SECTION 01 01 00
GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 DEFINITIONS

A. Owner: JEA.

B. Contractor: NA.

C. Engineers:
1. CDM Smith, 4651 Salisbury Road, Suite 420, Jacksonville, FL 32256.
2. Jacobs Engineering Group, 200 W. Forsyth Street, Suite 1520, Jacksonville, FL 32202.

D. Project Site: JEA Rivertown Water Treatment Plant (WTP) Well Nos. 1, 2, and Backup Well (No. 3), St. Johns County, FL.

PART 2 SUMMARY OF WORK

2.01 PROJECT DESCRIPTION

A. The Contractor shall clear and mow the Well No. 1 site as needed. In addition, the contractor shall overexcavate unsuitable materials as identified in the Appendix 1 – Geotech Report to a depth of approximately 4 feet and replace with compacted granular backfill in a 30-foot radius surrounding Well No. 1 prior to well drilling.

B. The Contractor shall clear, overexcavate unsuitable materials, backfill, grade, and stabilize the Well No. 2 site in accordance with the Appendix 1 – Geotech Report and the Rivertown WTP Well Nos. 2 and 3 Site Preparation for Well Drilling Drawings. The Contractor shall not clear or disturb outside the Well No. 2 “Limits of Clearing” as shown on Dwg. C-1 in the Rivertown WTP Well Nos. 2 and 3 Site Preparation for Well Drilling Drawings. Furthermore, any prohibited clearing that occurs outside the “Limits of Clearing” shall be restored to original condition and vegetation at no additional cost the Owner.

C. The Contractor shall clear, grade, and stabilize the Backup Well (No. 3) sites as well as the Backup Well (No. 3) access drive and raw water main stub-out in accordance with the Rivertown WTP Well Nos. 2 and 3 Site Preparation for Well Drilling Drawings. Site Preparation for Backup Well (No. 3) site, access drive, and raw water main stub-out will be an alternate bid item and shall be constructed if authorized by JEA. The Backup Well (No. 3) access drive and raw water main stub-out work will include:

1. A permanent access entry driveway from Longleaf Pine to JEA's easement that will be approximately 50 lineal feet consisting of 8 inches of No. 57 stone, Tensar BX geogrid (or equal) and proof rolled subgrade with a varying width of driveway, as noted in the Rivertown WTP Well Nos. 2 and 3 Site Preparation for Well Drilling Drawings.
2. A permanent sheet pile wall system for the access entry driveway located within JEA's easement, as shown on Contract Dwg. C-3 and S-1.
3. A temporary access road (350 lineal feet) between the permanent entrance driveway and the Well No. 3 site consisting of compacted embankment fill as temporary driveway surfacing, as show on Contract Dwg C-3.
4. Installation of raw water main piping within the Well Site No. 3 access driveway and Longleaf Pine Parkway right-of-way. This shall include approximately 143 linear feet of 12-inch CLDI raw water piping by open cut construction, two (2) 12-inch DI plugs and four (4) 12-inch DI MJ 45-degree bends, as noted on Contract Dwg. C-4.
5. Tree removal, clearing, grubbing and clean filling of material within the JEA easement, as shown on Contract Dwg. C-3.
6. Erosion and sedimentation control fencing along access driveway.
7. Removal and replacement of curb and gutter between entrance driveway and Longleaf Pine Parkway, as shown on Contract Dwg. C-3.

D. The Contractor shall install temporary 6-foot chain link security fencing at the well sites in accordance with Section 33 21 12.01, Well Drilling Mobilization and Cleanup.

E. The Contractor shall be responsible for installing temporary silt fences and/or barriers as required to avoid silt or turbid water transport from the work areas in accordance with Section 01 57 13, Temporary Erosion and Sediment Control.

F. The Contractor shall be responsible for staking the well locations prior to construction. Coordinates for the well locations are provided on Figure 1 of Section 33 21 19, Water Wells. Well locations shall be staked by a land surveyor registered in the state of Florida. The Contractor shall verify that the staked location meets the 100-foot setbacks shown in Figures 2, 3, and 4 of Section 33 21 19, Water Wells.

G. The Contractor shall construct up to three upper Floridan aquifer wells in accordance with Section 33 21 19, Water Wells. Well Nos. 1 and 2 are included in the base bid and Backup Well (No. 3) will be an alternate bid item and shall be constructed if authorized by JEA. The wells shall be constructed with 30-inch surface casing installed to approximately 100 feet and 20-inch production casing installed to a depth of approximately 320 feet. The open hole will be drilled to approximately 600 feet below land surface or as directed by the Engineer.

H. The Contractor shall provide, install, and operate a test pump in accordance with Section 33 21 13.10, Well Pumping Test. Contractor shall perform a step-drawdown test on each well and a 72-hour constant rate pumping test after completion of all wells.

I. The Contractor shall perform video logging of the completed wells from the surface to the total depth in accordance with Section 33 21 13.12, Water Well Video Inspection.

J. The Contractor shall perform geophysical logging of the wells under static and dynamic conditions in accordance with Section 33 21 13.03, Geophysical Logging of Wells.

K. Should water quality be unsuitable to the Owner, Contractor shall backplug the wells in accordance with Section 33 21 19, Water Wells, or as directed by Engineer.

L. The Contractor shall develop the wells in accordance with Section 33 21 19, Water Wells.

M. The Contractor shall disinfect the wells in accordance with Section 33 21 13.13, Water Well Disinfection.

N. The Contractor shall provide a fluids management and discharge plan during drilling and testing to be approved by Engineer prior to starting any work. The plan shall address at a minimum the following:

1. Lost circulation zones.

2. Reverse-air discharge.
3. Artesian flow management, if needed.
4. Discharge during pumping tests.
5. Management of turbidity.

O. For each supply well, the Contractor shall be responsible for setting the temporary casing flange in accordance with Section 33 21 19, Water Wells.

P. The Contractor is responsible for providing a contingency plan for installing casing through lost circulation zones that may be encountered. The Contractor shall submit to Engineer a plan for approval prior to any Work.

Q. The Contractor shall cleanup and demobilize from the drilling sites in accordance with Section 33 21 12.01, Well Drilling Mobilization and Cleanup.

R. Additional references for this project are included as appendices to this specification (Permitting Matrix, Geotechnical Report, Soft Dig Report and Wetlands and Wildlife Assessment Report).

2.02 SEQUENCE OF WORK

A. The Contractor shall construct Well No. 1 first followed by Well No. 2. Backup Well (No. 3) will be an alternate bid item and shall be constructed if authorized by JEA. Contractor shall execute work according to the tasks specified below during construction and testing of each production well. Coordinate the well construction and testing schedule and operations with Engineer and Owner:

1. Contractor shall obtain a Well Construction Permit from the St Johns River Water Management District (SJRWMD). All fees and documentation required to obtain the permit will be paid by the Contractor. No construction activities shall commence until the permit has been issued by the SJRWMD. The Contractor shall apply and comply with all aspects of the permit.
2. Contractor shall clear and mow the Well No. 1 site as needed prior to starting construction.
3. Contractor shall perform the following site preparation work for Well No. 2 site and Backup Well (No. 3) site if authorized by JEA:
   a. Clear and grub in accordance with the Rivertown WTP Well Nos. 2 and 3 Site Preparation for Well Drilling Drawings.
   b. Remove and dispose of all clearing and grubbing debris in accordance with the Rivertown WTP Well Nos. 2 and 3 Site Preparation for Well Drilling Drawings.

c. Deliver, place, and compact fill material in accordance with the Rivertown WTP Well Nos. 2 and 3 Site Preparation for Well Drilling Drawings.
d. Construct access roads in accordance with the Rivertown WTP Well Nos. 2 and 3 Site Preparation for Well Drilling Drawings.

4. Contractor shall erect temporary 6-foot chain link security fencing and gate at each well site in accordance with Section 33 21 12.01, Well Drilling Mobilization and Cleanup. The security fencing shall be installed to prevent public access to the sites and ensure public health and safety.
5. Install silt fencing at each well site in accordance with Section 01 57 13, Temporary Erosion and Sediment Control. Mobilize drill rig and equipment to the site in accordance with Section 33 21 21.01, Well Drilling Mobilization and Cleanup.
6. Set up fluid containment system for mud rotary and reverse air drilling.
7. Drill a nominal 8- to 12-inch pilot hole from ground surface to a depth of approximately 100 feet bls using mud rotary drilling techniques and in accordance with Section 33 21 19, Water Wells.
8. Collect formation samples during drilling from the circulation fluid, at 10-foot intervals, in accordance with Section 33 21 19, Water Wells.
9. Ream a nominal 36-inch diameter borehole and install and grout a 30-inch steel surface casing to a depth of approximately 100 feet bls in accordance with Section 33 21 19, Water Wells.
10. Drill a nominal 8- to 12-inch pilot hole from 100 feet bls to a depth of approximately 320 feet bls using mud rotary drilling techniques and in accordance with Section 33 21 19, Water Wells.
11. Collect formation samples during drilling from the circulation fluid, at 10-foot intervals, in accordance with Section 33 21 19, Water Wells.
12. Ream the pilot hole to a nominal 29-inch borehole, in accordance with Section 33 21 19, Water Wells.
13. Install and pressure grout a 20-inch final steel casing to a depth of approximately 320 feet bls, in accordance with Section 33 21 19, Water Wells.
14. Drill a nominal 8- to 12-inch pilot hole from 320 feet bls to a depth of approximately 600 feet bls using reverse-air drilling techniques and in accordance with Section 33 21 19, Water Wells.
15. Collect formation samples during drilling from the circulation fluid, at 10-foot intervals, in accordance with Section 33 21 19, Water Wells.
16. Collect reverse-air water samples at the change of each drill rod in accordance with Section 33 21 19, Water Wells, or as directed by Engineer.
17. Collect up to six (6) drill stem water samples as the in accordance with Section 33 21 19, Water Wells, or as directed by Engineer.

18. Ream the borehole to a nominal 19-inch borehole, in accordance with Section 33 21 19, Water Wells
19. Develop well in accordance with Section 33 21 19, Water Wells.
20. Conduct a step drawdown pumping test in accordance with Section 33 21 13.1, Well Pumping Test.
21. Conduct a video survey of the well in accordance with Section 33 21 13.12, Well Video Inspection.
22. Conduct static and dynamic geophysical logging in accordance with Section 33 21 13.03, Geophysical Logging of Wells.
23. Disinfect well in accordance with Section 33 21 13.13, Disinfection of Water Systems.
24. Install temporary blind flange in accordance with Section 33 21 19, Water Wells.
25. Conduct a 72-hour constant-rate pumping test after completion of all three wells in accordance with Section 33 21 13.1, Well Pumping Test.
26. Raw water quality sampling will be collected and transported by the engineer to the JEA Springfield laboratory for analysis. The analysis conducted will include primary and secondary drinking water standards, radionuclides, SOCs, VOCs and the requirements listed under the "black water rule". The Contractor shall be aware of this sampling requirement and assist and facilitate the engineer with the collection of the groundwater samples for the raw water quality analysis.
27. Following completion and acceptance of each well, the Contractor shall remove from the site the drill rig and equipment, temporary security fencing and gate, sediment control, unused materials, all debris, and other miscellaneous items resulting from or used in the operations.

2.03 SPECIFICATIONS AND DRAWINGS

A. The Specifications and Drawings establish the performance, quality requirements, location, and general arrangement of materials and equipment, and establish the minimum standards for quality of workmanship and appearance. Should there be questions concerning the applicability or interpretation of a particular Specification section or part of a Specification section or Drawing, the questions should be directed to Engineer prior to the submittal of a proposal for the Work under this Contract.

2.04 REASONABLY IMPLIED PARTS OF THE WORK SHALL BE DONE THOUGH ABSENT FROM SPECIFICATIONS

A. A part of the work that is necessary or required to perform the work satisfactorily and legally operable, even though it is not specifically included in the Specifications or on the Drawings, shall be performed as incidental work as if described in the Specifications and shown on the Drawings.

PART 3 SEQUENCE OF OPERATIONS

3.01 SCHEDULING

A. Prior to starting the work, confer with Owner to develop an approved work Schedule. All drilling and testing work described herein will require completion within the following durations from the date of Owner's Notice to Proceed:

<u>Well No. 1:</u>	
Substantial Completion:	130 calendar days
Final Completion:	160 calendar days
<u>Well No. 2:</u>	
Substantial Completion:	260 calendar days
Final Completion:	290 calendar days
<u>Backup Well No. 3, if authorized:</u>	
Substantial Completion:	390 calendar days
Final Completion:	420 calendar days

The Contractor shall prepare and submit a comprehensive project schedule at the beginning of the Project.

B. Work conducted outside normal working hours (sunrise to sunset) shall be scheduled in advance with the Owner and Engineer and conducted in accordance with Owner's contract requirements.

3.02 COORDINATION

A. Other contractors maybe performing Work on the Site which is unrelated to well construction. Contractor shall cooperate in the coordination of their separate activities in a manner that will provide the least interference to the work of others.

B. If any difficulty or dispute should arise in the accomplishment of the above, the problem shall be brought immediately to the attention of the Owner.

PART 4 SITE CONDITIONS

4.01 CUTTINGS AND SOLID WASTES

A. The Contractor shall be responsible for the regulatory compliant off-site disposal of all wastes including cuttings and drill mud generated during mud-rotary and reverse-air drilling.

4.02 SAFETY

A. Contractor shall conduct work in accordance with JEA safety requirements.

4.03 EROSION ABATEMENT AND WATER POLLUTION

A. It is imperative that any Contractor activities including tests requiring the pumping of water, do not contaminate or disturb the environment of the properties adjacent to the work. The Contractor shall, therefore, schedule and control his operations to confine all run off water from distributed surfaces in accordance with Section 01 57 13, Temporary Erosion and Sediment Control. Water from pumping operations that becomes contaminated with lime, silt, muck, and other deleterious matter, fuels, oils, bitumens, chemicals, and other polluting materials shall be disposed of in a regulatory compliant and environmentally safe manner.

PART 5 TEMPORARY CONSTRUCTION UTILITIES AND FACILITIES

5.01 CONTRACTOR'S WORK AREA

A. The Contractor shall conduct all activities within the construction limits of the JEA well site properties and in accordance with agreement with the Owner. The construction limits of the JEA well site properties are shown in Figures 2, 3, and 4 of Section 33 21 19, Water Wells.

B. The Contractor shall erect temporary 6-foot chain link security fencing and gate within the construction limits of the JEA well site properties in accordance with Section 33 21 12.01, Well Drilling Mobilization and Cleanup. The Contractor shall remove the temporary security fencing and gate following completion and acceptance of each well.

C. Materials shall be so stored as to ensure the preservation of their quality and fitness for the Work.

D. Additional area for staging materials may be available at the Site. Coordinate with Owner for additional staging areas.

E. Temporary water service is not available at the JEA well Site properties. The Contractor shall make provisions for conveying water supply to the Site using the following options:

1. Tap the finished water main adjacent to Longleaf Pine Parkway. If the Contractor choses to do so, the Contractor shall meter and pay JEA for their water usage.
2. Install ~~a~~ wells for water supply during drilling operations only. If the Contractor chooses to drill ~~a~~ temporary supply wells, written commitment stating all wells will be properly abandoned within 30 days of completing each well shall be provided to the Owner prior to well installation. In addition, the Contractor shall obtain approval of grouting from the SJRWMD prior to cutting off and burying any temporary supply well. ~~the well shall be abandoned by the Contractor at the end of the Project.~~

F. The contractor shall make arrangements for electric power, if required.

G. Contractor shall provide a chemical toilet and maintain the unit in a sanitary condition at all times.

PART 6 SUBMITTALS DURING CONSTRUCTION

6.01 GENERAL

A. Submittals to Engineer and JEA shall be sent via email to:

CDM Smith
Yanni Polematidis, PolematidisIM@cdmsmith.com
David Prah, PrahDJ@cdmsmith.com
cc: Erik Svenson, erik.svenson@jacobs.com
Blake Roberts blake.roberts@jacobs.com
Larry Gunn, larry.gunn@jacobs.com
Ivan Trullenque, ivan.trullenque@jacobs.com
Mickey Willoughby, willml@jea.com
Chris Cerreta, cerretacl@cdmsmith.com

B. Submitted data shall be fully sufficient in detail for determination of compliance with the Contract Documents.

C. Submittals must be received by CDM Smith, at a minimum of 1 week prior to delivery of materials to the Site.

D. Permits:

1. SJRWMD Well Construction Permit
2. Florida Department of Environmental Protection (FDEP) National Pollutant Discharge Elimination System (NPDES) Generic Permit for Stormwater Discharge from Large and Small Construction Activities
3. The Contractor shall furnish to the Owner and Engineer copies of all permits prior to the commencement of Work requiring permits.
4. Refer to Appendix 1 for a summary matrix of all relevant permits for this project. Contractor and Engineer shall discuss all permitting implications to construction activities during the Pre-Bid and Pre-Construction Meetings.

E. Contract Closeout Submittals:

1. As-built survey shall be conducted in accordance with JEA standards Section 501, in addition the following information will be included as part of the as-built survey:
   a. Top of finished well casing elevation for all wells (coordinate with Engineer for location).
   b. Horizontal location of all wells in state plane coordinates.
   c. Topographic survey with elevations taken in a 25-foot grid. Limits of the topographic survey shall be a minimum of 25-feet beyond any improved or impacted areas.
   d. Trees 6-inches in diameter at breast height or greater.
2. Final Well Logs: Two copies.
3. Video Logs: ~~Two copies~~MP4 Video Files.
4. Field Geophysical Logs: Provide electronic copies of ASCII raw data files in *.LAS format and PDF files of each log on an external USB drive before leaving Site.
5. Final Geophysical Logs: Email final version of ASCII files in *.LAS format and PDF files of each log to the Engineer within 10 days of completion of logging for each well.
6. Well Pumping Tests: Written record of flow and water level measurements collected during the variable rate step drawdown test and 72-hour constant rate test prior to leaving Site.
7. Copies of well completion reports and other relevant correspondence submitted to the regulatory agencies.

6.02 SCHEDULE OF VALUES

A. Submit completed schedule of values to include all work under the agreement.

1. Unit Price Work: Reflect unit price quantity and price breakdown.
2. Lump Sum Work: Reflect total price.
3. Front-end loaded Schedule of Values will not be acceptable.
4. Summation of the complete schedule of values representing all work under the agreement shall equal the Contract Price.

END OF SECTION

SECTION 33 21 12.01
WELL DRILLING MOBILIZATION AND CLEANUP

PART 1 GENERAL

1.01 SUBMITTALS

A. Written commitment from the Contractor to the Owner stating all temporary supply wells will be properly abandoned within 30 days of completing each well. This applies only if temporary supply wells are constructed for work water supply.

~~1.01~~1.02 WORK INCLUDED

A. This section covers the Work necessary to move in and move out personnel and equipment, setup and remove drill rigs and temporary facilities, and clean up the Sites following well completion.

B. The Contractor shall be responsible for site clearing, raising, grading, and stabilization at the properties for Well No. 2, Backup Well (No. 3), and the Backup Well (No. 3) temporary access driveway.

PART 2 PRODUCTS

2.01 GENERAL

A. Provide all materials and equipment required to accomplish the Work as specified.

PART 3 EXECUTION

3.01 GENERAL

A. The location of Well Nos. 1, 2, and Backup Well (No. 3) is shown in Figure 1 of Section 33 21 19, Water Wells.

B. The Contractor shall clear and mow the Well No. 1 site as needed prior to starting construction.

C. At Well No. 1, the Contractor shall erect temporary 6-foot chain link security fencing and gate within the limits of the future JEA Rivertown Water Treatment Plant Site as needed for well construction, security, and safety of the public. Furthermore, the Contractor shall utilize the existing manual swing gate at the Well No. 1 site as an additional security measure. The approximate location of the temporary security fencing for Well No. 1 is shown in Figure 2 of Section 33 21 19, Water Wells. The Contractor is responsible for the final temporary security fence layout. Furthermore, cellular company personnel will need periodic access to the cellular tower area, the Contractor shall provide unimpeded access to the cellular tower area at all times.

D. The Contractor shall clear, grade, and stabilize the properties for Well No. 2 and Backup Well (No. 3) in accordance with the Rivertown WTP Well Nos. 2 and 3 Site Preparation for Well Drilling Drawings.

E. The Contractor shall clear, raise, stabilize, and construct access roads to the Well No. 2 and Backup Well (No. 3) sites in accordance with the Rivertown WTP Well Nos. 2 and 3 Site Preparation for Well Drilling Drawings.

F. For the permanent and temporary driveway for Backup Well (No. 3), Contractor shall provide the clearing and grubbing within the limits of construction inside JEA's limits of easement, as show on Contract Dwg. C-3. Contractor shall be responsible for installing temporary silt fencing between Backup (Well No. 3) site and Longleaf Parkway.

G. At Well No. 2 and Backup Well (No. 3), the Contractor shall install temporary 6-foot chain link security fencing and gate within the limits of the site clearing as needed for well construction, security, and safety of the public. The approximate location of the temporary security fencing and gate for Well No. 2 and Backup Well (Well No. 3) is shown in Figures 3 and 4 of Section 33 21 19, Water Wells. The Contractor is responsible for the final temporary security fence layout.

H. The Contractor shall install temporary security fencing and gate prior to starting construction of each well. In addition, the Contractor shall always secure the Site before leaving for the day.

I. The Contractor shall be responsible for installing temporary silt fences and/or barriers as required to avoid silt or turbid water transport from the work areas in accordance with Section 01 57 13, Temporary Erosion and Sediment Control. The temporary security fences and/or barriers shall be installed as shown in Figures 2, 3, and 4 of Section 33 21 19, Water Wells.

J. Set up well drilling equipment in the areas designated by the Engineer. Accomplish all required Work in accordance with applicable portions of these Specifications.

K. The Contractor shall be responsible for the regulatory compliant off-site disposal of all wastes including drilling mud and other related material.

3.02 ONSITE UTILITIES

A. Temporary water service is not available at the JEA well site properties. The Contractor shall make provisions for conveying water supply to the Sites using the following options:

1. Tap the finished water main adjacent to Longleaf Pine Parkway. If the Contractor choses to do so, the Contractor shall meter and pay JEA for their water usage.
2. Install ~~a~~ wells for water supply during drilling operations only. If the Contractor chooses to drill ~~a~~ temporary supply wells, ~~the well shall be permitted and abandoned by the Contractor at the end of the project. A copy of the work water well permit shall be provided to the Engineer prior to installation~~ written commitment stating all wells will be properly abandoned within 30 days of completing each well shall be provided to the Owner prior to well installation. In addition, the Contractor shall obtain approval of grouting from the SJRWMD prior to cutting off and burying any temporary supply well.

B. The Contractor shall make arrangements for electric power, if required.

3.03 SANITARY FACILITIES

A. The Contractor shall provide a chemical toilet of suitable type and maintain the unit in a sanitary condition at all times.

3.04 CONTAMINATION PRECAUTIONS

A. Avoid contamination of the project area. Do not dump waste oil, rubbish, or other waste materials on the ground.

B. Repair any leaks of hydraulic or motor oil immediately.

3.05 CLEANUP OF CONSTRUCTION AREAS

A. Upon completion and acceptance of each well, remove from the site the drill rig and equipment, temporary security fencing and gate, sediment control, unused materials, all debris, and other miscellaneous items resulting from or used in the operations.

B. The Contractor shall set a temporary blind flange in accordance with Section 33 21 19, Water Wells.

END OF SECTION

SECTION 33 21 13.03
GEOPHYSICAL LOGGING OF WELLS

PART 1 GENERAL

1.01 SUBMITTALS

A. Shop Drawings:

1. List of downhole equipment including manufacturer, manufacturer's specifications, and physical dimensions of downhole tools.
2. Type of recording equipment.
3. Wire line size, type, and weight rating.

B. Quality Control Submittals:

1. Verification of equipment calibration.
2. Calibration data.

C. Contract Closeout Submittals:

1. Field Geophysical Logs: Provide electronic copies of the ASCII raw data files in *.LAS format and PDF files of each log on an external USB drive before leaving the Site.
2. Final Geophysical Logs: Email final version of ASCII files in *.LAS format and PDF files of each log to the Engineer within 10 days of completion of logging for each well.

1.02 SEQUENCING AND SCHEDULING

A. Perform logging of each new well as soon as possible after constructing the well and conditioning it for logging.

B. Coordinate logging with pumping tests as necessary.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 LOGGING

A. Geophysical Logging shall Include:

1. Electric: Resistivity (16-inch and 64-inch normal) and Single Point Resistance.
2. Natural gamma ray.
3. Caliper.
4. Temperature (static and pumping).
5. Fluid resistivity or conductivity (static and pumping).
6. Flowmeter (static and pumping).

B. Use a logging interval of the total depth of the well or borehole, or as determined by Engineer.

C. Record logs in digital format.

D. Report logs in graphic (analog) form.

E. Vertical scale for the log shall be 5 inches per 100 feet of depth.

F. Record logs at the highest sensitivity consistent with a minimum of off-scale deflection, or as directed by Engineer.

G. Record scales, calibration and standardization, and other pertinent data on each log.

H. Record a duplicate (repeat) section of each log equal to 20 percent of total logged depth for wells up to 250 feet deep, and 10 percent of logged depth of wells deeper than 250 feet up to a maximum of 100 feet. The duplicate section will be selected by Engineer.

I. The Contractor shall demonstrate calibration of the geophysical logging tools in the field.

J. If artesian conditions are encountered at the well Sites, the wellhead shall be sealed at land surface with a pack-off or stand pipe during static logging.

K. The Contractor shall run the flowmeter tool inside the 20-inch casing under static (non-pumping) conditions at a minimum of three different tool speeds and record tool output and corresponding tool speed. These data shall be provided to the Engineer before leaving the Site.

L. Run the static flow log from the base of the final 20-inch casing to total depth, and again, from total depth to the base of the 20-inch casing.

M. Run the pumping fluid conductivity and temperature logs at a minimum rate of 1,650 gpm.

N. The pumping flow log shall be run at two different flow rates; 825 gpm and 1,650 gpm, or as directed by the Engineer.

END OF SECTION

SECTION 33 21 19
WATER WELLS

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Petroleum Institute (API):
   a. SPEC 5L, Specification for Line Pipe, 38th Edition.
   b. API 10-A, Specification for Materials and Testing for Well Cements.
2. American Society for Testing and Materials (ASTM):
   a. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded, and Stainless.
   b. A139, Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over).
   c. C33, Fine Aggregate.
   d. C150, Standard Specification for Portland Cement.
   e. C494, Standard Specifications for Chemical Admixtures for Concrete.
   f. D1586, Standard Method for Penetration Test and Split-Barrel Sampling of Soils.
   g. D1785, Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
   h. F480, Standard Specification for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), Schedule 40 and Schedule 80.
3. American Water Works Association (AWWA):
   a. A100, Standard for Water Wells.
   b. C200, Standard for Steel Water Pipe, 6 Inches or Larger.
   c. C206, Standard for Field Welding of Steel Water Pipe.
4. Florida Administrative Code (FAC).
   a. Chapter 62-302, Surface Water Quality Standards.

1.02 SUBMITTALS

A. Copies of well construction permits issued by the SJRWMD and/or other regulatory agencies.

B. Quality Control Submittals:

1. Daily drilling log.
2. Manufacturer's Mill Certificate on surface and final steel casings prior to installation.
3. Drilling Fluid Additives: NSF/ANSI Standard 60 certified for potable use.
4. Grout Seal Additives: NSF/ANSI Standard 60 certified for potable use.

C. Fluid management and discharge plan. Address at a minimum the following:

1. Lost circulation zones.
2. Reverse-air discharge.
3. Artesian flow management.
4. Discharge during pumping tests.
5. Management of turbidity.

D. Contract Closeout Submittals:

1. Final well logs (Two copies).
2. Video logs (~~Two copies~~MP4 Video Files).
3. Field Geophysical Logs: Provide electronic copies of ASCII raw data files in *.LAS format and PDF files of each log on an external USB drive before leaving the site.
4. Final Geophysical Logs: Email final version of ASCII files in *.LAS format and PDF files of each log to the Engineer within 10 days of completion of logging for each well.~~.~~
5. Copies of well completion reports and other relevant correspondence submitted to the regulatory agencies.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: Deliver dry cement to site in bags or bulk. Store and protect from contamination in accordance with AWWA A100.

1.04 SCHEDULING AND SEQUENCING

A. Notify Owner of proposed drilling start date at least 5 working days before drilling begins. Notify Owner of anticipated delays whenever they become apparent. Notify Owner at least 2 working days in advance of weekend or after hours' work or work outside of normal working hours.

PART 2 PRODUCTS

2.01 CASING

A. Materials Permanently Installed in Wells: New steel pipe conforming to ASTM A53, Grade B, final casing shall be 20-inch OD with 0.375-inch wall thickness, and surface casing shall be 30-inch OD with 0.375-inch wall thickness.

B. Dimensions:

Nominal Diameter (inches)	Casing Type	Inside/Outside Diameter (inches)	Wall Thickness (inches)	Weight per/ft
20	Final	19.25/20	0.375	78.60
30	Surface	29.25/30	0.375	118.65

C. Pipe intended for joining by field butt-welding shall be provided with ends trued and beveled.

D. Fittings: Standard manufacture for the intended application and compatible with the well casing.

2.02 GROUT SEAL

A. Portland Cement: Conform to ASTM C150, Type II.

B. Grout Additives:

1. Additives such as bentonite to reduce shrinkage, other admixtures (ASTM C494) to reduce permeability, increase fluidity, and control set time, shall be suitable for use in water well construction.
2. Use of additives and composition of resultant slurry, shall be subject to Engineer's approval.

2.03 GROUT MIXES

A. Neat Cement: 1 cubic foot of Portland cement to not more than 6 gallons of water.

PART 3 EXECUTION

3.01 DRILLING EQUIPMENT

A. Provide rotary drilling rigs and accessories required to complete the well(s) as specified.

B. Provide drill rods with a minimum outside diameter of 5-inches.

3.02 TEMPORARY PIPING

A. Provide temporary settling tanks, piping, and appurtenances to filter and convey water produced by drilling, development, and testing to the designated discharge locations.

3.03 DRILLING

A. Wells shall be drilled by the direct circulation mud-rotary method prior to setting final casing, unless otherwise approved by Engineer.

B. The open borehole below the final casing shall be drilled using air reverse circulation rotary methods.

C. Drilling Fluids and Additives:

1. Approved for use in potable water wells.
2. Suitable to complete well as specified.

3.04 PILOT HOLE DRILLING AND SAMPLING

A. Drill exploratory pilot hole to full depth of each casing string prior to installation of casings.

B. Drill exploratory pilot hole while reverse-air drilling below the 20-inch final casing unless otherwise approved by Engineer.

C. Exploratory pilot holes shall be 8 to 12 inches in diameter.

D. As boreholes are advanced, collect representative formation samples at 10-foot intervals. Each sample shall be approximately 1 pint in volume. Samples shall be placed in a permeable cloth sample bag labeled in an indelible way, with date, well identification, and depth at which sample was collected. Samples will be stored onsite in a location which is not exposed to direct sunlight or rain. It shall be the Contractor's sole responsibility to collect, protect, and deliver the formation samples, properly labeled, to the Owner's onsite representative.

E. An appropriate container shall be a permeable cloth sample bag with attached marking label, such as the 4-1/2-inch by 6-inch bag manufactured by Hubco.

3.05 WATER SAMPLES

A. While drilling using reverse air methods, the Contractor shall collect representative water samples at the change of each drill rod (approximate~~ly~~ 30 foo~~et~~t intervals). Samples shall be collected in new plastic bottles that have a capacity of not less than 16 fluid ounces and that are equipped with nonmetallic caps. Each bottle shall be rinsed twice with the water to be sampled before collecting the corresponding sample. Engineer reserves the right to shorten the sampling interval as necessary.

B. Sample bottles shall be clearly labeled in an indelible way with the description of the well, depth, time and date of collection. It shall be the Contractor's sole responsibility to collect, protect, and deliver the water samples, properly labeled after collection, to Owner's onsite representative. Should the water samples need to be temporarily stored on site, the Contractor shall store the samples in a location which is not exposed to direct sunlight or rain.

C. In addition to the reverse-air samples, up to six (6) water samples will be collected from the drill stem under artesian flowing conditions or by installation of a submersible sampling pump (Grundfos Redi-flo2 or equal) capable of pumping 5 to 10 gallons per minute (gpm), if artesian conditions are not encountered. Contractor shall furnish, maintain, and operate the submersible sampling pump.

D. If artesian flowing conditions are encountered, the annulus between the drill stem and the 20-inch casing shall be sealed so that water only flows through the drill stem during purging and sampling.

E. Purge drill stem for a minimum of 1 hour prior to collecting a sample or as directed by Engineer. Drill stem sampling will not result in Contractor standby time.

~~B.~~F. The Contractor shall make provisions as necessary during construction and testing activities to account for and control flowing artesian conditions which may be encountered in the Floridan aquifer at the well sites.

G. The Engineer will be responsible for field analyzing and delivering all water samples collected to the JEA Springfield Laboratory for analysis.

3.06 BOREHOLE

A. Drill boreholes to the approximate dimensions and depths as shown in Figures 5 and 6.

B. Drill boreholes sufficiently straight and plumb per Section 3.11 to permit installation of casing.

C. Prior to geophysical logging, condition the borehole to allow the free passage of the logging tools to bottom.

3.07 LOGS

A. Maintain up-to-date daily logs of drilling progress.

B. Maintain current copy of logs at drill site for inspection.

C. Maintain Borehole Log Containing:

1. Description of geologic materials and depth encountered.
2. Depths of lost circulation.
3. Methods used to regain circulation.
4. Time, depth, and description of unusual occurrences or problems during drilling.
5. Diameter and length of casing installed.

D. Daily Log: Use Daily Drilling Report form located at the end of this section.

E. Final Well Log:

1. Completion date.
2. Well identification.
3. Location.
4. Borehole diameters.
5. Depth to bottom of casing and bottom of borehole.
6. Diameters and wall thicknesses of casing.
7. Range of depth of each cemented zone and quantity of cement used.
8. Other information from daily logs pertinent to well construction.

3.08 MANAGEMENT DISPOSAL OF CUTTINGS AND DRILLING FLUIDS

A. The Contractor shall be responsible for collection, storage, and disposal of mud-rotary cuttings and drilling fluids.

B. The drilling will be accomplished using circulation systems designed and constructed so that under no conditions shall there be an overflow. The Contractor is required to take all necessary steps to prevent accidental spillage from occurring. Frac tanks and other containers shall be used for the settling and/or storage of drill cuttings and solids and must be leak free.

C. The Contractor shall submit plans for a fluid management system to the Engineer for review. This Project will require decanting and removal of solids of all drilling and testing fluids during drilling and development operations. After settling, the liquid portion of the fluids will be directed from the settling tanks to the discharge areas designated in Figures 2, 3, and 4. During the final pumping test, when water is free of turbidity, discharge water will also be pumped to the discharge areas shown in Figures 2, 3, and 4. The Contractor shall be responsible for ensuring that no adverse environmental impacts or violations occur as a result of the well construction activities and discharge of drilling and testing fluids.

D. The Contractor shall meet the surface water quality threshold for turbidity established by FAC Chapter 62-302 Surface Water Quality Standards, which is no more than 29 NTUs above natural background conditions, prior to discharging. The natural background turbidity conditions of nearby surface water bodies will be established by the Engineer prior to commencement of work. The Engineer will also measure the turbidity level of water discharged from the well sites a minimum of once per day during reverse-air drilling and development activities.

3.09 PROTECTION OF WATER QUALITY

A. Prevent contaminated water, gasoline, or other harmful substances from entering well, either through opening or by seepage into ground.

B. Do not allow cuttings or drilling fluids to contaminate ground or surface water.

C. Contractor shall obtain any required permits for offsite discharge.

3.10 INSTALLATION OF CASING

A. It is the Contractor's sole responsibility to control the flow of the well at all times.

B. The Contractor is responsible for providing a contingency plan for installing surface or final casing through lost circulation zones that may be encountered. The Contractor shall submit to Engineer a plan for approval prior to any Work.

C. Install casing to approximate depth as shown on Figures 5 and 6 ~~3~~ or as directed by Engineer.

1. Provide joint with same structural integrity as casing itself.
2. Provide centralizers, casing shoes, grouting accessories, and other fittings necessary to complete the well.

D. Join Casing Ends Watertight:

1. Steel: Welding shall be in conformance with AWWA C206.

E. Install Casing Centralizers:

1. One set 5 feet above bottom.
2. One set 40 feet above bottom.
3. One set 100 feet above bottom.
4. One set every 100 feet thereafter to nearest 100 feet from ground surface.

F. A centralizer set includes four equally spaced centralizing guides equally spaced around the casing at each required depth.

G. Attach Centralizers Vertically to Casing:

1. Arranged in four vertical and straight lines along casing.
2. Spaced 90 degrees apart to allow maximum clearance for tremie pipes.

H. Surface and Final Casings: Install and cement in hole not less than 5 inches greater in diameter than nominal diameter of casing, unless otherwise directed by Engineer.

3.11 STRAIGHTNESS AND ALIGNMENT TEST

A. The well shall be adequately plumb and straight so as not to interfere with the installation and operation of the permanent pump and appurtenances.

B. The well shall be deemed adequately plumb if the horizontal displacement from the vertical is less than 2/3 the diameter of the inner casing per 100 feet in the cased part of the well. The alignment test shall be conducted as described in AWWA A100 Appendix C.

C. The test shall be conducted on the upper 200 feet of the final 20-inch casing.

3.12 TEMPORARY CASING FLANGE

A. The temporary casing flange for each well shall be set 4 feet above the existing grade and capped with a 20-inch ANSI blind flange to create a watertight seal. The blind flange shall be equipped with a 2-inch access port and ball valve.

B. Refer to Figures 5 and 6 at the end of this section.

3.13 MIXING AND PLACING GROUT FOR CASING CONSTRUCTION

A. Consistency and method of mixing will be reviewed by Engineer prior to grouting. Top of each grout stage shall be tagged with the tremie pipe and the next stage of grout shall be placed with the tremie pipe positioned within 2 feet of the tag depth.

B. Engineer will review method of grout placement.

1. Force grout from bottom of casing to ground surface using the tremie pipe and pressure grout method.
~~1.~~2. The base of the tremie pipe shall be positioned within a few feet of the casing setting depth.
~~2.~~3. Grout continuously filling entire annulus in one operation, if possible. Stage cement in separate lifts, if necessary.
~~3.~~4. Drilling operations not permitted until grout has cured.
~~4.~~5. Curing time for grout is 24 hours.

3.14 MIXING AND PLACING GROUT FOR BACKPLUGGING

A. Consistency and method of mixing shall be reviewed by the Engineer prior to grouting.

B. Grout shall be placed from the total depth of the borehole up to the target back plugging depth. Lost circulation zones may require a short interval of gravel.

C. Grout shall be placed at the bottom and working up the borehole using the tremie method.

D. Grouting may require several stages.

E. Minimum cure time between cement stages is 12 hours.

F. Cure time following placement of final cement stage is 24 hours.

3.15 WELL DEVELOPMENT

A. Develop wells until the water is free of sand and suspended solids, and the maximum production capacity of the wells is achieved. Sand content of the water shall not exceed 5 mg/L when pumping at 110 percent of the design pumping rate. The Contractor shall provide a sand content measuring device such as a Rossum centrifugal sand separator or a sand sampler as shown in Appendix D of AWWA A100, or equal. The Contractor shall also provide a tap for sampling discharge water during development. The Engineer will measure the sand content of the discharge water a minimum of once per day during development activities.

B. Develop wells in accordance with AWWA A100. Install air line and develop wells by surging the wells vigorously with air followed by high rate continuous air lifting.

C. Continue development until the wells are free of turbidity, sand, and no increase in capacity is observed, as directed by Engineer.

D. Air lifting compressor and equipment shall be capable of producing a minimum flow of 500 gpm through the casing during continuous air lifting.

E. Water and solids produced during the development shall be disposed of as specified in Section 33 21 13.10, Well Pumping Test, or other applicable sections.

F. The static water level in the wells shall be allowed to recover overnight prior to starting the well pumping test.

3.16 WELLHEAD COMPLETION

A. After each well has been completed and tested, it shall be thoroughly cleaned of all foreign substances.

B. Disinfect wells in accordance with Section 33 21 13.13, Water Well Disinfection.

C. Following disinfection, the Contractor shall install a casing flange with companion blind flange (leak-proof) equipped with a 2-inch access port and ball valve on the final joint of 20-inch casing of each well. The Contractor shall set the face of the casing flanges in accordance with Section 3.13, Temporary Casing Flange.

3.17 SUPPLEMENTS

A. The supplement and figures listed below, following "END OF SECTION," are a part of this Specification.

1. Supplement 1, Forms: Daily Drilling Report.
2. Figure 1, JEA Rivertown WTP Wells No. 1, 2, and 3 Location Map.
3. Figure 2, JEA Rivertown WTP Well No. 1 Proposed Site Plan.
4. Figure 3, JEA Rivertown WTP Well No. 2 Proposed Site Plan.
5. Figure 4, JEA Rivertown WTP Backup Well (No. 3) Proposed Site Plan.
6. Figure 5, JEA Rivertown WTP Well Nos. 1 ~~and 3~~ Well Schematic.
7. Figure 6, JEA Rivertown WTP Well Nos. 2 and Backup Well (No. 3) Well Schematic.

END OF SECTION

DAILY DRILLING REPORT

Date:_____ Owner:_____

Well No.:_____

Casing/Hole Diameter _____ inch Well Location:_____

Depth of Well

Start of Shift _____ feet

End of Shift _____ feet

Depth to Water (belowground)

Start of Shift _____ feet

End of Shift _____ feet

Log of Materials Encountered

Description	Depth From	Depth To

Remarks: (Character of drilling, casing added, miscellaneous work items, problems, or unusual occurrences)

_____

_____

_____

Driller:_____

Helper:_____

(Use other side for more comments)