Install entry and exit seals at pits, and employ measures as required to prevent ground and groundwater inflows as portals are opened in the pit support system, and during pipe jacking. Provide seals at the entry and exit for the anticipated ground and ground water conditions indicated in the Contract Documents.

D. Inspect casing prior to lowering it into the launch pit to ensure that no cracked, broken, or otherwise defective materials are being used. Casing delivered with visible damage shall not be used. Damaged or defective pipe shall be marked as rejected and promptly removed from the site.

E. Prevent damage to the casing pipe and carrier pipe during handling. Lift pipe in accordance with the manufacturer's recommendations.

F. Damaged casing pipe and carrier pipe shall be removed from the site.

G. Clean ends of each casing pipe before joining pipes.

H. Weld casing joints to provide the full capacity of the pipe against jacking and installed loading conditions.

I. Mark each casing pipe joint with a painted number, visible from the top of the launch pit, indicating the order of installation.

J. Operate and control the auger boring cutting head and casing position as required to maintain face stability and to prevent over-excavation and settlement, during pipe jacking, and when jacking is temporarily stopped.

K. Water jetting shall not be used to excavate the bore.

L. In the event of a work stoppage, bulkhead the face against ground movement, as required to stabilize the face. Install weep holes to prevent excessive water pressure build up, and filter materials as required to prevent erosion of soil into the casing.

M. Jack the casing string periodically during periods of work stoppage, as required to prevent pipe set and to prevent start-up jacking loads from exceeding the allowable loads.

N. If an obstruction is encountered during boring, immediately stabilize and support the face to prevent ingress of soil and groundwater, and notify and meet with the JEA Project Representative. Within 12 hours of encountering an obstruction, provide the JEA Project Representative with Contractor's plan to remove or otherwise remediate the obstruction, so that the auger bore can progress past the obstruction.

3.06 LINE AND GRADE CONTROL

A. Utilize a system to monitor the auger bore line and grade, and adjust the bore inclination during jacking of each casing pipe segment.

B. Survey and record the position of the lead casing a minimum of two (2) times during auger boring.

C. Perform an as-built survey of the installed casing pipe before installing the carrier pipe. Survey line and grade at the invert and crown, at 20-ft intervals.

D. Utilize a laser line to control, check, and adjust the position of the carrier pipe within the casing, during carrier pipe installation. Adjust the carrier pipe position as necessary to achieve the design tolerances, prior to commencing placement of cellular concrete.

3.07 CARRIER PIPE INSTALLATION

A. Remove all construction debris, spoil, oil, grease, and other materials from the installed casing pipe prior to commencing carrier pipe installation.

B. Polyethylene encasement of the carrier pipe is required prior to inserting the ductile iron pipe into the casing, in accordance with JEA Water and Wastewater Standards Manual Section 350, Paragraph II.4.4. Protect the polyethylene encasement around the carrier pipe during the course of the work, and repair any encasement observed to be damaged prior to cellular concrete placement.

C. Install spacers at locations and spacing per JEA Water and Sewer Standards Specification Section 350 Paragraph II.5.3 and as shown on the Steel Casing detail on the Drawings, to fully support the carrier pipes and associated loads. Casing spacers shall be installed at a maximum interval of every 9 feet. Clearances of the spacer system from the casing wall shall be as recommended by the casing spacer manufacturer.

D. Install pipe on the design line and grade, by sliding the assembly into the casing. Adjust casing spacers and/or provide blocking prior to insertion, as needed to maintain pipe position within the specified tolerances. Secure spacers with blocking, as needed to prevent displacement during backfill placement.

E. Provide lubricant between casing spacers and casing.

F. Prevent rotation of carrier pipe during installation.

G. Prevent forces on pipe or spacers from exceeding the allowable forces, as provided by the manufacturers of the pipe and casing spacer assemblies.

H. Test carrier pipe in accordance with JEA Water and Sewer Standards Specification Section 350.

I. Seal the annular space between the casing pipe and carrier pipe, at each end of the casing, with a vertical bulkhead capable of containing the cellular concrete at the pressures exerted by the fluid cellular concrete, and as shown on the Drawings.

J. Place cellular concrete to fill all space between the carrier pipe and the casing, in accordance with Section 02350.

3.08 CLEANUP, TESTING AND INSPECTION

A. Remove all construction debris, spoil, oil, grease, and other materials from the installed carrier pipe.

B. Prepare as-built drawings in accordance with JEA Water and Sewer Standards Specification Section 501.

3.09 ACCEPTANCE CRITERIA

A. Acceptance of the carrier pipe shall be based on meeting following requirements:

1. The carrier pipe has been cleaned and is free from debris.

2. The line and grade of the carrier pipe is within the tolerances specified in the Contract Documents.

3. Carrier pipe has been tested as required by this Section and in accordance with the carrier pipe requirements.

**937. Geotechnical Instrument and Monitoring Specifications (Prepared by Jacobs Engineering Group)**

# PART 1 GENERAL

## 1.01 SUMMARY

A. The work specified in this Section includes furnishing, installing, and maintaining geotechnical instruments as shown on the Drawings and specified herein, to monitor ground and structure movements in the vicinity of trenchless bored crossings and pipe installations.

B. Use the geotechnical instrumentation to monitor ground conditions and response to achieve the specified Project requirements and prevent damage to existing structures and utilities.

C. Approximate locations for geotechnical instrumentation are shown on the Drawings. The final locations shall be agreed with the JEA Project Representative, considering actual conditions observed at the sites.

D. Remove all instrumentation and associated elements upon completion of the work, and restore the ground surface to pre-existing conditions, unless otherwise directed or agreed to by the JEA Project Representative.

## 1.02 RELATED SECTIONS

A. Auger Boring.

B. Horizontal Directional Drilling.

## 1.03 DEFINITIONS

A. Deep Settlement Monitoring Point (DMP): Settlement monitoring point installed to monitor vertical ground movement at depth below the ground surface. DMPs are a type of settlement monitoring point.

B. Piezometer: Standpipe piezometer, consisting of a hollow casing, well screen, and aggregate filter pack as shown on the Drawings. Readings are obtained by means of a water level tape.

C. Baseline Reading: Value of instrumentation readings taken prior to construction to provide a baseline against which subsequent readings are compared.

D. Review Level: Value of instrumentation readings at which the Contractor and JEA Project Representative jointly assess necessity of altering methods, rate, or sequence of construction.

E. Geotechnical instrumentation: any device or installation used for monitoring groundwater pressures or the movement of ground or structures situated on or within the ground. DMPs and piezometers are geotechnical instruments.

F. Settlement monitoring point: any instrument for monitoring changes in elevation of structures, surfaces, or ground, that may result due to potential ground settlement.

## 1.04 QUALITY CONTROL

A. Piezometer installation shall be performed by a geotechnical engineering or well drilling firm, routinely engaged in drilling and installing piezometers for the purpose of groundwater level monitoring for geotechnical engineering, as determined to be acceptable by the JEA Project Representative.

B. Settlement monitoring shall be performed by an experienced surveyor or survey technician with training and experience determined to be acceptable by the JEA Project Representative. Monitoring point locations, survey control points, and baseline readings shall be obtained by a Professional Land Surveyor, registered in Florida, and having experience with comparable monitoring projects, as determined to be acceptable by the JEA Project Representative.

## 1.05 TOLERANCES

A. Install DMPs and piezometers within one foot of the horizontal location shown on the Drawings, unless otherwise directed or approved by the JEA Project Representative.

B. The Contractor's surveyor shall determine the initial coordinates of all installed instruments before monitoring commences.

C. Provide and install benchmarks and fixed survey control points that are not susceptible to horizontal or vertical movement, or disturbance and damage during construction.

1.06 SUBMITTALS

A. Provide documentation of qualifications to demonstrate that the proposed personnel meet the requirements of this Section. Provide resumes, project lists, references, and other pertinent information as required by the JEA Project Representative.

B. Work plan for installation and monitoring of DMPs and piezometers. Include the following information in the plan:

1. Plan sketches for each site showing planned instrument locations and anticipated utility locations. Include list of instruments to install at each site.

2. Description of methods, equipment, and products to be used for installation and protection of the instruments, including dimensions. Include cut sheets summarizing product specifications, as available.

3. Materials and mix proportions for aggregate and grout.

4. Description of the survey instruments that will be used including: manufacturer's product information for the instrument, and copies of instrument calibration.

5. Procedures for reducing the survey data and verifying survey results.

6. Example forms, spreadsheets, and plots to be used for recording, reporting, and tracking instrumentation monitoring data.

C. Within five days following installation of the instruments, submit as-built drawings and records showing the installed location, instrument identification number, instrument type, installation date and time. Include log of borehole drilling if applicable.

D. Reports and Records: Provide reports of monitoring data in accordance with the requirements of this Section. Submit instrumentation monitoring data by email, in Microsoft Excel format. Maintain a complete record of monitoring data on-site in a form compatible with Microsoft Excel.

# PART 2 PRODUCTS

2.01 MATERIALS

A. Grout: cement grout shall be a mixture of 5.5 gallons of water per 94 lb. sack of cement. Cement shall be Type I or Type II meeting the requirements of ASTM C 150.

B. Flush mounted protective covers:

1. Watertight steel cover meeting the requirements shown on the Drawings.

2. In paved areas, or where instrument collar is below grade, use a traffic rated valve box meeting JEA Standards.

C. DMPs:

1. Casing: Black steel pipe conforming to ASTM A53, Grade A or B, Schedule 80.

2. Steel Pipe: Black steel pipe conforming to ASTM A53, Grade A or B, Schedule 80.

3. Rebar: No. 8, Grade 60, conforming to ASTM A615.

4. Centralizers: Constructed of schedule 40 PVC.

5. Concrete: as required to completely fill all voids, 3,000 psi minimum.

6. Sand: as for Piezometers.

D. Piezometers:

1. Standpipe: NSF rated, Schedule 40, flush threaded, PVC. Minimum diameter 2 inches.

2. Well screen: Schedule 40 PVC, 10 slot screen with sump and cap at base.

3. Sand filter pack: #20-40 sand.

4. Bentonite: Sodium bentonite, as chips.

5. Tip depth: Minimum depth below pits and casing as shown on the Drawings.

2.02 EQUIPMENT

A. Surveying instruments used for vertical or horizontal monitoring shall have a minimum accuracy of ± 0.005 foot.

B. Calibrate surveying instruments and well monitoring tape in accordance with the procedures recommended by the manufacturer or supplier.

# PART 3 EXECUTION

3.01 GENERAL

A. Notify the JEA Project Representative at least five days prior to installing instruments.

B. Obtain all permits required for installing instruments before starting installation.

C. Existing Conditions: Locate conduits and underground utilities in areas where drilling or excavation is required to install the instruments. Notify utility companies in accordance with regulations and specified requirements.

D. Approximate instrument locations are shown on the Drawings. Adjust the locations of the instruments, as approved in the field by the JEA Project Representative, to avoid interference with existing conduits, utilities, and structures. Repair damage to existing utilities and structures resulting from instrument installations at no additional cost to the Owner.

E. Clearly mark, label, and protect instruments to avoid being covered, obstructed or damaged by construction operations or the general public.

F. Surveying: Survey the location of the instruments to provide horizontal coordinates and elevations within two days of completing the installation.

1. Establish the initial coordinates of each instrument installation to 0.1 foot.

2. Establish the initial elevation of DMPs to 0.005 foot. Establish the elevation of piezometer reference points to 0.005 foot.

3. Record the subsequent elevations of DMPs to 0.005 foot.

G. Provide the Owner and JEA Project Representative with access to the instruments at all times.

H. Piezometer readings:

1. Identify a reference point for water level readings by marking the top of each standpipe piezometer casing.

2. The Contractor's licensed surveyor shall obtain a baseline reading of elevation and position of the reference point for each piezometer. Clearly mark the reference point elevation on the piezometer.

3. Measure the water level position in each piezometer relative to the reference point, using a calibrated water level tape, and record the position in a Microsoft Excel table.

3.02 INSTALLATION SCHEDULE

A. Install DMPs within 14 days to 30 days prior to the start of construction.

B. Install piezometers at least 45 days prior to the start of construction.

3.03 INSTALLATION

A. Use vacuum methods to perform excavation for installation of instruments adjacent to existing utilities as marked by the utility locator or shown on the Drawings, where necessary to protect the utility against damage.

B. Clearly label or mark all instruments to enable field identification.

C. Prepare an installation record as each instrument is installed including:

1. Establish the initial coordinates of each instrument installation to 0.1 foot.

2. Project name and contract name and number.

3. Instrument type and number.

4. Personnel responsible for installation.

5. Equipment used, including diameter and depth of any drill casing used.

6. Date and time of start and completion.

7. A log of soil and subsurface conditions.

8. Type of backfill used.

9. Surveyed as-built location in plan and elevation.

10. As-built lengths and volumes of backfill.

11. Weather conditions at the time of installation on record sheet.

12. Notes including problems encountered, delays, unusual features of the installation, and any events that may have an influence on instrument behavior.

D. Deep Settlement Monitoring Points (DMPs) installation procedures:

1. Perform borings for DMPs using geotechnical auger boring equipment, and drilling methods that will provide a stable borehole and enable installation of the monitoring points.

2. Lay out all components for DMP installation to verify lengths, prior to starting drilling.

3. During drilling, collect soil samples at five foot intervals using Standard Penetration Testing (SPT) in accordance with ASTM D1586. Record SPT blow counts and retain soil samples in glass jars. Label samples with borehole and sample depth, and provide samples to the JEA Project Representative.

4. Clean out the borehole and install the steel casing.

5. Insert the steel rod or pipe into the casing, and push the tip to the specified elevation.

6. Install the protective cover at surface, as shown on the Drawings.

3.04 MONITORING FREQUENCY

A. The monitoring frequencies noted in the following sections are the minimum required frequencies. This monitoring frequency does not include monitoring required for Contractor's control or safety of construction. The Contractor shall perform all monitoring as they deem necessary for safety and performance of construction operations.

B. The JEA Project Representative may modify the monitoring frequencies depending upon location, construction progress, rates of movement, and other factors affecting the ground or structures that are subject to monitoring.

C. Baseline readings for the DMPs shall consist of an average of three readings.

D. Settlement monitoring points:

1. Survey elevation once every 24 hours during pit excavation and construction.

2. Survey elevation once every 24 hours during auger boring work, until completion of the work.

3. Survey elevation two (2) times, during a period of 1 month to 3 months following backfilling of the pit, as directed by the JEA Project Representative.

E. Obtain water level readings in standpipe piezometers according to the following schedule:

1. Once every 7 days for the first two weeks following installation.

2. Once every 7 days for the two weeks prior to starting excavation or dewatering within 200 feet of the piezometer.

3. Once every 24 hours during construction of any excavation or bore located within 100 feet of the piezometer.

4. Once per week during the period when the excavation or bore is within 100 feet of the piezometer remains open.

5. Once every 7 days for 2 weeks after the excavation or bore is within 100 feet of the piezometer is backfilled.

6. Once within 1-2 months following construction, as directed by the JEA Project Representative.

3.05 REVIEW LEVEL

A. The review level for DMPs shall be 0.5 inches (0.04 feet) settlement relative to the baseline.

B. If the Review Level is reached:

1. Immediately notify the JEA Project Representative.

2. Within two (2) hours, meet with the JEA Project Representative to discuss response action(s), and develop a plan of action to prevent further settlement.

3. Implement the plan of action to prevent further settlement and to remediate any adverse conditions or damage.

4. The cost of measures required to limit further settlement, and to repair settlement induced damage due to auger boring and pit excavations shall be incidental to the work.

3.06 REPORTING

A. Provide readings from instruments to the JEA Project Representative within 24 hours of taking the measurement. Provide data and updated plots of changes in elevation to the JEA Project Representative in Microsoft Excel format.

B. Prepare and submit a weekly report documenting the monitoring performed and results of the monitoring. Include, at minimum, the following information:

1. Description and location of adjacent construction activity.

2. Excavation depth, or stations of the boring, drilling, or reaming operations, and other pertinent work that may affect the readings.

3. Data plots for each instrument. For DMPs, provide plots of vertical displacement with time. For piezometers, prepare plots of water level versus time.

4. Indicate any exceedances of the review levels specified herein.

C. Contractor shall not disclose any instrumentation data to third parties, nor publish data, without prior written approval from the Owner.

3.07 PROTECTION, MAINTENANCE, AND REPAIR

A. Protect instruments and appurtenant fixtures and other components of instrumentation systems from damage due to construction operations, weather, traffic, and vandalism.

B. If an instrument is damaged or inoperative, notify the JEA Project Representative within 24 hours from the time that the damage was observed.

C. Repair or replace the damaged or inoperative instrument within 72 hours at no additional cost to the Owner. Notify the JEA Project Representative at least 24 hours prior to repairing or replacing a damaged or inoperative instrument.

D. The JEA Project Representative may impose a work stoppage in the vicinity of the damaged or inoperative instrument until it is operational at no cost to the Owner and with no schedule adjustment.

3.08 RESTORATION

A. Remove or decommission all instrumentation and associated elements installed upon completion of the work, unless otherwise directed by the JEA Project Representative.

B. Remove portions of instruments above or at grade including protective covers and concrete pads. Fill any subsurface installations with neat cement grout. Patch surface to match material at the surface or another material approved by the JEA Project Representative.

**938. Cellular Concrete Backfill Specifications (Prepared by Jacobs Engineering Group)**

# PART 1 GENERAL

1.01 SUMMARY

A. The work specified in this Section includes furnishing and installing cellular concrete for backfill between the carrier pipe and steel casing, at the locations shown on the Drawings.

B. Furnish all equipment, materials, and supplies required to complete the work specified herein.

C. Polyethylene encasement of the carrier pipe is required prior to inserting the ductile iron pipe into the casing, in accordance with JEA Water and Wastewater Standards Manual Section 350, Paragraph II.4.4.

1.02 RELATED SECTIONS

A. Section 02342, Auger Boring.

B. JEA Water and Wastewater Standards Manual, Section 350.

1.03 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM C150 – Standard Specification for Portland Cement

2. ASTM C495 – Standard Test Method for Compressive Strength of Lightweight Insulating Concrete

3. ASTM C796 – Standard Test Method for Foaming Agents for Use in Producing Cellular Concrete Using Preformed Foam

4. ASTM C869 – Standard Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete

5. ASTM C173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

B. American Concrete Institute ACI 523.3R-14 Guide for Cellular Concretes Above 50 lb/ft 3 (800 kg/m3)

1.04 DEFINITIONS

A. Cellular concrete is a lightweight concrete containing stable air or gas cells uniformly distributed throughout the mixture, and conforming to the requirements for constituent materials, mix proportions, and production, as specified in this Section.

B. Foaming agent is a liquid product developed and produced for the purpose of generating foam comprised of stable air or gas cells, to be combined within the other constituents of a cellular concrete mix prior to placement.

1.05 QUALITY ASSURANCE

A. Perform the work using qualified personnel, and in accordance with OSHA requirements.

B. Design the cellular concrete mix and check adequacy of design by preparing and testing a trial batch prior to mobilization for cellular concrete backfill placement, in a qualified laboratory, in accordance with

ASTM C495. Verify that all admixtures to be used during the actual construction operations are included in the trial mix.

C. Designate a dedicated cellular concrete crew and/or retain a specialist Subcontractor to design, supply, mix and place cellular concrete. Personnel and subcontractors performing the work shall be capable of performing the work in accordance with the requirements of this Section. Cellular concrete crews shall be supervised by a superintendent or foreman meeting the minimum experience requirements.

D. The Contractor or cellular concrete subcontractor shall have at least three (3) years of experience producing and placing cellular concrete, including at least one (1) project providing and placing cellular concrete to encapsulate a carrier pipe in a subsurface installation, in the past three (3) years.

E. Cellular concrete batching and mixing shall be supervised by a superintendent or foreman with experience producing cellular concrete similar to the proposed cellular concrete, as determined to be satisfactory by the JEA Project Representative prior to commencing carrier pipe installation.

F. Cellular concrete placement shall be supervised by a superintendent or foreman with experience placing grout or other fluid, cementitious backfill around carrier pipes under similar conditions as required for the work, as determined to be satisfactory by the JEA Project Representative, prior to commencing carrier pipe installation.

G. The foaming agent material supplier shall review the proposed foaming agent usage, including the Contractor's proposed work plans for batching, mixing, and conveying the cellular concrete, prior to commencing cellular concrete placement.

H. Provide the JEA Project Representative with full access to the cellular concrete batching and placement operations, and to the jacking and reception shafts, before, during, and after cellular concrete placement. Access shall include, but shall not be limited to, inspection of the cellular concrete and verification of the concrete properties. Provide safe access to all operations in accordance with all safety regulations.

1.06 QUALITY CONTROL

A. The Owner will employ and pay for services of a concrete testing laboratory to perform compression testing of concrete cylinders taken during construction.

B. Design the cellular concrete mix and verify the adequacy of the mix design by preparing and testing a trial batch in a qualified laboratory, in accordance with ASTM C495. Perform trial batch testing for all proposed mix designs.

C. Perform routine field quality control sampling and testing at regular intervals throughout batching, mixing, and placement operations, as specified herein. The sampling and testing frequency specified herein is the minimum required. Perform any additional sampling and testing, as required by the JEA Project Representative.

D. The cost of additional testing performed at the Contractor's discretion shall be incidental to the work.

E. Sampling:

1. Provide a system of valves in the main cellular concrete delivery line, including a collection valve at or near the injection outlet to the casing, in order to obtain test specimens directly from the main delivery line without disconnecting the line from the outlet fitting.

2. Obtain routine test and quality verification specimens at the collection valve. Obtain additional specimens directly from the mixer as required by the JEA Project Representative.

3. Perform tests on cellular concrete backfill in accordance with the requirements of this Section.

F. Unit Weight: Obtain specimens and complete unit weight (wet density) tests every ten cubic yards of cellular concrete placed, and from each batch of cellular concrete tested for unconfined compressive strength. At the end of each shift, provide a table of the unit weight test results to the JEA Project Representative.

G. Compressive Strength Tests: Make two sets of four test cylinders (3 inches diameter by 6 inches high) for each 50 cubic yards placed per shift. If less than 50 cubic yards are placed in a shift, make a minimum of two sets of cylinders per shift. Testing will be performed on cylinders from one set at an age of 3 days and cylinders from the second set at an age of 28 days.

1. Compressive strength of cellular concrete shall be considered satisfactory if both of the following requirements are met:

a. Average of the compressive strength tests from a set of cylinders equals or exceeds the specified 28-day compressive strength.

b. No individual compressive strength test is below the specified 28-day compressive strength by more than 20 percent.

2. Test cylinders shall be made in the field, cured and stored in the laboratory, and tested in accordance with ASTM C495.

3. Mark each set of compressive strength test cylinders with the date and time of day the cylinders were made, the location where the cellular concrete was placed, batch number, unit weight (wet density), and air content.

4. After the cylinders have achieved final set, transport and deliver the cylinders to the concrete laboratory designated by the Owner for compressive strength testing.

H. Test and record air content for each batch in accordance with ASTM C173.

1.07 SUBMITTALS

A. Provide statements of qualifications for the cellular concrete crew or subcontractor, supervisory personnel for cellular concrete work, the cellular concrete mix supplier, and suppliers of the foaming agent and admixtures. Include resumes, project lists, and reference contact information, as required to demonstrate compliance with the Quality Assurance requirements, and as required by the JEA Project Representative.

B. Product Data

1. Provide the mix designs for each proposed cellular concrete mix, including:

a. Summary of constituent materials and design mix proportions for materials, water, and foam. State material type, brand, and sources, including water source.

b. Product literature describing each material or product, provided by the supplier or manufacturer. Include recommendations of mix proportions and procedures for batching and usage, for each foaming agent and admixture.

2. Provide trial batch test results for each proposed cellular concrete mix.

3. Provide a written statement from the foaming agent supplier confirming that the proposed foam usage, concentration, and mixing and conveying methods are appropriate for the proposed mix design and application.

C. Provide test reports and certifications, as follows:

1. Mill test reports and certificates of compliance for each constituent material and admixture.

2. Printouts of plant scale weights for all loads placed.

D. Equipment: Manufacturer’s specifications and product literature for pumping and mixing equipment, including pumps, foam generators, and ancillary equipment.

E. Calibration certificates for all pressure gauges.

F. Work plan for cellular concrete placement, addressing:

1. Summary of the work schedule and daily sequence of operations.

2. Site layout drawing in plan, showing equipment and conveyance line arrangement, material laydown areas, and site access and egress. Identify injection locations and work stations.

3. Compiled work procedures for batching, mixing, placement, cleanup, control and testing procedures, and communication procedures during backfilling to control and coordinate batching and placement.

4. Means and methods for monitoring and controlling the following, during cellular concrete placement:

a. Groundwater seepage into the casing. Include sketch showing the location of pumping, drainage, and collection facilities.

b. Concrete wet unit weight, at regular intervals not exceeding every 15 minutes during pumping.

c. Pumping pressures and rates.

d. Level and volume of cellular concrete, relative to the expected or required level.

e. Placement sequences to prevent carrier pipe flotation.

5. Valve arrangement in the delivery lines, and collection valve configuration.

6. Methods and procedure to verify that the space between the carrier pipe crown and the casing is completely filled with cellular concrete upon completion of cellular concrete placement.

G. The Contractor's work plans for carrier pipe blocking and backfill placement shall be reviewed by the carrier pipe manufacturer. The carrier pipe manufacturer shall provide a written statement verifying that the Contractor's proposed backfill plan has been reviewed and that work performed according to the plan will not affect the structural integrity of the pipe and seals at the pipe joints.

H. Provide a summary of the maximum permissible grouting pressures as given by the carrier pipe manufacturer.

I. Daily reports and records of cellular concrete batching and placement, including equipment and personnel, volumes of materials delivered, volume of cellular concrete placed, injection and placement locations, injection pressures, wet unit weight and air content testing results, time of placement, and designations of cylinder samples.

1.08 SAFETY REQUIREMENTS

A. Perform Work in accordance with the current applicable regulations of federal, state, and local agencies. Comply with OSHA requirements.

B. Protect the public and workers from potential releases of cellular concrete and other hazards that could result from the work.

# PART 2 PRODUCTS

2.01 EQUIPMENT

A. Provide means of direct communication between the injection point and the pump operator, and between the pump operator and the batch plant.

B. Cellular concrete shall be made using a foam generator to produce a predetermined quantity of preformed foam which shall be injected into a mixer and blended with cement slurry. The foaming agent supplier shall confirm that the foaming agent is suitable for the proposed foam generation equipment and processes.

C. The foam generator shall be a batch or continuous foam generating system, conforming to the following:

1. Batch systems shall consist of a tank in which the foaming agent concentrate and water are premixed. The foam solution is discharged from a pressurized tank or pumped through a foam-making nozzle in which the foam solution is blended with compressed air in consistent proportions controlled by a regulating device. Surge hopper equipped pumps may be used. If batch mixing is used, adjust rates of mixing and pumping to provide continuous flow of cellular concrete at the discharge point.

2. Continuous generating systems shall consist of a mixing vessel that continuously draws foaming agent concentrate directly from a shipping container, and blends the concentrate in the mixing vessel with water and compressed air in consistent proportions controlled by a regulating device.

D. Cellular concrete placement shall only be performed with calibrated and functional pressure gauges and flow meters in place. Routinely verify pressure gauge and flow meter accuracy against accurately calibrated, high precision gauges furnished and maintained on site by the Contractor.

E. Provide at least two pressure gauges; one at the grout pump and one on the manifold adjacent to the point of injection. Keep at least two spare gauges on site to replace non-functioning gauges. Pressure gauges of appropriate range for monitoring the cellular concrete backfill injection pressures shall be located in the line conveying the cellular concrete to the point of injection.

F. Provide a flow meter to measure the amount of grout injected in gallons to the nearest 0.1 gallon. Check the accuracy of the meter daily at the start of the backfilling operations, and when requested by the JEA Project Representative.

2.02 MATERIALS

A. Cement: Normal Portland Cement Type I/II, conforming to the requirements of ASTM C150.

B. Water: Potable water, free from deleterious amounts of alkali, acid, and organic materials that could adversely affect the cellular concrete setting time or strength.

C. Fly ash and other pozzolans: Use is prohibited.

D. Aggregate, including sand: Use is prohibited.

E. Admixtures: No calcium chloride or admixture containing chloride shall be used. Admixtures may only be used as approved by the JEA Project Representative, and when used as recommended by the foaming agent manufacturer, as confirmed in writing by the foaming agent manufacturer.

F. Foaming Agent: Foaming agent shall be produced for use specifically in the production of cellular concrete, and shall comply with ASTM C869 when tested in accordance with ASTM C796.

2.03 MIX DESIGN

A. General: Design the cellular concrete mix in accordance with the requirements of ACI 523.3R, and the additional requirements herein.

B. Design and produce cellular concrete to achieve the following performance requirements:

1. Minimum 28-day compressive strength as tested in accordance with ASTM C495: 500 psi.

2. Cellular concrete shall have a wet density (unit weight) not less than 55 pcf at the point of placement.

C. Generate foam with stable, closed cell bubbles. Mix foam cells into the cellular concrete so that they are distributed uniformly throughout the mixture. Foam cells shall retain stability within the mixture until the cement sets to form a self-supporting matrix.

D. In the event that admixtures are used, admixture content, batching method, and time of introduction to the mix shall be in accordance with the foaming agent manufacturer’s recommendations to limit shrinkage of the cellular concrete.

E. Perform trial batch testing for each trial mix design, at least 2 months before the planned placement date, to verify that the proposed mix design meets the minimum requirements of this Section. All costs of testing trial mixes shall be incidental to the work.

F. Perform trial batch testing as follows:

1. Prepare trial batches using the same materials and comparable equipment as proposed for the work.

2. Cellular concrete test specimens shall be made, cured, stored, and tested in accordance with ASTM C495.

3. Two sets of compressive strength test cylinders (3 inches by 6 inches), four cylinders per set, shall be made from each proposed cellular concrete mix.

4. One set of four cylinders shall be tested at an age of 3 days and the other set shall be tested at an age of 28 days.

5. Test and record air content for each batch in accordance with ASTM C173.

# PART 3 EXECUTION

## 3.01 GENERAL

A. Seal the casing against groundwater seepage before placing cellular concrete.

B. Fill low spots, sumps or any area within the casing, where water may pond with concrete before placing cellular concrete.

C. Cellular concrete backfill shall not be installed until the reclaimed water main carrier pipe has passed the pressure and leakage testing requirements in Section 701 – Reclaimed Water Piping and Section 350 – Potable Water Piping of the JEA Water and Wastewater Standards Manual.

D. Notify the JEA Project Representative at least 24 hours before placing cellular concrete, and provide the planned location and time of placement.

E. Protect the polyethylene encasement around the carrier pipe during the course of the work, and repair any encasement observed to be damaged prior to cellular concrete placement.

## 3.02 BATCHING AND MIXING

A. Batching and mixing procedures shall conform to the foaming agent manufacturer's usage recommendations.

B. Mixing:

1. Mix cellular concrete by mechanical means to produce a uniform distribution of the constituent materials. Avoid excessive mixing to limit the potential for unintended deviations from the design unit weight and consistency. Adjust mixing as required to account for changes to the cellular concrete that may occur during pumping.

2. For batch mixing, fill the mixer in the order recommended by the mixer manufacturer.

3. For continuous mixing, add mix components at a uniform and continuous rate at positions arrayed around in the mixing machine, in the correct ratio, as required to produce a uniform and consistent cellular concrete.

C. Generate preformed foam by combining controlled quantities of air, water, and foaming agent under pressure. Proportion and mix the foaming agent in accordance with the foaming agent manufacturer's recommendations.

## 3.03 CELLULAR CONCRETE PLACEMENT

A. Perform quality control sampling and testing throughout placement, in accordance with the requirements of this Section.

B. Install casing spacers and additional blocking as required so that the carrier pipe is held securely to prevent horizontal and vertical movement of the carrier pipe during placement.

C. Install continuous piping in the crown of the casing to convey the cellular concrete to multiple discharge points along the casing, to prevent air lock during filling, and to permit monitoring of the concrete level as required to verify complete filling of the annular space to the crown. Placement piping shall have a minimum diameter of 3 inches.

D. Construct brick bulkheads at each end of the casing to retain the cellular concrete. Provide openings in the bulkhead at the bottom and top of the bulkhead to allow for drainage of water and monitoring of the backfill level. Additional openings may be added as required by the Contractor with approval of the JEA Project Representative.

E. Pump cellular concrete to completely fill the annular space between the casing and the carrier pipe. Place the cellular concrete in stages as required to permit observation to verify complete filling of the annular space, and as required to prevent flotation of the carrier pipe.

F. Limit grouting pressures to a maximum of 15 psi or as recommended by the carrier pipe manufacturer.

G. Measure, monitor, and record the volume of cellular concrete placed, and compare the volume with the anticipated volume per linear foot of casing.

3.04 PROTECTION AND CLEAN UP

A. Protect and preserve the interior of the casing and carrier pipe from damage. Clean up cellular concrete spillage immediately.

B. Repair damage to the carrier pipe by means approved by the JEA Project Representative, at no additional cost to the Owner.

C. Remove and properly dispose of all waste resulting from cellular concrete operations.

**939. Horizontal Direction Drilling Supplement for JEA Section 755 - Horizontal Directional Drilling (Large Diameter Pipe Greater Than 12 Inches) of the JEA Water and Wastewater Standards Manual**

All pipe greater than 12-inch diameter installed by the Horizontal Directional Drilling method shall be in conformance to JEA Technical Specification Section 755 – Horizontal Directional Drilling and Technical Specification section 02445. In case of contradictory information, the supplemental technical specification requirements in Section 02445 take precedence over Section 755. The Measurement and Payment for this item shall be in accordance with JEA's Water and Sewer Standard as specified in Section 801.XXIV.

**Horizontal Directional Drill Specifications (Prepared by Jacobs Engineering Group)**

# PART 1 GENERAL

1.01 DESCRIPTION

A. This section supplements JEA Water and Wastewater Standards Section 755 for Horizontal Directional Drilling (Large Diameter Pipe Greater Than 12 Inches) and Section 701 Reclaimed Water Piping. Specifically, this specification addresses additional requirements. In the case of contradictory information, this specification takes precedence over Section 755 and Section 701.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. JEA Water and Wastewater Standards Section 701 – Reclaimed Water Piping

2. JEA Water and Wastewater Standards Section 755 – Horizontal Directional Drilling (Large Diameter Pipe Greater Than 12 Inches)

1.02 QUALIFICATIONS

A. The HDD Contractor shall have successfully self-performed at least five (5) horizontal directional drilling projects to install carrier pipe of a similar nominal diameter (18-inch HDPE DR 11 DIPS), or larger, and similar length (1,300 LF single pull HDD), or longer, to the proposed project within the last five (5) years. At least one (1) project shall have been performed in FDOT Right-of-Way or crossing FDOT Right-of-Way. References for the five (5) similar projects shall be included in the bid documents. References shall include: project name, project completion date, project HDPE pipe diameter, project single pull HDD length, reference person's name and phone number.

1.03 SUBMITTALS

A. In addition to the requirements in JEA Water and Wastewater Standards Section 755, Paragraph I.8.1:

1. Changes to Personnel: Any changes to personnel designated in Paragraph I.8.1 shall be subject to the same personnel qualifications submittal and review process as the original personnel, and deemed

satisfactory by JEA prior to the new personnel performing any work. There shall be no schedule extension due to change in personnel and JEA's review of personnel qualifications.

B. In addition to the requirements in JEA Water and Wastewater Standards Section 755, Paragraph I.8.2:
1. Buoyancy ballast plan: The Contractor shall provide the buoyancy ballast plan for the pipe pullback, including the total volume of water required for neutral buoyancy, the volume of water per pipe joint, the diameter and material of the pipe that will be used for delivering the ballast water to the HDPE pipe, the procedure for monitoring ballast water volumes injected during pullback, and the source for the ballast water. The buoyancy ballast calculations and plan shall be sealed by a Professional Engineer registered in the State of Florida.
2. Changes to approved HDD Work Plan: Any changes to the approved HDD Work Plan or Submittal Information under Section I.8 shall be submitted to JEA for review as a RFI prior to work differing from the approved HDD Work Plan being performed. There shall be no schedule extension due to changes in the HDD Work Plan and JEA's review of changes.

C. In addition to the requirements in JEA Water and Wastewater Standards Section 755, Paragraph I.8.2.1.1:
1. After "Procedures for pilot hole drilling and reaming", include the number of reaming and swabbing passes. For each reaming pass, provide reamer diameter, type of reamer, and total length and direction of reaming pass. For each swabbing pass, provide swab diameter, type of swab, and total length and direction of swabbing pass.

D. In addition to the requirements in JEA Water and Wastewater Standards Section 755, Paragraph I.8.2.3:
1. Units of drill rig gauges for push/pull and rotary. Provide conversion factors to force (e.g. pounds) for the push/pull gauge and torque (e.g. foot-pounds) for the rotary if these units are not permanently marked on the drill rig gauges.

E. Modify Paragraph I.8.5.1.3 in JEA Water and Wastewater Standards Section 755, to the following:
1. Construction Records – Daily Reports: Description of drilling fluid, including density, viscosity, and sand content. Record additives that are added to the drilling fluid, including the commercial name of the additive, the amount used, and the time of the application. Provide drilling fluid description on the daily drill log report. Drilling fluid parameters, including density, viscosity, and sand content, shall be tested and recorded at least three (3) times per 12-hour shift.

F. In addition to the requirements in JEA Water and Wastewater Standards Section 755, Paragraph I.8.5.2:
1. Pilot hole as-built data shall be submitted to JEA within one (1) working day of completion of the pilot bore. Any subsequent reaming and installation work is performed at the Contractor's risk until the pilot bore as-built data is reviewed and approved by JEA.

G. In addition to the requirements in JEA Water and Wastewater Standards Section 755, Paragraph I.8.5.3.3. and Paragraph III.6:
1. For each HDPE pipe joint fusion provide actual recorded values for the following data, submitted in tabular format:
a. Actual temperature of heating element
b. Time of heating
c. Time of heater removal/transition
d. Time of fusion/cooling
e. Minimum and maximum pressures of heating phase

f. Minimum and maximum pressures of fusion/cooling phase

2. HDPE pipe joint fusion data files shall be immediately uploaded to the McElroy DataLogger Vault (or JEA approved equal) and made available to the JEA Representative. Data files shall also be submitted in datalogger file format (.DL6) and in PDF file format, in addition to tabular data listed above, within 2 business days of the HDPE pipe joint fusion completion. At a minimum, HDPE pipe joint fusion data for the pipe string to be installed shall be submitted at least 5 days prior to pipe pullback. Data files shall include:

a. The date and time of the fusion

b. The fusion technician's name and ID

c. Joint number

d. Fusion machine manufacturer and model used, and serial number used

e. DataLogger device manufacturer and model used and serial number used

f. DataLogger device current calibration date

g. The pipe manufacturer

h. The pipe material and material designation

i. The pipe OD and DR

j. The heat butt fusion procedure or standard used

k. Recommended hydraulic butt fusion machine gauge pressure for the different steps in the heat butt fusion process:

i. Bead-up pressure

ii. Heat soak pressure

iii. Fusion/Cooling pressure

l. The drag pressure

m. The interfacial pressure used

n. The actual heater temperature at the beginning of the heat cycle

o. The actual pressure applied during the heating, fusing and cooling cycle

p. The time for each stage of the process from the beginning of the heat cycle through the end of the cool cycle (time of heating/heat soak, time of heater removal/transition, time of fusion/cooling)

q. Time versus pressure graph throughout the entire butt fusion process, from the start of the heating phase through the end of the fusion/cooling phase

r. Pictures of fused joint

3. Equipment shall be McElroy DataLogger 6 or JEA approved equal.

4. The joint number corresponding to the DataLogger joint number shall be painted or permanently marked on the pipe next to the fused joint.

# PART 2 PRODUCTS

## 2.01 MATERIALS

A. High Density Polyethylene (HDPE): The HDPE pipe shall meet the requirements of Section 755 with the additional requirement that the material used to manufacture the pipe shall be PE4710 high density polyethylene meeting cell classification 445474C or 445574C per ASTM D3350, and the HDPE pipe shall conform to AWWA C906, DR-11, Ductile Iron Pipe (DIP) size and NSF 61 Standard.

## 2.02 EQUIPMENT

A. Use pipe rollers to support the full length of the HDPE pipe string during fusing, testing, and pullback.

# PART 3 DRILLING PROCEDURES

3.01 PILOT HOLE

A. Elevation: The pilot hole tolerance is +/- 5 feet of the path shown on the drawings.

B. Curve Radius: While overall curve radii of curvature over a series of segments should average to what is shown on the plans, specific locations will be checked using the Three-Point Curve Radius method described below.

Three-Point Curve Radius: The installed/drilled pilot hole radius of curvature shall not be tighter than eighty percent (80%) of the minimum radius of curvature as shown on the drawings (example, radius of curvature shown on plans = 2,000 feet; eighty percent (80%) is 1,600 feet) as calculated by the three (3) joint method described below. The drilled radius of curvature shall be calculated over any and all three (3) joint (Two (2) drill pipe rods) segment using the following formula:

$R_{drilled} = (L_{drilled}/A_{avg}) * 57.30$

Where:$R_{drilled}$, (feet) is the calculated/estimated drilled radius

$L_{drilled}$, (feet) is the segment length (Two (2) drill pipe rods)

$A_{avg}$, is the difference in degrees (delta) of either the inclination or azimuth angle in degrees of the joint at the beginning of the two drill rod section and the end of the two drill rod section

In the case of horizontal curves, the azimuth angles will be used and the inclination angles will be used everywhere else for $A_{avg}$.

3.02 PULLBACK

A. In addition to the requirements in JEA Water and Wastewater Standards Section 755, Paragraph IV.4:

1. Buoyancy control measures (ballast) are required.

2. Use ballast to control pipe buoyancy during pullback. Ballast shall consist of water filling the pipe at the HDPE pipe breakover point throughout installation. Contractor may submit an alternative ballast plan for review by the JEA Project Representative.

3. HDPE pipe shall be welded/fused together in one length and pulled back without stopping work. Work hours will be 24 hours a day until pipe pullback is complete.

4. Individual workers shall not work any shift or be present on site for longer than 24 hours. If the continuous pipe pullback requires workers to work a shift longer than 24 hours, the Contractor shall use two (2) crews to complete the work. A minimum rest time of 8 hours is required between shifts for any individual worker.

5. Pull pipe so that a minimum of 10 feet of pipe is exposed at both ends of the bore following HDPE pipe strain recovery.

# PART 4 TESTING

4.01 HDPE PIPE

A. Prior to pullback, the HDPE pipe shall be pressure tested in accordance with JEA Section 755. After pullback, the HDPE pipe shall be again pressure tested in accordance with JEA Section 755.