Crooked Lake Wellsite
P280 Hydrogeological Investigation of the Lower Floridan Aquifer in Polk County, Florida

TECHNICAL SPECIFICATIONS

APRIL 2018

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CROOKED LAKE WELLSITE

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DIVISION 1

GENERAL REQUIREMENTS

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SECTION 01010

SUMMARY OF WORK

1.0 GENERAL

1.01 WORK INCLUDED

A. All of the work under this contract is located within the areas shown on the Figures 1 and 2 in southeastern Polk County, Florida.

B. The CONTRACTOR shall furnish all labor, materials, equipment, tools, services and incidentals to complete all work required by these Specifications and as shown on the Figures.

C. The CONTRACTOR shall perform the work complete, in place, and ready for continuous service, and include repairs, testing, permits, cleanup, replacements and restoration required as a result of damages caused during this construction.

D. All materials, equipment, skills, tools and labor which are reasonably and properly inferable and necessary for the proper completion of the work in a substantial manner and in compliance with the requirements stated or implied by these Specifications or Figures shall be furnished and installed by the CONTRACTOR whether specifically indicated in the contract documents or not.

E. The CONTRACTOR shall comply with all Municipal, County, State, Federal, and other codes which are applicable to the proposed construction work.

1.02 GENERAL DESCRIPTION OF WORK

A. The project consists of the construction and testing of one Lower Floridan aquifer dual zone monitor well at the Crooked Lake Wellsite for the Southwest Florida Water Management District (SWFWMD) as shown on Figures 3 and 4. The work shall be performed by a licensed Florida Water Well Contractor with equipment which is adequate to complete all phases of well construction. All work shall be completed in full conformance with Chapter 40D-3, Florida Administrative Code (F.A.C.), or this Specification, whichever is more stringent.

1.03 DETAILED DESCRIPTION OF COMPONENTS

The CONTRACTOR shall install one (1) Lower Floridan aquifer (LFA) dual zone monitor well (CL-LFA 2A & 2B). The construction of this well will include the following work components:

A. Lower Floridan Aquifer Wells CL-LFA 2A & 2B (Dual Zone Test/Monitor Well)

Figure 3 shows the LFA Dual Zone Well diagram and the suggested construction and testing sequence follows:

1. Coordinate construction activities with District and obtain well construction permits through the Florida Department of Environmental Protection (FDEP);
2. Mobilize and set up drilling and support equipment, drilling pad and holding pond/tank for

brackish water discharge/dilution;

3. Install 42-inch dia. steel pit casing to a depth and method determined by the Contractor, based on the CL-SA and CL-UFA lithologic logs;
4. Install ±100 ft. of 36-inch dia. steel surface casing and cement from land surface into top of clay strata;
5. Drill ±8-inch dia. pilot-hole using mud rotary method from ±100 to 280 ft. bls into competent limestone of the UFA;
6. Ream 35-inch dia. borehole using mud rotary to ±280 ft. bls. Run caliper log in the 35-inch dia. borehole and develop a cementing plan;
7. Install 28-inch dia. steel casing and cement from land surface to ±280 ft. bls into top of UFA;
8. Drill ±10-inch-dia. pilot-hole using reverse air rotary to from 280 to ±1600 ft. bls into top of LFA-2A;
9. Ream nominal ±27-inch-dia. borehole from 280 ft. to ±1600 ft. bls into top of LFA-2A;
10. Run Suite 1 geophysical logs in 25-inch dia. borehole from ±280 to ±1600 ft. bls within the UFA and MCU II and develop a cementing plan;
11. Install 16-inch dia. FRP casing from up to 3 feet above land surface to ±1600 ft. bls into top of LFA-2A;
12. Drill ±10-inch-dia. pilot hole from ±1600 to 1800 ft. bls within LFA-2A;
13. Set temporary pump and discharge piping, develop well clear and run Suite 2 geophysical logs within LFA-2A (Open ±1600 to 1800 ft. bls);
14. Perform a ±2-hour constant rate test on LFA-2A (up to ±1000 gpm and 120,000 gallons discharge) as determined during well development (Open ±1600 to 1800 ft. bls);
15. Drill ±10-inch-dia. pilot hole from ±1800 to 2600 ft. bls into bottom of LFA-2B;
16. Set temporary pump and discharge piping, develop well clear and run Suite 1 geophysical logs within LFA-2A, CL-1 and LFA-2B (Open ±1600 to 2600 ft. bls);
17. Perform ±6 straddle packer test(s) within 10-inch dia. LFA borehole to total depth (Open ±1600 to 2600 ft. bls) based on geophysical logs;
18. Based on above testing, results, WSP Team will select final open intervals for Dual Zone Test-Monitor Well;
19. Ream 15-inch-dia. borehole from ±1600 ft. to 2400 ft. bls within LFA-2A, and clean out 10-inch pilot hole to 2600 ft. bls with reverse air to ±2600 ft.;
20. Install 4.5-inch I.D. fiberglass (FRP) casing from top of LFA-2B (±2400 ft. bls up to ±3 ft. above land surface (note the coupling O.D. is 7.5 inches);
21. Cement the FRP casing annulus from top of LFA-2B to base of LFA-2A and perform cement bond and temperature logs to confirm cement bond (Cement interval ±1800 to 2400 ft. bls);
22. Develop well free of sediment and turbidity;
23. Run video and caliper log inside well CL-LFA2B FRP casing (4.5-inch dia.) and open borehole (0 to 2600 ft. bls)
24. Run video log inside well CL-LFA2A annulus and open borehole (±0 to 1800 ft. bls)
25. Complete wellhead consisting of a concrete pad, a locking protective riser and four bollards;
26. Install dedicated groundwater sampling pumps for dual zone monitor well (LFA-2A and LFA-2B) and collect water samples within both completed CL-LFA2A and CL-LFA2B monitor wells for water quality analysis;
27. Install 6-foot tall, 25 feet x 65 feet fencing around monitor well stick-ups with gate;

28. Demobilize and clean up well site.

2.0 PRODUCTS

Not Used.

3.0 EXECUTION

Not Used.

END OF SECTION

SECTION 01015

PROJECT REQUIREMENTS

1.0 GENERAL DESCRIPTION OF WORK

A. The work described herein consists of constructing one dual zone monitor well within the Lower Floridan Aquifer (LFA) in accordance with Section 02050 of the Specifications and as shown in Figures 3 and 4. The suggested sequence of work for each well is detailed in Section 01010.

B. These Specifications are intended to be a general description of the required work, but may not cover all contingencies that may occur during well construction. Changes or variations from the work plan shall be approved by the GEOLOGIST, prior to execution.

C. The CONTRACTOR shall comply with the OSHA regulations contained in 29CFR Section 1910 for General Industry Regulations and 29CFR Section 1926 for Construction Regulations.

2.0 QUALIFICATIONS

A. The CONTRACTOR responsible for constructing the wells shall be a licensed Florida Water Well Contractor employing only competent workmen for the execution of this Work, and all such Work shall be performed under the direct supervision of an experienced well driller satisfactory to the SWFWMD and GEOLOGIST.

B. The CONTRACTOR must have successfully completed a minimum of three (3) similar projects in the last ten (10) years, as detailed in Section 02050 of the Specifications.

1. List all similar projects undertaken in the past ten (10) years. Describe the scope of each project in physical terms and by cost, dates of service. Provide the respondent's responsibilities, and provide the name, telephone number, and email address of an individual in a position of responsibility who can attest to respondent's activities in relation to the project.

2. At least one (1) of the similar project descriptions provided above shall include construction to a minimum depth of 2,600 feet below land surface, and shall demonstrate experience successfully executing inflatable packer tests, with water quality sampling from the packer intervals.

3. Constructed value of at least one million two hundred fifty thousand dollars ($1,250,000).

C. The CONTRACTOR shall furnish capable personnel, experienced in the work required by these specifications. In addition, the following shall apply:

1. The CONTRACTOR shall provide an adequate number of competent helpers.

2. The drillers shall be capable of keeping good and clean well logs, and reports of the drilling, developing and pump testing operations as instructed by the GEOLOGIST.

3. All welding shall be performed according to the American Welding Society standards and American Society for Testing and Materials standards. All welding shall be conducted by certified welders of the AWS, ASTM, ASME, or approved equal.

4. All well drillers shall possess a current State of Florida Water Well Contractor License, issued by the one of the five water management districts. The drillers must have prior experience operating the drilling equipment selected for the project and should have successfully constructed and tested similar wells within carbonate formations. The CONTRACTOR's well driller shall be capable of identifying lithologic samples, maintaining complete and current well logs and daily notes for the well completion report, and developing and testing the well, as required by these specifications.

D. Where possible, the CONTRACTOR shall utilize the skills of a specialist service company, expert in the type of service for which they are employed. The name of the company and the individuals providing the services shall be submitted to the GEOLOGIST for approval prior to beginning work. The GEOLOGIST reserves the right to reject any service company.

E. The GEOLOGIST may make any other investigations deemed necessary to determine the ability of the CONTRACTOR to perform the Work, and the CONTRACTOR shall furnish to the GEOLOGIST all such information and data for this purpose as the GEOLOGIST may request.

F. The CONTRACTOR shall furnish satisfactory evidence upon request that all materials to be furnished in performing the specified Work are new and all equipment to be used is in good working order.

G. The CONTRACTOR shall complete the Work described in this Section in accordance with (a) the American Water Works Association Standard for Water Well (AWWA A100-97), (b) applicable portions of the Rules of the SWFWMD, Chapter 40D-3, F.A.C., and (c) applicable portions of the Rules of the FDEP, Chapter 62-555, and 62-532 F.A.C.

3.0 CONTRACTORS EQUIPMENT

A. The CONTRACTOR shall prepare an area, within the limits of a location for the storage of materials required for this work.

B. The CONTRACTOR is responsible for protecting their own work including materials from theft, vandalism, and unauthorized entry.

C. The equipment shall be provided with all sound deadening devices reasonably possible. The rig engines and all other power plant equipment shall have mufflers, and metal parts of the rig that may encounter casing or drill pipe shall be protected through the use of wood, or other sound absorbent material, where possible. CONTRACTOR shall provide complete drilling rigs, all tools, accessories, power, pumps, lighting, water and other equipment necessary to conduct efficient drilling and testing operations.

D. The CONTRACTOR's drilling rig shall have a lift capacity exceeding the greatest load required during construction of the well. The rig shall be equipped with drill string weight and drilling speed recorder.

E. CONTRACTOR shall make necessary arrangements to acquire construction water. Existing monitor wells CL-UFA may be used as a construction water source.

4.0 PRECONSTRUCTION CONFERENCE

A. Prior to the commencement of Work at the Site, a preconstruction conference will be held at a mutually agreed time and place. The conference shall be attended by:

a. CONTRACTOR and its superintendent.
b. Principal Sub-Contractors.
c. Representatives of principal Suppliers and manufacturers as appropriate.
d. Representatives of SWFWMD.
e. Government representatives as appropriate.
f. Others as requested by CONTRACTOR, SWFWMD, or GEOLOGIST.

B. Unless previously submitted to GEOLOGIST, CONTRACTOR shall bring to the conference a preliminary schedule for each of the following:

a. Progress Schedule.
b. Procurement Schedule.
c. Schedule of Values for progress payment purposes.
d. Schedule of Shop Drawings and other submittals.

C. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The agenda will include:

a. CONTRACTOR's preliminary schedules.
b. Transmittal, review, and distribution of CONTRACTOR's submittals.
c. Processing Applications for Payment.
d. Maintaining record documents.
e. Critical Work sequencing.
f. Field decisions and Change Orders.
g. Use of premises, office and storage areas, security, housekeeping, and SWFWMD's needs.
h. Major equipment deliveries and priorities.
i. CONTRACTOR's assignments for safety and first aid.

D. GEOLOGIST will preside at the conference and will arrange for keeping the minutes and distributing the minutes to all persons in attendance.

5.0 WORK SCHEDULE

A. The SWFWMD reserves the right to have their GEOLOGIST present to observe all Work performed by the CONTRACTOR. Working hours for the RPR are a 10-hour period between the hours of 7:00 a.m. and 7:00 p.m., Monday through Friday. Any Work beyond the 10-hour period shall be considered overtime and shall be requested in writing 24 hours prior. CONTRACTOR, with verbal permission of the GEOLOGIST, may work 24 hours a day to provide clean-up, maintenance of

vehicles and equipment, and other such items without the GEOLOGIST present.

B. Any Work required on Saturday or Sunday shall be requested in writing 48 hours in advance. All requests must be approved by SWFWMD in advance. Under emergency situations a verbal request may be made with a follow-up written request.

6.0 LAND FOR CONSTRUCTION PURPOSES

A. CONTRACTOR will be permitted to use available land belonging to SWFWMD, on or near the Site, for construction purposes and for storage of materials and equipment.

B. The locations and extent of the areas so used shall be as indicated on Figure 2.

C. The CONTRACTOR shall immediately move stored materials or equipment if any occasion arises, as determined by SWFWMD, requiring access to the storage area. Materials or equipment shall not be placed on the property of SWFWMD until SWFWMD has agreed to the location to be used for storage.

7.0 MOBILIZATION REQUIRMENTS

A. The CONTRACTOR shall mobilize its equipment and personnel to effectively commence its drilling operations within the time limit specified.

B. Above and below ground utilities: Location of all existing utilities will be the CONTRACTOR's responsibility. Damage to any utilities shall be repaired at the CONTRACTOR's expense.

C. The CONTRACTOR shall provide, install and maintain erosion controls for the duration of the well construction work as needed and to prevent sediment and turbidity from entering surface water bodies and to avoid erosion problems by directing flow away from the drilling site and adjacent properties.

D. The CONTRACTOR shall prepare an area, within the limits of the location delineated in the field by the GEOLOGIST, for the work described in these Technical Specifications.

E. Only limestone and dolostone cuttings may be disposed of at the site in a designated area. No drilling operations can commence without an approved disposal site by the SWFWMD or GEOLOGIST. The CONTRACTOR shall be responsible for providing and maintaining all necessary tank trucks, dump trucks, pipe, pumps and equipment necessary to pump and haul excess pad drainage, drilling fluid, drill cuttings and pumped water to a pre-determined disposal site in accordance with federal, state and local regulations, or sub-contract with a firm capable of providing these services when necessary.

F. The CONTRACTOR shall provide temporary sanitary facilities at the site for the needs of all construction workers and others performing work or services in connection with this Subcontract. Sanitary facilities shall be of reasonable capacity, and properly maintained throughout the construction period. The CONTRACTOR shall place the sanitary facilities such that they are obscured from public view to the greatest practical extent. If toilets of the chemically-treated type are used, at least one (1) toilet will be provided for every ten (10) employees. CONTRACTOR

shall enforce the use of such sanitary facilities by all personnel at the site. All toilets, regardless of type, must have self-contained waste storage facilities.

8.0 SITE ADMINISTRATION

A. The CONTRACTOR shall be responsible for all areas of the Site used by it and by all Sub-Contractors in the performance of the Work. CONTRACTOR shall exert full control over the actions of all employees and other persons with respect to the use and preservation of property and existing facilities, except such controls as may be specifically reserved to SWFWMD or others. CONTRACTOR shall have the right to exclude from the Site all persons who have no purpose related to the Work or its inspection, and may require all persons on the Site (except SWFWMD's employees) to observe the same regulations as CONTRACTOR requires of its employees.

B. Access to the Site will be limited to the main gate off Highway 27 unless specific alternate arrangements are made with the SWFWMD. CONTRACTOR shall supply a list, and periodically update it, that contains the names of all personnel that will be on-site during construction.

C. Existing gates shall be restored to previous conditions upon entering property.

9.0 SECURITY

A. CONTRACTOR shall be responsible for protection of the Site, and all Work, materials, equipment, and existing facilities thereon, against vandals and other unauthorized persons.

B. No claim shall be made against SWFWMD by reason of any act of an employee or trespasser, and CONTRACTOR shall make good all damage to SWFWMD's property resulting from CONTRACTOR's failure to provide security measures as specified.

10.0 UNFAVORABLE CONSTRUCTION CONDITIONS

A. During unfavorable weather, wet ground, or other unsuitable construction conditions, CONTRACTOR shall confine its operations to work which will not be affected adversely by such conditions. No portion of the Work shall be constructed under conditions which would affect adversely the quality or efficiency thereof, unless special means or precautions are taken by CONTRACTOR to perform the Work in a proper and satisfactory manner.

11.0 HYDROGEOLOGIC CONDITIONS

A. The CONTRACTOR shall be aware that unfavorable subsurface geologic conditions may exist at the selected well sites. Loss of circulation may indicate subsurface conditions that, if severe, could cause the overlying sediments to collapse, thereby causing surface stability problems at and around the site. The CONTRACTOR, in particular, shall determine the necessity of a surface casing to prevent well construction problems resulting from overlying sediment collapse and surface instability. The CONTRACTOR shall be responsible for setting the surface casing to a sufficient depth to avoid surface caving and raveling.

B. The CONTRACTOR is responsible for resolving issues associated with drilling through potentially unstable zones where caving may occur within the underlying formations. Procedures used to resolve these issues must be approved by the DISTRICT prior to implementing. Additional work

associated with this type of problem will be paid at the unit prices provided in the CONTRACTOR's Bid Schedule.

C. The DISTRICT reserves the right to use an alternate site if unfavorable hydrogeological conditions are encountered. Additional well construction would be paid at the unit prices provided in the CONTRACTOR's Bid Schedule.

12.0 PROGRESS MEETINGS

A. CONTRACTOR shall schedule and hold regular onsite progress meetings at least monthly and at other times as requested by SWFWMD or required by progress of the Work. CONTRACTOR, GEOLOGIST, and all Sub-Contractors active on the Site shall be represented at each meeting. CONTRACTOR may at its discretion request attendance by representatives of its Suppliers, manufacturers, and other Sub-Contractors. Progress meetings should be held monthly at the District Bartow office.

13.0 REFERENCE STANDARDS

A. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code, or laws or regulations in effect at the time of opening of Bids (or on the effective date of the Contract or Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents. However, no provision of any referenced standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of SWFWMD, CONTRACTOR, or GEOLOGIST, or any of their SUBCONTRACTORs, consultants, agents, or employees from those set forth in the Contract Documents, nor shall any such provision or instruction be effective to assign to SWFWMD, GEOLOGIST, or any of GEOLOGIST's CONSULTANTS, agents, or employees, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

B. AWWA, ASTM, ANSI, and API standards shall apply as referenced herein. Standards shall include, but are not restricted to the following:

1. AWWA Water Well Standards, A100-97 and A100-90.
2. ASTM Pipe Standards A53, D2241 and F480.
3. API Pipe Standards, 5L.
4. ASTM Portland Cement Standards, C 150-92.

14.0 SUBSTITUTES AND "OR-EQUAL" ITEMS

A. Whenever a material or article is specified or described by using the name of a proprietary product or the name of a particular manufacturer or vendor, the specified item shall be understood as establishing the type, function, and quality desired. Requests for review of equivalency will not be accepted from anyone except CONTRACTOR, and such requests will not be considered until after the Contract has been awarded. Other manufacturers' products may be accepted, provided sufficient information is submitted to allow GEOLOGIST to determine that the products proposed are equivalent to those named. Such items shall be submitted for review by the procedure set

forth in the Submittals section.

15.0 SUBMITTALS

A. General: All CONTRACTOR submittals shall conform to the applicable requirements as specified by SWFWMD and the supplementary requirements specified. All measurements for depths shall be referenced to ground surface at the well site.

B. Schedule: The CONTRACTOR shall submit a work schedule that includes the major components of the project. The work schedule shall be submitted to the SWFWMD and GEOLOGIST.

C. Materials and Shop Drawings: Copies of all materials required to establish compliance with the Specifications shall be submitted. Submittals shall at least include descriptive literature, bulletins, and/or catalogs providing description of all materials and mill certifications by material and specification (e.g., ANSI). These submittals shall include, but not be limited to the surface casing, well casing, and drilling fluid products.

D. Supplier's List: The CONTRACTOR shall submit a complete list of all proposed vendors, and suppliers, along with corresponding material specifications to be used in the work. The Materials and Supplier's List shall be submitted to the SWFWMD and GEOLOGIST one week prior to mobilizing the rig to the site.

E. Applications for Payment: The CONTRACTOR shall submit copies of all applications for payment to both the GEOLOGIST and SWFWMD.

F. Subcontractor's List: The CONTRACTOR shall submit a complete list of all proposed subcontractors to be used in the work, for acceptance by the SWFWMD, one week prior to mobilizing the rig to the site. The CONTRACTOR may be required to submit additional information or a resume of qualifications for any of the subcontractors proposed.

G. Welders: Prior to the start of work, the CONTRACTOR shall submit a list of the welders he proposes to use during well construction, and the type of welding for which each has been qualified, along with current certification documents for each welder listed.

H. Daily Log: The CONTRACTOR shall maintain a detailed daily log of events for his activities on the site during well construction and testing. The information shall be recorded on Daily Drilling Report forms. Failure to keep this log up to date on a weekly basis shall be grounds for the GEOLOGIST to stop drilling operations. No standby time will be paid. The report forms should include information on bit assembly and drill string, drilling mud and additives, fluid losses, water- and fluid- level changes, footage drilled and formations encountered, change in formation, hard and soft zones, and cementing operations. Installed quantities of items identified on the Bid Form should be included in the daily log. In addition, information relative to maintenance and repair time, along with details of repair, CONTRACTOR'S personnel/sub-contractors personnel, and other pertinent information shall be included. Development and pump testing records shall also be included and attached. One legible form (with any attachments) suitable for photocopying shall be submitted to the GEOLOGIST on a weekly basis

I. Mill Certificates: Casing mill certificates shall be submitted to the GEOLOGIST for all casings, one

week prior to the installation of the casing in the ground. Heat numbers on casing joints shall be readily visible and legible or the casing will not be accepted by the GEOLOGIST.

J. Welding Procedures: The CONTRACTOR shall submit to the GEOLOGIST proposed procedure specifications and qualification records for welding activities for all pipe and casing welding to be performed under this section, in accordance with Section IX, Article II of the ASME Boiler and Pressure Vessel Code. Materials shall be submitted to the GEOLOGIST no less than one week prior to the proposed welding activity.

K. Geological Samples: The CONTRACTOR shall collect label and store, samples of all geological formations encountered during drilling operations. Each sample shall be clearly labeled and indicate well number, date, time, and the exact depth from which the sample was taken. Two sets of samples shall be collected in zip lock or cloth bags and stored in a protected place near the drilling site.

L. Geophysical Logging: The CONTRACTOR shall submit 2 draft field copies of all geophysical logs to the GEOLOGIST within 24 hours following logging activities, and 6 final copies and an electronic file (pdf electronic file and Excel spreadsheet or txt binary file) within 10 days of logging. The printed reports must be submitted to the GEOLOGIST/ GEOLOGIST within 72 hours of completion of logging. The logs to be performed are listed in Sections 02051 and 02052 Part 3-Execution.

M. Abandonment: During back plugging or plugging of a well, daily reports shall be maintained by the CONTRACTOR and provided to the GEOLOGIST. The CONTRACTOR is responsible for obtaining all applicable well plugging abandonment permits through the FDEP prior to commencement of such activities. The daily report shall contain the following information. The daily report shall contain the following information: (a) number of feet plugged; (b) amount of cement and aggregate used; and (c) any other pertinent data that the CONTRACTOR may record or the GEOLOGIST/ GEOLOGIST may request. It is the CONTRACTOR's responsibility to obtain all permits with local and state regulatory agencies associated with the construction and testing of the facility. This also includes review and approval by Florida Department of Environmental Protection (FDEP).

N. Laboratory Analyses and Testing: The CONTRACTOR will coordinate with the GEOLOGIST/ GEOLOGIST for the collection of water samples during drilling of the Floridan aquifer system for analysis.

O. Calibration Data: Calibration records for each measuring instrument used in the construction of the well shall be submitted to the GEOLOGIST for review one (1) week prior to the installation or use of the instruments. The calibration records shall contain the following information:

a. Flow meter calibration sheet: Serial Number, Model Number, Gears, Test apparatus size, Meter reading and flow rate for at least three (3) steps, Percent error for each step, Tester's name and title.
b. Pressure gauge calibration sheet: Serial Number, Model Number, Scale range, Meter reading and inches of mercury for at least three steps covering the entire range of the gauge, Percent error for each step, Tester's name and title.
c. Inclination tools and geophysical logs: Each downhole instrument used in testing the wells during construction shall demonstrate acceptable calibration before use. Where possible, this calibration record shall be included on the output of the test or on the log.

P. Operations: The CONTRACTOR shall submit for the GEOLOGIST's approval plans for cementing operations and casing installation, at least 48 hours prior to commencing work on those operations. These plans shall include the following information:

a. Cementing Program: Top and bottom of each interval to be cemented, pre-flush and spacer, composition of cement to be used in each interval and volume to be pumped, method of emplacement of cement, expected fill-up, expected pressures, and any additives to be used.

b. Casing Installation: Tabulation of casing on site and the length of each section, weight of each joint, cumulative string weight, order of installation of casing sections, locations of centralizers and casing tabs.

Q. Well Development Description and Test Records: A description of the Well Development procedure shall be submitted to the GEOLOGIST one (1) week prior to development activities. Development and test records shall be recorded on a 5 minutes basis, showing production rates, static water level (pre-development and post-development), pumping level, drawdown, production of sand, and all other pertinent information concerning development and testing methods. This data shall be recorded on a form to be provided to the GEOLOGIST.

R. Permits: It is the CONTRACTOR's responsibility to obtain all permits with local and state regulatory agencies associated with the construction and testing of the facility. This also includes review and approval by Florida Department of Environmental Protection (FDEP). The CONTRACTOR shall not perform work on the well until these permits are obtained. The CONTRACTOR shall furnish copies of all permits to the SWFWMD and GEOLOGIST as the permits are obtained. As required by law, the CONTRACTOR shall retain and/or post copies of the permits at the site.

S. Final Description: The final well descriptions shall show the following: diameter, wall thickness, depths and lengths of casings installed; borehole diameters; cemented casings; quantities of cement installed; centralizer locations; depths and thickness' of annular seals; quantity of material removed during development operations; and all other pertinent details, and shall be submitted to the GEOLOGIST prior to acceptance of the well.

T. Records Required by Law: The CONTRACTOR shall maintain all records required by governmental agencies having jurisdiction, and shall submit such records to them as may be required. Two copies of all such material shall also be furnished to the GEOLOGIST.

U. Record Figures: Record Figures shall be submitted in accordance with the relevant section of the technical specifications and Figures.

V. Completion Report Required: A Water Well Completion Report (Form 41.10-410(2)) must be filed with the appropriate agencies within 30 days of well completion.

W. Drilling Waste Disposal: The CONTRACTOR shall notify the GEOLOGIST of a drilling waste disposal location for approval by SWFWMD two (2) weeks prior to disposal.

X. Costs: All costs for meeting the provisions of the regulatory agencies having jurisdiction in this

project shall be included in the lump sum bid. Should any action by the CONTRACTOR be necessary to meet these requirements during construction and testing, the entire cost of compliance shall be borne by the CONTRACTOR.

Y. Video Survey: The CONTRACTOR shall perform a clear video survey on the well from land surface to the base of the well following drilling and development activities. Six (6) copies of the completed survey, in DVD format, shall be provided by the CONTRACTOR to the GEOLOGIST/ GEOLOGIST for distribution within 30 days of completion of the video survey.

Z. Photographs of Site: Color photographs will be taken prior to construction and after construction is complete. The site shall be restored to the condition prior to commencement of work.

16.0 PROJECT RECORDS

A. During drilling of the wells, the CONTRACTOR shall maintain at the well site a complete log setting forth the following:

1. The depth at which changes of formation occur.
2. The depth and interval of each cavity encountered during drilling.
3. The identification of the material of which each stratum is composed.
4. The depth interval from which each formation sample is taken.
5. The depth interval from which each water sample is taken.
6. The depth at which hole diameters change.
7. Depth at which drilling method is changed.
8. Other pertinent data requested by the GEOLOGIST.

B. A daily detailed driller's report shall be maintained and provided upon request to the GEOLOGIST or the SWFWMD at the well site. The report shall give a complete description of all lithologies encountered, number of feet drilled, number of hours on the job, shutdown time due to breakdown or other cause, the fluid level in the hole measured daily before starting pumps, the properties of the drilling fluid, feet of casing set, and such other pertinent data as requested by the GEOLOGIST.

17.0 MATERIALS DELIEVERY, STORAGE and PROTECTION OF MATERIALS

A. All materials shall be delivered in an undamaged condition and stored to provide protection against damage. All defective or damaged materials shall be replaced with new materials at the CONTRACTOR'S expense.

B. All materials must be properly protected against damage during a prolonged period at the site.

C. The CONTRACTOR shall prepare an area, within the limits of a location approved by the GEOLOGIST, for the storage of materials required for this work.

18.0 WELL ACCEPTANCE CRITERIA

A. The turbidity of the water from the completed production wells shall not exceed 10 NTU as measured on a calibrated turbidity meter when each well is being pumped.

B. The casing and borehole for each well shall be constructed round, plumb and true to line; the wells shall comply with AWWA A100-97.

19.0 WARRANTY

A. All materials supplied under this Section shall be warranted for a period of five (5) years by the CONTRACTOR and material manufacturers. The manufacturer's warranty period shall run concurrently with the CONTRACTOR's warranty period. The warranty period shall commence on the Final Completion Date, as specified in the Contract or upon completion and acceptance by the SWFWMD of testing or remedial procedures.

B. The materials shall be warranted to be free from defects in workmanship and design. Any materials that fail during the warranty period shall be replaced and the unit(s) restored to service at no expense to the SWFWMD.

20.0 SITE CLEANUP, PRESERVATION AND RESTORATION

A. Unused Materials and Equipment: During construction, the CONTRACTOR shall regularly remove from the site all accumulated debris and surplus materials of any kind which results from his operations. Unused tools or equipment shall be stored at the CONTRACTOR's yard or base of operations for the project.

B. Periodic Cleaning: The CONTRACTOR shall perform clean-up work on a regular basis and as frequently as requested by the GEOLOGIST.

C. Basic site restoration in an area shall be accomplished immediately following installation or substantial completion of the required facilities in that area. Also, such work shall be performed, when requested by the GEOLOGIST, if partially completed facilities must remain incomplete for some time period due to unforeseen circumstances.

D. Upon completion of work at the site, the CONTRACTOR shall promptly remove all equipment and unused materials. CONTRACTOR shall dismantle any temporary structures erected for purposes not part of the final product. CONTRACTOR shall promptly provide minor repairs and leave the site in a manner acceptable to the GEOLOGIST, within one month after the completion of drilling and testing.

E. Wastes shall not be buried or burned on the Site or disposed of into storm drains, sanitary sewers, streams, or waterways. All wastes shall be removed from the Site and disposed of in a manner complying with local ordinances and antipollution laws.

F. Adequate cleanup will be a condition for recommendation of progress payment applications.

21.0 ADDITIONAL WORK

A. At the option of the SWFWMD, additional work may be authorized. Additional work shall be completed at prices not exceeding those of comparable work and materials contained in the CONTRACTOR's bid or as determined by the GEOLOGIST.

END OF SECTION

SECTION 01026

MEASUREMENT AND PAYMENT

1.0 SCOPE

This section covers methods of measurement and payment for items of Work under this Contract.

2.0 GENERAL

A. The total Contract Amount shall cover all Work required by the Contract Documents. All costs in connection with the proper and successful completion of the Work, including permit fees; furnishing all materials, equipment, supplies, and appurtenances; providing all construction equipment and tools; providing all necessary temporary facilities; and performing all necessary labor and supervision to fully complete the Work, shall be included in the unit and lump sum prices bid. All Work not specifically set forth as a pay item in the Bid Form shall be considered a subsidiary obligation of the CONTRACTOR and all costs in connection therewith shall be included in the prices bid.

B. The CONTRACTOR shall receive and accept the compensation per quantity provided in the Proposal and the Contract as full payment for furnishing all materials, labor, tools and equipment, for performing all operations necessary to complete the work under the Contract, and also in full payment for all loss or damages arising from the nature of the work, or from the action of the elements or from any unforeseen difficulties which may be encountered during the execution of the work until the final acceptance by the DISTRICT.

C. The prices stated in the Proposal include all costs and expenses for taxes, labor, equipment, materials, permits, commissions, transportation charges and expenses, patent fees and royalties, labor for handling materials during inspection, together with any and all other costs and expenses for performing and completing the work as shown on the Drawings and as specified herein. The basis of payment for an item at the price shown in the Proposal shall be in accordance with the description of that item in this Section.

D. The quantities for payment under this Contract shall be determined by actual measurement of the completed items, in place, ready for service and accepted by the DISTRICT, in accordance with the applicable method of measurement therefore contained herein and the unit prices indicated on the Bid Form, as described below under 6. BID FORM PAYMENT ITEMS FOR WELLS.

E. The quantities included in the Bid Form are the line item quantities required for the bidding of the wells. Total Contract Amount will be the sum of the itemized totals including Lower Floridan aquifer Dual Zone Monitor Wells CL-LFA2A and LFA2B. The existing construction supply well will also be back plugged up to land surface.

3.0 ESTIMATED QUANTITIES FOR WELLS

All estimated quantities stipulated in the Bid Form or other Contract Documents for construction of the well is approximate and are to be used only (a) as a basis for estimating the probable cost of the Work and (b) for the purpose of comparing the bids submitted for the Work. The actual amounts of work done and materials furnished under unit price items for construction of the wells may differ from the estimated quantities. The basis of payment for work and materials for the wells will be the actual amount of work done and materials furnished for the wells ready for service and accepted by the DISTRICT. The CONTRACTOR agrees that it will make no claim for damages, anticipated profits, or otherwise on account of any difference between the amounts of work actually performed and materials actually furnished for the wells and the estimated amounts therefore.

4.0 WELL WORK FAILURE

A. If evidence indicates that the casing in a well is broken or that the well is not constructed in accordance with the Specifications to the satisfaction of the DISTRICT. The DISTRICT OR CONSULTANT may order repairs or alterations to be made by the CONTRACTOR to bring the well into compliance with the Specifications. In the event that repairs or alterations cannot be made to bring the well into compliance with the Specifications, the DISTRICT and the CONSULTANT may order the CONTRACTOR to plug and abandon such well and to construct a new well without additional cost to the DISTRICT. If such well failure should occur before a well is completed, the CONTRACTOR shall plug the abandoned well and construct the new well to the same state of completion at no cost to the DISTRICT; and the DISTRICT shall pay the CONTRACTOR for Work performed to complete the construction, in accordance with the amounts indicated in the Bid Form.

B. If the DISTRICT or the CONSULTANT determines that a well must be abandoned due to circumstances beyond the CONTRACTOR's control, then payment will be made for all work and materials incorporated into the abandoned well based on the units completed in accordance with contract unit rates. Such circumstances would include, but not necessarily be limited to, unacceptable subsurface geologic or hydrologic conditions. Additionally, the CONTRACTOR will be paid for grout required to plug the abandoned well at the unit price for cement grouting indicated in the Bid Form.

C. If it is determined by the CONSULTANT or the DISTRICT that the CONTRACTOR is at fault for an interruption causing a pumping test to be terminated, no payment shall be made for test pumping for the hours expended during the terminated test. If a pumping test is interrupted and the CONTRACTOR is not at fault, then payment for the test pumping for the terminated test will be made on the basis of the unit price for test pumping as indicated on the Bid Form.

5.0 MEASUREMENT

A. CONTRACTOR shall be responsible for making all measurements required for payment and make measurements in the presence of the CONSULTANT. All quantities shall be included on the CONTRACTOR's Daily Log.

B. The quantities for payment shall be determined by actual measurement of the completed items, in place, ready for service and accepted by the DISTRICT, in accordance with the applicable method of measurement.

C. Units of measure shown on the Bid Form shall be as follows unless specified otherwise.

Item	Method of Measurement
EA	Each
LS	Lump Sum
HR	Hour
LF	Linear Foot
SK	Sack of Cement or Hole Plug

6.0 BID FORM PAYMENT ITEMS FOR WELLS

A. BASE BID FOR DUAL ZONE MONITOR WELL CL-LFA2A & LFA2B

Item 1. Mobilization/demobilization

Payment for Mobilization/Demobilization will be made at the Contract lump sum price for the item, which price and payment shall be full compensation for the Work consisting of the preparatory Work and operations in mobilizing for beginning Work on Dual Zone Monitor Well, including, but not

limited to, furnishing those supplies and incidentals to the project site, preparation of submittals, safety equipment and first aid supplies, project signs, field surveys, sanitary and other facilities required by these specifications, and State and local laws and regulations. The costs of bonds and any required insurance and any other preconstruction expense necessary for the start of the work, excluding the cost of construction materials, shall also be included. This Work also consist of the general project management of the Work including, but not limited to, field supervision and office management, as well as other incidental cost for management of the Work during the duration of the Contract. This Work also includes maintenance of the field offices for the duration of the Contract which includes a generator for temporary utility service; maintaining access roads from the main gate to, and within, the work area; and mowing the project work area regularly (the work area is identified in Figure 2 of the Specification). The Work specified in this item also consists of demobilization or the operations normally involved in ending Work on the project including, but not limited to, termination and removal of temporary utility service; demolition and removal of temporary structures and facilities; restoration of Contractor storage areas; disposal of trash and rubbish, and any other post-construction work necessary for the proper conclusion of the Work. **This pay item may not exceed 5% of the sub-total for well Dual Zone Monitor Well bid amount.**

Item 2. Provide holding tanks to contain dilute/discharge of brackish groundwater.

The Contractor will be responsible for providing Holding tanks to contain/dilute/discharge brackish groundwater of sufficient size to allow for constant rate discharge testing and packer testing without the re-introduction of fluids into the well during such testing. A minimum of 120,000 gallons of storage is required during all drilling and testing activities unless otherwise approved by consultant. Drilling fluid or formation water shall be diluted in tanks below 250 mg/L chloride prior to spreading on land surface (onsite). Water generated from packer testing, pumping tests, or well development that is recirculated into the well shall have a turbidity measurement of 20 NTU or less at all times, or as directed by consultant. It is the contractor's responsibility to provide a turbidity meter to monitor the water. lt is the intent to drill using closed circulation techniques during reverse-air drilling.

Item 3. Drilling, furnish and install steel pit casing and cement grout seal (if mud rotary method is used).

The Contractor is responsible for selecting the diameter and depth of the pit casing and method of installation. Payment will be made at the at the Contract lump sum price stated in the Bid Form for the item, which shall be full compensation for providing all items necessary to drill pilot hole, ream borehole, furnish and install a steel casing pipe, casing shoes, fittings, centralizers, cement grout seal and other appurtenances and performing the necessary joining for complete installation of casing pipe and all other incidentals required to complete the work as identified in the Specifications.

Item 4. Furnish and install 36" dia. steel surface casing (+0 to 100 ft. bls).

The Contractor is responsible for selecting the method of installing the surface casing. Payment will be made at the unit price per linear foot stated in the Bid Form for the item, which shall be full compensation for providing all items necessary to install a nominal 36" dia. steel casing pipe, casing shoes, fittings, centralizers and other appurtenances and performing the necessary joining for complete installation of casing pipe and all other incidentals required to complete the work as identified in the Specifications.

Item 5. Furnish and install cement grout seal (if mud rotary method is used +0 to 100 ft. bls).

Payment will be made at the unit price per 94 lb sack stated in the Bid Form for the item, which shall be full compensation for providing all items necessary to cement grout seal casing pipes and all other incidentals required to complete the work as identified in the Specifications.

Item 6. Drill pilot hole in unconsolidated formation (+100 to 280 ft. bls).

Payment will be made at the unit price per linear foot stated in the Bid Form for the item, which shall be full compensation for providing all items necessary to drill pilot hole, and all other incidentals required to complete the work as identified in the Specifications (includes lithologic sampling).

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Item 7. Ream 35-inch dia. borehole (+100 to 280 ft. bls).

Payment will be made at the unit price per linear foot stated in the Bid Form for the item, which shall be full compensation for providing all items necessary to ream the pilot hole, and all other incidentals required to complete the work as identified in the Specifications.

Item 8. Run caliper and Gamma Ray logs (+0 to 280 ft. bls).

The basis of payment will be made on the unit price for the lump sum price for the logging event stated on the Bid Form and shall include all equipment, labor, and materials necessary for performing the caliper and gamma ray logs as identified in the Specifications.

Item 9. Furnish and install 28" dia. steel casing. (+0 to 280 ft. bls).

Payment will be made at the unit price per linear foot stated in the Bid Form for the item, which shall be full compensation for providing all items necessary to install a nominal 28” dia. steel casing pipe, casing shoes, fittings, centralizers and other appurtenances and performing the necessary joining for complete installation of casing pipe and all other incidentals required to complete the work as identified in the Specifications.

Item 10. Furnish and install cement grout seal (+0 to 280 ft. bls).

Payment will be made at the unit price per 94 lb sack stated in the Bid Form for the item, which shall be full compensation for providing all items necessary to cement grout seal casing pipes and all other incidentals required to complete the work as identified in the Specifications.

Item 11. Drill pilot hole in consolidated formation (+280 to 1600 ft. bls).

Payment will be made at the unit price per linear foot stated in the Bid Form for the item, which shall be full compensation for providing all items necessary to drill pilot hole, and all other incidentals required to complete the work as identified in the Specifications (includes lithologic sampling).

Item 12. Ream 27-inch dia. borehole (+280 to 1600 ft. bls).

Payment will be made at the unit price per linear foot stated in the Bid Form for the item, which shall be full compensation for providing all items necessary to ream the pilot hole, and all other incidentals required to complete the work as identified in the Specifications.

Item 13. Run Suite 1 Geophysical Logs (+0 to 1600 ft. bls).

The basis of payment will be made on the unit price for the lump sum price for the logging event stated on the Bid Form and shall include all equipment, labor, and materials necessary for performing the Suite 1 geophysical logs (includes pumping well) as identified in the Specifications (Section 02050 (307) (E)).

Item 14. Furnish and install nominal 16-inch dia. FRP fiberglass casing (+3 to +1600 ft. bls) (Burgess Well company, Inc. or equal).

Payment will be made at the unit price per linear foot stated in the Bid Form for the item, which shall be full compensation for providing all items necessary to install a nominal 16" dia. FRP fiberglass casing pipe, couplings, fittings, centralizers and other appurtenances and performing the necessary joining for complete installation of casing pipe and all other incidentals required to complete the work as identified in the Specifications.

Item 15. Furnish and install Type II cement grout seal (+0 to 1600 ft. bls)

Payment will be made at the unit price per 94 lb sack stated in the Bid Form for the item, which shall be full compensation for providing all items necessary to cement grout seal casing pipes and all other incidentals required to complete the work as identified in the Specifications.

Item 16. Drill pilot hole in consolidated formation (+1600 to 1800 ft. bls).

Payment will be made at the unit price per linear foot stated in the Bid Form for the item, which shall be full compensation for providing all items necessary to drill pilot hole, and all other incidentals required to complete the work as identified in the Specifications (includes lithologic sampling).

Item 17. Set and remove test pump and discharge line.

Payment will be made at the lump sum price, stated in the Bid Form, for installation/removal of the test pump for purposes of well development, flow logging and testing for yield and drawdown. This Item includes installing/removing discharge pipeline, couplings, flow measurement device, engine, motor, drives, controls, fuel tanks, start-up and other appurtenances necessary to install the test pump and make it ready to conduct flow and drawdown tests.

Item 18. Run Suite 1 Geophysical Logs (+1600 to 1800 ft. bls).

The basis of payment will be made on the lump sum price for the logging event stated on the Bid Form and shall include all equipment, labor, and materials necessary for performing the Suite 1 geophysical logs (includes pumping well) as identified in the Specifications (Section 02050 (307) (E)).

Item 19. Run two (2) hour constant rate discharge test (open +1600 to 1800 ft. bls).

CONTRACTOR shall be paid the lump sum price for pump operation during two (2) hour constant rate discharge test and shall include management of discharge water and Consultant assistance.

Item 20. Drill pilot hole in consolidated formation (+1800 to 2600 ft. bls).

Payment will be made at the unit price per linear foot stated in the Bid Form for the item, which shall be full compensation for providing all items necessary to drill pilot hole, and all other incidentals required to complete the work as identified in the Specifications (includes lithologic sampling).

Item 21. Set and remove test pump and discharge line.

Payment will be made at the lump sum price, stated in the Bid Form, for installation/removal of the test pump for purposes of well development, flow logging and testing for yield and drawdown. This Item includes installing/removing discharge pipeline, couplings, flow measurement device, engine, motor, drives, controls, fuel tanks, start-up and other appurtenances necessary to install the test pump and make it ready to conduct flow and drawdown tests. Safely managing the disposal of groundwater water in compliance with specification requirements are to be incidental to this item.

Item 22. Run Suite 1 Geophysical Logs (+1600 to 2600 ft. bls).

The basis of payment will be made on the lump sum price for the logging event stated on the Bid Form and shall include all equipment, labor, and materials necessary for performing the Suite 1 geophysical logs (includes pumping well) as identified in the Specifications (Section 02050 (307) (E)).

Item 23. Straddle packer testing (+1600 to 2600 ft. bls).

The basis of payment will be made on the unit price for each packer test stated in the Bid Form for the item, which shall be full compensation for providing all items necessary for packer testing within the Floridan aquifer system and all other incidentals required to complete the work as identified in the Specifications, including specific capacity testing and water quality sampling assistance. Safely managing the disposal of groundwater water in compliance with specification requirements are to be incidental to this item.

Item 24. Ream 15-inch dia. borehole (+1600 to 2400 ft. bls).

Payment will be made at the unit price per linear foot stated in the Bid Form for the item, which shall be full compensation for providing all items necessary to ream the pilot hole, and all other incidentals required to complete the work as identified in the Specifications.

Item 25. Clean out 10-inch dia. pilot hole (+2400 to 2600 ft. bls).

Payment will be made at the unit price per linear foot stated in the Bid Form for the item, which shall be full compensation for providing all items necessary to clean out cuttings from the pilot hole, using reverse air or other methods and all other incidentals required to complete the work as identified in the Specifications.

Item 26. Furnish and install nominal 4.5-inch dia. FRP fiberglass casing (+3 to +2400 ft. bls) (Burgess Well Company, Inc. or equal).

Payment will be made at the unit price per linear foot stated in the Bid Form for the item, which shall be full compensation for providing all items necessary to install a nominal 4.5” dia. FRP fiberglass casing pipe, couplings, fittings, centralizers and other appurtenances and performing the necessary joining for complete installation of casing pipe and all other incidentals required to complete the work as identified in the Specifications.

Item 27. Furnish and install Type V cement grout seal (+1800 to 2400 ft. bls).

Payment will be made at the unit price per 94 lb. sack of Type V cement stated in the Bid Form for the item, which shall be full compensation for providing all items necessary to cement grout seal casing pipes and all other incidentals required to complete the work as identified in the Specifications.

Item 28. Run cement bond and temperature logs (+1800 to 2400 ft. bls).

The basis of payment will be made on the unit price for the lump sum price for the logging event stated on the Bid Form and shall include all equipment, labor, and materials necessary for performing the caliper log as identified in the Specifications.

Item 29. Set and remove test pump and discharge line.

Payment will be made at the lump sum price, stated in the Bid Form, for installation/removal of the test pump and for purposes of final well development This Item includes installing/removing discharge pipeline, couplings, flow measurement device, engine, motor, drives, controls, fuel tanks,

start-up and other appurtenances necessary to install the test pump and make it ready to conduct flow for well development.

Item 30. Well Development.

Assume each well CL-LFA2A and LFA2B will be pumped for 8 hours each at maximum rates or obtain turbidity < 5 NTU (whichever is first). Safely managing the disposal of groundwater water in compliance with specification requirements are to be incidental to this item.

Item 31. Water Quality Samples in wells CL-LFA2A & LFA2B.

Subsequent to well development, the basis for payment will be made for the lump sum price to collect water samples from well CL-LFA2A and CL-LFA2B, for parameters as identified in the Specifications (Section 02050 (3.09 (A)).

Item 32. Run caliper and video logs in wells CL-LFA2A & LFA2B.

The basis of payment will be made on the unit price for the lump sum price for the logging event stated on the Bid Form and shall include all equipment, labor, and materials necessary for performing the caliper log only in well CL-LFA2B as identified in the Specifications. A visible and clear color video recording of the well shall be made for the full depth of each well CL-LFA2A & LFA2B, as specified herein.

Item 33. Furnish and install protective riser, concrete pad and sampling pumps.

Payment will be made on the basis of the lump sum price for wellhead completion indicated on the Bid Form and shall include all equipment, material, and labor necessary to install the well head riser, a concrete pad, and appurtenances as described in the Specifications and shown in Figure 4. The DISTRICT will provide an aluminum box with locking hinged well cover and lock that the CONTRACTOR shall attach to the top of riser pipe and flange. Two permanent sampling pumps will be installed to sample both CL-LFA2A and LFA2B monitoring zones. The dedicated pump shall be a stainless steel submersible 3-inch diameter Grundfos Pumps, or equal, capable of purging a minimum of 75 gpm. The pump column pipe shall be 2-inch dia. PVC Certa-Lok (or equal).

Item 34. Furnish and install sand and or limerock gravel for cavity fill.

Payment will be made at the unit price per cubic yard stated in the Bid Form for the item, which shall be full compensation for providing all items necessary to install sand or limerock gravel for filling cavities when filling/cementing plugging the annulus and all other incidentals required to complete the work as identified in the Specifications.

Item 35. Install 6-foot chain link fence around well site.

At the conclusion of well construction and testing, the CONTRACTOR shall install a 6-foot chain link fencing topped with 2-feet of barbed wire around all four (4) wells. Install one double swing chain link gate for each fenced area to allow vehicle access. Plant Florida native grasses inside the fenced area around the well pads. The fencing will be of the following approximate dimensions are 25 feet x 65 feet to encompass all wells. The basis of payment will be made on the lump sum price.

Item 36. Contingency.

A contingency of $75,500 is included for unanticipated events during the project. Contingency funds are to be expended only upon written approval from the District.

END OF SECTION

SECTION 01026
MEASUREMENT AND PAYMENT

Phase II-P280 Hydrogeological Investigation of the Lower Floridan Aquifer in Polk County, Florida
Crooked Lake Wellsite

The items listed on this form correspond to the schedules listed in the
Measurement and Payment Section 01026 of the Specifications

LOWER FLORIDAN AQUIFER DUAL ZONE TEST/MONITOR WELL CL-LFA 2A & CL-LFA 2B					
Item No.	Description	Estimated Quantity	Unit	Unit Price	Total Estimated Price
1	Mobilization/demobilization (maximum 5% of total Bid)	1	LS	$ _____	$ _____
2	Provide holding tanks to contain dilute/discharge of brackish groundwater	1	LS	$ _____	$ _____
3	Drilling, furnish and install steel pit casing and cement grout seal (if mud rotary method is used)	1	LS	$ _____	$ _____
4	Furnish and install 36" dia. steel surface casing (+0 to 100 ft. bls)	100	FT	$ _____	$ _____
5	Furnish and install cement grout seal (if mud rotary method is used +0 to 100 ft. bls)	300	SK	$ _____	$ _____
6	Drill pilot hole in unconsolidated formation (+100 to 280 ft. bls)	180	FT	$ _____	$ _____
7	Ream 35-inch dia. borehole (+100 to 280 ft. bls)	180	FT	$ _____	$ _____
8	Run caliper and gamma ray logs (+0 to 280 ft. bls).	1	LS	$ _____	$ _____
9	Furnish and install 28" dia. steel casing. (+0 to 280 ft. bls)	280	LF	$ _____	$ _____
10	Furnish and install cement grout seal (+0 to 280 ft. bls).	850	SK	$ _____	$ _____
11	Drill pilot hole in consolidated formation (+280 to 1600 ft. bls)	1320	FT	$ _____	$ _____
12	Ream nominal 27-inch-dia. borehole from 280 ft. to 1600 ft. bls into top of LFA-2A	1320	FT	$ _____	$ _____
13	Run Suite 1 Geophysical Logs (+0 to 1600 ft. bls)	1	LS	$ _____	$ _____
14	Furnish and install nominal 16-inch dia. FRP fiberglass casing (+3 to +1600 ft. bls)	1603	FT	$ _____	$ _____
15	Furnish and install Type II cement grout seal (+0 to 1600 ft. bls)	4150	SK	$ _____	$ _____
16	Drill pilot hole in consolidated formation (+1600 to 1800 ft. bls).	200	FT	$ _____	$ _____
17	Set and remove test pump and discharge line	1	LS	$ _____	$ _____
18	Run Suite 1 Geophysical Logs (+1600 to 1800 ft. bls)	1	LS	$ _____	$ _____
19	Run two (2) hour constant rate discharge test (open +1600 to 1800 ft. bls)	4	HR	$ _____	$ _____
20	Drill pilot hole in consolidated formation (+1800 to 2600 ft. bls)	800	FT	$ _____	$ _____

LOWER FLORIDAN AQUIFER DUAL ZONE TEST/MONITOR WELL CL-LFA 2A & CL-LFA 2B					
Item No.	Description	Estimated Quantity	Unit	Unit Price	Total Estimated Price
21	Set and remove test pump and discharge line	1	LS	$ _____	$ _____
22	Run Suite 1 Geophysical Logs (+1600 to 2600 ft. bls)	1	LS	$ _____	$ _____
23	Straddle packer testing (+1600 to 2600 ft. bls)	5	EA	$ _____	$ _____
24	Ream 15-inch dia. borehole (+1600 to 2400 ft. bls).	800	FT	$ _____	$ _____
25	Clean out 10-inch dia. pilot hole (+2400 to 2600 ft. bls)	200	FT	$ _____	$ _____
26	Furnish and install nominal 4.5-inch dia. FRP fiberglass casing (+3 to +2400 ft. bls)	2403	FT	$ _____	$ _____
27	Furnish and install Type V cement grout seal (+1800 to 2400 ft. bls)	685	SK	$ _____	$ _____
28	Run cement bond and temperature logs (+1800 to 2400 ft. bls)	1	LS	$ _____	$ _____
29	Set and remove test pump and discharge line	1	LS	$ _____	$ _____
30	Well development	16	HR	$ _____	$ _____
31	Water Quality Samples in wells CL-LFA2A & LFA2B	1	LS	$ _____	$ _____
32	Run caliper and video logs in wells CL-LFA2A & LFA2B	1	LS	$ _____	$ _____
33	Furnish and install protective riser, concrete pad, and sampling pumps	1	LS	$ _____	$ _____
34	Furnish and install sand and or limerock gravel for cavity fill	20	CY	$ _____	$ _____
35	Install 6-foot chain link fence around well site	1	LS	$ _____	$ _____
36	Contingency	1	LS	$75,000.00	$75,000.00

LOWER FLORIDAN AQUIFER DUAL ZONE MONITOR WELL CL-LFA-2A & CL-LFA-2B TOTAL BID $ _____

(Figures)

_____

(Words)

_____

(Contractor Name)

_____

(Contractor Signature)

SECTION 01500

TEMPORARY FACILITIES

1.0 WATER

A. All water required for and in connection with the Work to be performed shall be furnished by and at the expense of CONTRACTOR. CONTRACTOR shall supply all necessary tools, hose, and pipe, or otherwise transport the water to the point of use, and shall make its own arrangements as to the amount of water required and the time when the water will be needed.

B. The CONTRACTOR may use water from the existing Upper Floridan aquifer supply well.

C. No surface water may be used for well construction purposes.

3.0. POWER

The CONTRACTOR is responsible for the provisions required in order to provide temporary power for construction purposes. There is no excess electrical power available at the Crooked Lake Wellsite.

4.0. SANITARY FACILITIES

CONTRACTOR shall furnish temporary sanitary facilities at the Site, as provided herein, for the needs of all construction workers and others performing work or furnishing services on the Project. Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period, and obscured from public view to the greatest practical extent. CONTRACTOR shall enforce the use of such sanitary facilities by all personnel at the Site.

5.0. MAINTENANCE OF TRAFFIC

CONTRACTOR shall conduct its work to interfere as little as possible with vehicular traffic, particularly entering/exiting onto Highway 27. Whenever it is necessary to cross, obstruct, or close roads, driveways, and walks, CONTRACTOR shall provide and maintain suitable and safe bridges, detours, or other temporary expedients for the accommodation of the traffic.

6.0. FENCES

All existing fences affected by the Work shall be maintained by CONTRACTOR until completion of the Work. Fences which interfere with construction operations shall not be relocated or dismantled. Gates shall be kept closed and locked at all times when not in use. Cattle gates located between the US-27 Entry Gate and the fenced Project Area are managed by the cattle lessee and should be left as found.

On completion of the Work, CONTRACTOR shall restore all fences to their original or to a better condition.

7.0. DAMAGE TO EXISTING PROPERTY

CONTRACTOR will be held responsible for any damage to existing structures, Work, materials, or equipment because of his operations and shall repair or replace any damaged structures, Work, materials, or equipment to the satisfaction of, and at no additional cost to, SWFWMD.

CONTRACTOR shall protect all existing structures and property from damage and shall provide bracing, shoring, or other work necessary for such protection.

8.0. DUST CONTROL

CONTRACTOR shall take reasonable measures to prevent unnecessary dust. Earth surfaces subject to dusting shall be kept moist with water. When practicable, dusty materials in piles or in transit shall be covered to prevent blowing dust.

9.0. TEMPORARY DRAINAGE PROVISIONS

CONTRACTOR shall provide for the drainage of storm water and such water as may be applied or discharged on the Site in performance of the Work. Drainage facilities shall be adequate to prevent damage to the Work, the Site, and adjacent property.

Existing drainage channels and conduits shall be cleaned, enlarged, or supplemented as necessary to carry all increased runoff attributable to CONTRACTOR's operations. Dikes shall be constructed as necessary to divert increased runoff from entering adjacent property (except in natural channels), to protect the Work, and to direct water to drainage channels or conduits. Ponding shall be provided as necessary to prevent downstream flooding.

10.0. POLLUTION CONTROL

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

11.0. TREE AND PLANT PROTECTION

All trees and other vegetation which must be removed to perform the Work shall be removed and disposed of by CONTRACTOR; however, no trees or cultured plants shall be unnecessarily removed. All trees and plants not removed shall be protected against injury from construction operations.

12.0. SECURITY

A. CONTRACTOR shall be responsible for protection of the Site, and all Work, materials, equipment, and existing facilities thereon, against vandals and other unauthorized persons.

B. No Claim shall be made against SWFWMD by reason of any act of an employee or trespasser, and CONTRACTOR shall make good all damage to SWFWMD's property resulting from CONTRACTOR's failure to provide security measures as specified.

C. All personnel, CONTRACTOR employees and or SUB-CONTRACTORs passing through the gates shall be subject to background checks to identify any historical crimes dealing with terrorism, sabotage, or other government related illegal activities. Background checks shall be provided by the CONTRACTOR, if requested. The background checks shall include running fingerprints through FDLE to determine nationwide arrest history. If requested, background check information for each personnel shall be submitted to the SWFWMD prior to access to the well site.

D. All deliveries entering the site shall be escorted by CONTRACTOR for the duration of the time on site.

13.0. LOCATION OF STORAGE AREAS

Areas where the CONTRACTOR may store materials used in his operations shall be approved by the GEOLOGIST. Offsite storage arrangements, if allowed, require pre-approval by GEOLOGIST for all materials and equipment not incorporated into the Work but included in Applications for Payment. Such offsite storage arrangements shall be presented in writing and shall afford security and protection that is satisfactory to the GEOLOGIST. Offsite storage facilities shall be accessible to SWFWMD and GEOLOGIST.

14.0. EROSION CONTROL

CONTRACTOR shall prevent erosion of soil on the Site and adjacent property resulting from its construction activities. Effective measures shall be initiated prior to the commencement of clearing, grading, excavation, or other operation that will disturb the natural protection.

Work shall be scheduled to expose areas subject to erosion for the shortest possible time, and natural vegetation shall be preserved to the greatest extent practicable. Temporary storage and construction buildings shall be located, and construction traffic routed, to minimize erosion. Temporary fast-growing vegetation or other suitable ground cover shall be provided as necessary to control runoff.

15.0 NOISE CONTROL

CONTRACTOR shall take reasonable measures to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound levels in the area during working hours. All construction machinery and vehicles shall be equipped with practical sound-muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the Work.

16.0 REMOVAL OF TEMPORARY CONSTRUCTION WHEN NO LONGER NEEDED

When temporary facilities, services, and controls are no longer needed and before the Work is completed, remove the various temporary facilities, services, and controls and legally dispose of them. Portions of the site used for temporary facilities shall be reconditioned and restored to their previous condition.

END OF SECTION

DIVISION 2

SITEWORK

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SECTION 02050

LOWER FLORIDAN AQUIFER DUAL ZONE TEST/MONITOR WELL CL-LFA 2A & 2B

PART I – GENERAL

1.01 SCOPE OF WORK

A. Well CL-LFA 2A & 2B will be constructed as a dual zone monitor well within the Lower Floridan aquifer (LFA) (Figure 3). The long-term purpose of this well is for monitoring water levels and water quality fluctuations. Lithologic cutting samples will be collected during the drilling process. Geophysical logging will be conducted on the pilot hole providing additional hydrogeologic data. Hydraulic and water quality data are collected as the borehole is advanced using straddle packers and pumping tests. Dedicated sampling pumps will be installed to allow for collection of water quality samples.

PART 2 - PRODUCTS

2.01 WELL CASINGS

A. The inner well casing (CL-LFA 2B) shall be new fiberglass pipe manufactured by Burgess Well Company, Inc., or equal, (http://burgesswell.com/375-2/) having perfect roundness and uniform thickness. Well casing shall have 5.25 inches O.D., and a minimum wall thickness of 0.375 inches (4.5-inch I.D.).

B. The middle well casing (CL-LFA 2A) shall be new fiberglass pipe manufactured by Burgess Well Company, Inc., or equal, (http://burgesswell.com/375-2/) having perfect roundness and uniform thickness. The well casing shall have 16.75 inches O.D., and a minimum wall thickness of 0.375 inches (26.0-inch I.D.).

C. The intermediate well casing shall be new black steel pipe having perfect roundness and uniform thickness. Well casing shall have 28 inches O.D., and a minimum wall thickness of 0.375 inches.

D. The surface well casing shall be new black steel pipe having perfect roundness and uniform thickness. Well casing shall have 36 inches O.D., and a minimum wall thickness of 0.375 inches.

E. The pit well casing shall be new black steel pipe having perfect roundness and uniform thickness. Well casing shall have 42 inches O.D., and a minimum wall thickness of 0.375 inches.

F. The well casing shall be as manufactured by U.S. Steel Corporation, or an approved equal. Well casings shall conform to ASTM A53B or API 5L, Grade B, seamless or electric resistance welded, for black steel casing. Copies of the mill certificates shall be submitted by the CONTRACTOR to the SWFWMD/GEOLOGIST for approval prior to shipment of casing to the site.

G. Casing lengths shall be joined watertight so that the resulting joints shall have the same structural integrity as the casing itself. The fiberglass casings shall be joined per the manufacturer's instructions. For black steel casing, the standards of the American Welding Society and AWWA C206 shall apply. Casing ends shall be coupled by field welding and shall be beveled. Should the

joints fail or break, the CONTRACTOR shall be responsible for abandonment, repair or replacement of the well.

2.02 DRILLING FLUID

A. The drilling fluid shall possess such characteristics as are required to adequately maintain the walls of the hole, to prevent caving of the wall as drilling progresses, and to permit recovery of representative samples of cuttings. The fluid shall be consistent with AWWA A100-90 standards.

B. The CONTRACTOR shall provide all materials and equipment for mixing, circulating and testing the drilling fluid and for maintaining its properties. The drilling fluid shall be maintained within limits that allow their complete removal from the well, if necessary, and shall not damage the potential capacity, efficiency, or quality of the well.

C. All additives used to maintain the properties of the drilling fluid shall be approved by the GEOLOGIST and specifically recommended by the manufacturer for use in water well drilling. No additive shall be used which causes persistent bacterial growth in the well and aquifer. Makeup water shall be from an approved source.

2.03 CEMENT GROUT

A. Grout shall be Type II (ASTM C150) neat Portland cement and proportioned in accordance with AWWA A100. The grout mixture may contain up to 6 percent (by volume) of bentonite clay and will be subject to testing at the discretion of the GEOLOGIST. Grout not meeting the specification shall be rejected. The CONTRACTOR shall provide a standard mud balance to measure grout density onsite.

B. Composition of neat cement grout shall consist of 5.2 to 5.5 gallons of water per cubic foot or 94-pound sack of Portland cement or a mixture of 6.0 gallons of water per sack of Portland cement with 3 to 7.5 pounds of Bentonite not to exceed 8 percent by weight.

C. When grouting the 4.5-inch I.D. inner well casing (CL-LFA 2B) the CONTRACTOR shall use high sulfate resistance Type V cement grout (ASTM C150) from 2,400 to 1,800 ft. bls.

2.04 LIMEROCK GRAVEL

A. Limerock gravel aggregate may be used to bridge cavernous/fractured formations to reduce loss of grout as determined by the GEOLOGIST. Prior approval for use of gravel from the FDEP shall be obtained. Gravel aggregate shall be clean, well sorted, and free from organic and other deleterious material, and shall be of virgin origin. Material shall be less than 1/2 -inch in diameter.

2.05 BENTONITE PRODUCTS

A. Bentonite products may be used to bridge cavernous/fractured formations or to backplug boreholes pursuant to Chapter 40D-3, F.A.C., or pursuant to product manufacturer specifications. Barroid Hole Plug or EZ-Seal and Enviroplug brand products may be acceptable as determined by the GEOLOGIST.

a. A Bentonite grout shall consist of a high solid sodium montmorillonite. The grout shall yield solids ranging from 20 to 30 percent, with a minimum density equal to or greater than 9.4 pounds per gallon, and a permeability of approximately 1 x 10-7 centimeters per second or less.

b. Bentonite slurry grout used for sealing purposes is restricted to wells with an outside diameter of five inches or less in diameter nominal size. A formation packer or a five foot neat cement plug must be installed at the casing seat and an upper ten feet of neat cement is required to prevent deterioration of or damage to the bentonite seal.

c. Bentonite grout used for abandonment purposes is not restricted by well size but cannot be used to abandon a dry well and cannot be placed any higher in the well than the height of the static water level. Any unsealed remainder above the height of the static water level must be filled with neat cement. At a minimum, an upper ten feet of neat cement is required to prevent deterioration of or damage to the bentonite seal.

d. Only Bentonite grout approved by the National Sanitation Foundation is allowed on public supply wells or in any identified contamination areas. If artesian flow conditions occur, a neat cement plug shall be installed to stop the flow prior to the use of Bentonite grout. Use of Bentonite grout shall not be allowed in contaminated wells when the contaminants will prevent an adequate seal, or in wells with water quality concentrations exceeding 10,000 milligrams per liter total dissolved solids.

2.06 DISINFECTANT

A. Disinfectant solution shall be prepared for a minimum concentration of 50 mg/L of Sodium Hypochlorite chlorine during final well development.

2.07 GEOPHYSICAL LOGGING

A. Provide continuous-recording geophysical logging equipment capable of logging the total well depth with scale of 1:200 (1 foot on paper = 200 feet of logged depth).

B. Color video logging equipment shall be capable logging the total well depth. During inspection, maintain continuous image on video screen displaying depth of camera below ground surface.

C. Geophysical logging equipment shall be capable of producing logs in a reproducible chart format and in an electronic disk (PDF and LAS formats).

PART 3 – EXECUTION

3.01 BOREHOLE CONSTRUCTION

A. All drilling procedures must comply with all applicable local, state and federal requirements, and be in accordance with the standards of AWWA A100.

B. Well CL-LFA 2A & 2B shall be constructed by a combination of the mud rotary and the reverse air rotary drilling methods. Alternate drilling methods may be proposed by the CONTRACTOR, but are not to be utilized unless prior approval from the GEOLOGIST is provided.

C. Each borehole shall be drilled using clean, uncontaminated equipment in good working order and free from fuel, oil, and hydraulic fluid leaks or discharges. The drill bit, bottom hole assembly, and rod shall be in good condition and appropriate for rapid and correct completion.

D. Drilling fluids shall be contained and recirculated with a closed loop system during mud rotary construction activities. The CONTRACTOR may construct an earthen pit with a plastic liner for use as a mud containment system, if necessary. CONTRACTOR will be responsible for offsite disposal of drilling mud and reclaiming this area upon completion.

E. Drilling fluid shall be prepared using fresh uncontaminated water and approved additives. The flow of water at the site during drilling will be controlled to prevent excessive flooding of the site. At the earliest time possible after the Floridan aquifer has been penetrated, drilling with mud additives will be discontinued and drilling will continue using the reverse air method.

F. Ten inch (10") minimum diameter pilot holes shall be utilized to determine the seating depths of all casing strings.

G. The 10-inch pilot holes will then be reamed out to a diameter so the annular space between the borehole and the casings shall be a minimum of three (3) inches.

3.02 CASING INSTALLATION

A. When the reaming operation has been completed, casing shall be installed. The lengths and intervals of each casing type will be determined by the GEOLOGIST. All casings shall be installed as shown in Figure 3 and in accordance with the Technical Specifications.

B. Once a borehole has been advanced to slightly below the depth at which each casing is to be set, the CONTRACTOR shall perform necessary work to condition the borehole, including as a minimum circulating cuttings out of the borehole.

C. The casings shall be lowered into the borehole open-ended and the weight of the casing shall be supported by the drilling rig. The hook load of the drilling rig must exceed the maximum casing weight to be encountered during the construction of the well. Alternative methods of casing installation may be proposed by the CONTRACTOR by submitting the proposed method to the GEOLOGIST for approval.

D. The casing shall be suspended in tension from the surface by means of a landing clamp. The bottom of the casing shall be at a sufficient distance above the bottom of the reamed hole as to insure that none of the casing will be supported from the bottom of the hole.

E. If the casing cannot be landed in the correct position or at a depth acceptable to the GEOLOGIST, the CONTRACTOR shall construct another well immediately adjacent to the original location and complete this well in accordance with the Contract Documents at no additional cost to the

SWFWMD. The abandoned hole shall be sealed in accordance with all State of Florida regulations at CONTRACTOR's expense.

F. The CONTRACTOR shall lower the steel casings into the hole and hold plumb and center by use of welded steel centralizers. These centralizers will be placed within 5 feet of the bottom and the top of the casing and at approximately 100-foot intervals in between.

G. The FRP fiberglass casing shall be installed in accordance with the manufacturer's instructions. Centralizers (QuickZip or equal) shall be placed between the annulus seal (±1800-2400-feet) and at every 100-foot interval up to surface.

H. Two cement baskets shall be securely fastened at 1 foot and 5 foot from the bottom of the FRP casing.

I. If the casing should collapse for any reason prior to well completion, it shall be withdrawn and replaced at the CONTRACTOR'S expense.

J. The inner casings shall extend 3 feet above land surface.

3.03 WELDING

A. The standards of the American Welding Society, Structural Welding Code (AWS D1.1) shall apply for all welded joint casing and accessories. All welds shall conform to the latest revision of ANSI B31.1. All welded casing joints shall be made by certified welders of the AWS, ASTM, ASME, or approved equal.

B. All casing shall be handled using drilling rig tools that are equipped with a weight indicator. Each casing joint shall be able to support the weight of the casing below. The casing joints shall be made with the casing properly aligned and using casing tabs to insure alignment and sufficient strength at the joint. Each weld shall be made with sufficient tensile strength to support the weight of the casing below and with sufficient burst strength to contain water at a pressure of 300 psi without leaking.

C. Weld reinforcement shall be as specified by the AWS code. Upon completion of welding, all weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance, with uniform weld contours and dimensions.

D. All steel casings in the well shall be centralized in the borehole using strap-type centralizers (or approved equal) installed at intervals along the pipe at 0, 90, 180 and 270 degrees around the casing at each position. The four centralizers spaced at 90 degrees around the casing constitute a centralizer group. These centralizers will be placed within 5 feet of the bottom and the top of the casing the casing strings and at approximately 50-foot intervals in between.

E. All centralizer groups shall be vertically aligned, one above the other in order to permit the passage of tremie pipes alongside the casing to the bottom of the borehole.

F. There shall be a minimum of three (3) weld passes on all pipe. Welded joints shall be allowed to cure for not less than 30 minutes before weld is placed in contact with water.

3.04 GROUTING

A. Well casings shall be grouted in accordance with the Rules of the SWFWMD, Chapter 40D-3, F.A.C.

B. All grouting and sealing of each well shall be performed in the presence of the GEOLOGIST and SWFWMD representative, if available. The grouting shall be done in a manner that the annular space will be filled in a continuous operation. No drilling operations or other work in a well will be permitted until at least 24 hours after grouting the well.

C. The CONTRACTOR shall flush the annular space with drilling fluids or water until clear and free of cuttings prior to the start of well grouting.

D. Before proceeding with placement of the grout, the CONTRACTOR shall secure the GEOLOGIST approval of the proposed method of placement. No method will be approved that does not specify the forcing of grout from the bottom of the space to be grouted towards the surface.

E. The CONTACTOR shall have a cement bond and temperature log performed within the fiberglass casing immediately after grouting between LFA 2 and LFA 2 permeable zones (±1800 to 2400 ft. bls) to confirm the annulus cement seal is satisfactory.

F. The CONTRACTOR shall be responsible for any damage to well casing resulting from cementing operations and for the cost required to correct such damages.

3.05 PUMPING TESTS

A. The CONTRACTOR shall provide an operator during the total duration of all pumping tests conducted as required by the GEOLOGIST to operate the prime mover and to regulate the discharge by the throttling devices during the test pumping period.

B. Provide and install a temporary 1 inch minimum ID pipe to permit installation of a water level measuring device furnished by the GEOLOGIST. The pipe shall terminate approximately 10 feet above the pump and be of sufficient strength to remain open for the duration of each test.

C. The constant rate discharge test shall be conducted on well CL-LFA-2A when the 16-inch casing is installed to ±1600 feet and the 10" borehole is open to ±1800 feet depth. The test will then be performed at a rate up to ±1000 gpm and duration that allows discharge of the brackish water within the storage constraints of the onsite holding tanks (up to 120,000 gallons). A calibrated inline flow meter will be used to measure pumping rate.

D. Water produced during the pumping test shall be piped to the on-site holding tanks for dilution and discharged on the ground or back into the borehole or at a suitable onsite location in accordance with environmental agency regulations. The method of discharge shall not result in washouts, or scouring or turbid water entering any surface water bodies or wetlands. The CONTRACTOR shall be responsible for constructing any necessary discharge baffles or spreading plates filter barriers to discharge the water in accordance with these Specifications.

E. CONTRACTOR shall provide, install and maintain erosion controls as needed and to prevent sediment and turbidity entering surface water bodies. A discharge line of sufficient diameter and

length shall be provided by the CONTRACTOR to convey the water to the approved location in an environmentally safe manner. The CONTRACTOR will be responsible for maintaining the discharge pipe during the test to prevent leaks and or adverse flooding conditions.

3.06 PACKER TESTING

A. The CONTRACTOR shall submit shop drawings and manufacturer's details and specifications of the temporary packer to the GEOLOGIST for approval 10 days prior to use.

B. The CONTRACTOR shall provide and install all materials and equipment necessary for packer testing. Packer shall be capable of being used as a straddle type packer of a diameter capable of sealing the ±10-inch diameter borehole. Furnish all required fittings for running and setting the packer to the maximum depth of the well.

C. Straddle or off bottom packer tests have been budgeted for testing within the LFA to evaluate water quality and specific capacity within 50 to 100-foot intervals to isolate intervals where changes in water quality are observed during drilling in order to characterize the transition zone between freshwater/brackish/saline water within the FAS, to obtain measurements of hydraulic head at different vertical locations for comparison with previous water level measurements and to provide discrete measurements which will allow estimation of any vertical hydraulic gradient that may exist within the aquifer.

D. CONTRACTOR shall provide all appurtenances needed to run the packer tests complete. Equipment shall include a submersible pump (capable of pumping from 100 to 500 gpm at a total head of 150 ft), discharge valve capable of regulating flows from 100 to 500 gpm, and in-line propeller flow meter with totalizer and access for water level measurements.

E. The CONTRACTOR shall be responsible for providing all gauges necessary for testing including a recording pressure system capable of measuring pressure changes of 0.01 psi to measure the drawdown and recovery due to pumping and shall provide access for water-level measurements using an electronic probe, tape or electronic transducer.

F. Run up to six (6) packer tests from the bottom of borehole upwards at intervals selected by the GEOLOGIST based on the geophysical logging results. Set packer assembly to selected depth for testing and open ports between packer at the test interval determined by the ENGINEER. Install submersible pump selected by the GEOLOGIST to a depth of approximately 120 ft below the water level inside the 16-inch casing.

G. Provide a means for the ENGINEER to measure water levels inside the casing and outside or above the packers to detect packer leaks.

H. The CONTRACTOR shall be responsible for re-setting the packer element to prevent leakage and/or malfunctions. In the event of packer failure during performance of the packer test, the CONTRACTOR's cost for re-setting packers and retesting shall be at the CONTRACTOR's expense and will not be paid for separately.

I. After successfully inflating and setting the packers, the CONTRACTOR shall run a preliminary test to confirm that the packer has seated and that all equipment is functioning properly. The

CONTRACTOR shall then develop each zone so that it is free of any drilling fluids/muds and is producing representative formation water to the satisfaction of the GEOLOGIST. The volume of development water purged shall be approximately five volumes of the open borehole space between straddle packers and/or stabilization of the water level and water quality within the well as directed by the GEOLOGIST.

J. Furnish, install, maintain, and operate ±500-ft of temporary discharge piping for the pump unit of sufficient size capable to conduct pumped water to a location determined by the GEOLOGIST. Discharge water will need to be diluted below 250 mg/L chloride concentration using fresh water from existing Upper Floridan aquifer well CL-UFA.

K. After zone development, water level in the well will be monitored (recorded) for at least one hour before each packer test until water levels have returned to near static levels, as judged by the GEOLOGIST.

L. Each packer test will consist of a two-hour specific capacity pumping test and a minimum two-hour recovery test. It is anticipated that rates of between 100 and 500 gpm will be obtained during the packer tests. The water produced during the pumping test and zone development shall be discharged onsite, as directed by the GEOLOGIST.

M. GEOLOGIST may order a change in pumps if the first pump selected does not match the producing capability of the formation being tested. Changing pumps shall be included in the cost of each packer test.

N. The CONTRACTOR shall accommodate water quality sampling by GEOLOGIST and configure a low flow discharge port along the discharge line. The CONTRACTOR shall assist GEOLOGIST with the collection of water quality samples from each packer zone.

O. Remove transducers and submersible pump from the standpipe. The CONTRACTOR shall be responsible for any damage to the transducers that may occur during retrieval.

P. Remove pumping equipment, deflate the packers, reset the upper interval, inflate packers, and repeat packer testing as per above. In case of packer failure, pipe blockage, and/or unsatisfactory performance of the CONTRACTOR'S equipment, the test shall be rerun at no additional cost to SWFWMD.

3.07 GEOPHYSICAL AND VIDEO LOGGING

A. The CONTRACTOR shall subcontract geophysical logging for well CL-LFA 2A & 2B.

B. CONTRACTOR shall assist in the logging operations when needed to set up logging equipment, during the logging, and to disassemble the logging setup.

C. The CONTRACTOR shall be responsible for keeping the borehole open and free of obstructions during geophysical logging, and shall remove any obstruction to the logging tools at his own expense. In the event the logging tools do not reach within 5 feet of the bottom of the hole, as measured with the drill pipe, the CONTRACTOR shall clean the hole to the original drilled depth at his own expense. Standby time necessary to rerun the logs shall not be paid.

D. Geophysical logging shall be performed as identified hereinafter and as determined by the GEOLOGIST. Two (2) field copies of each requested geophysical log shall be provided to the GEOLOGIST by the CONTRACTOR immediately upon the completion of each logging event. Six (6) final copies of each geophysical log, including one (1) reproducible copy, shall be provided to the GEOLOGIST by the CONTRACTOR upon the GEOLOGIST's review of such items as accuracy, scale, reproducibility, etc. Also, provide one compact disk of all logs in PDF and LAS formatted at the completion of the project.

E. CONTRACTOR's Geophysical logger shall run logs on well CL-LFA 2A as listed below:

RUN ID	LOG INTERVALS	BOREHOLE DIAMETER	LOG TYPES
1	0'-270'	35"	Caliper and gamma ray
2	270'-1600'	25"	*Suite 1
3	1600'-1800'	10"	*Suite 1
4	1600'-2600'	10"	*Suite 1
5	1800'-2400'	4.5"	cement bond and temperature log
6	0'-1800'	15"	color video in completed well CL-LFA 2A
7	00'-2600'	4.5"/10"	color video in completed well CL-LFA 2B

*Suite 1 - caliper, natural gamma ray, single point resistance, spontaneous-potential, long and short normal resistivity, dual-induction, and static/dynamic fluid resistivity, temperature, flowmeter, thief sampler, color video survey.

F. CONTRACTOR shall provide, install and maintain any pumps needed for dynamic logging estimated to be up to approximately 500 gpm. CONTRACTOR must set the test pump equipment in the well so that a 4-inch diameter, 6-foot long logging tool can be inserted at the surface and pass the pump and or piping freely.

G. A color TV video recording of both wells CL-LFA 2A & 2B will be made for the full depth upon completion. The CONTRACTOR shall prepare and perform inspection and taping only while water in the well is clear. During inspection, maintain continuous image on video screen. During inspection, display date and numbers indicating depth of camera below top of casing on video monitor. Record numbers with image on video tape. Color video surveys of the borehole shall be recorded on digital video disc (DVD format). CONTRACTOR shall furnish the OWNER with the master disc of all runs and six (6) copies of the survey on CD/DVD.

3.08 WELL DEVELOPMENT

A. The purpose of well development is to remove effectively from the well, walls, and from the formation immediately adjacent to the well, material like drilling mud, clay, fine particles of sand and/or of shell, and any other type of fine materials.

B. The completed wells CL-LFA-2A and CL-LFA-2B shall be developed by surging and interrupted over-pumping. CONTRACTOR may propose an alternative approach to development, subject to review by the onsite GEOLOGIST.

C. The discharge process will be repeated until such time as the well's discharge water is substantially sand free or until discontinued by the onsite GEOLOGIST. Development shall continue until turbidity in the well is below 10 NTU.

D. Disposition of well development water is the responsibility of the CONTRACTOR. All water produced shall be settled of excess solids and conveyed away from the well in an environmentally safe manner as approved by the onsite GEOLOGIST. If any negative impacts occur to these properties as a result of well development, the well development process shall be immediately terminated and alternate arrangements shall be made to the satisfaction of the onsite GEOLOGIST.

3.09 WATER QUALITY SAMPLES

A. Water quality samples shall be collected from the wells CL-LFA-2A and CL-LFA-2B well once development has been completed. The samples shall be analyzed for the list of parameters provided for in Exhibit 1 at the end of the section.

B. The Contractor shall be responsible for coordination with the state-approved analytical laboratory for the delivery of the required sample containers, appropriate storage and delivery of samples to the laboratory, and for all the analytical costs.

3.10 WELL DISINFECTION

A. After well development, both wells CL-LFA-2A and CL-LFA-2B shall be disinfected in accordance with the AWWA C654, latest Edition, including pumping to waste. No bacteriologic testing will be performed.

3.11 WELLHEAD COMPLETION

A. Grout which has overflowed the borehole shall be carefully removed to prevent obstruction during installation of the well pad and protective casing. A protective aluminum riser box with locking lid a concrete well pad and four bollards shall immediately be installed at the newly constructed monitor well, as shown in Figure 4. The protective riser shall be positioned and maintained in a plumb position and shall extend 3-ft above the well pad. A six-inch clearance between the top of the casing and the top of the lid shall be maintained. The SWFWMD will provide a lock for the protective casing.

B. Provide a 4 foot by 4 foot by 6-inch thick diameter concrete pad centered on the well, perpendicular to the protective casing. The SWFWMD will provide a survey marker to be placed in wet cement. Grade around the well so the grassing is flush with the pad and slopes away from the well.

C. Holes for bollards shall be dug using a post hole digger at four corners that are 5 feet apart in a manner that will protect the casing from damage. A 5-foot-long 6-inch diameter PVC pipe shall be placed perpendicular into the hole and filled with clean sand and capped with grout, installed in a concrete-filled hole to a depth of 2 feet bls and extending to 3 feet above land surface. The protective bollards shall be painted with yellow epoxy paint.

D. Permanent sampling pumps will be installed to sample both the CL-LFA2A and CL-LFA2B zones. The dedicated pump shall be a stainless-steel submersible 3-inch diameter Grundfos Pumps, or equal, capable of purging a minimum of 30 gpm.

3.12 WELL ABANDONMENT

A. In the event that the CONTRACTOR fails to complete any well to the depth specified or to such lesser depth as requested by the ENGINEER/ GEOLOGIST due to equipment failure, or fails to set or grout the casing to SWFWMD standards, or must abandon a well because of loss of tools or for any other cause, he shall, if requested by the SWFWMD, plug the well in accordance with, Chapter 40D-3, F.A.C.

B. The well casing of any well to be abandoned may, at the CONTRACTOR's option, be salvaged and become the property of the CONTRACTOR. Such casing shall not be reused without approval by the ENGINEER/ GEOLOGIST.

C. No hourly rate will be paid for pulling casing or reconditioning the open borehole unless the GEOLOGIST directs that the casing be pulled.

D. If the CONTRACTOR must abandon a well through fault of the CONTRACTOR or his employees or SUBCONTRACTORS, costs of drilling and abandonment will be borne by the CONTRACTOR.

EXHIBIT 1
Standard Water Quality Sampling Parameters

Temperature	Turbidity	Manganese (Dissolved)
pH (field)	Total Suspended Solids	Bromide
Conductivity	Silt Density Index	Total Organic Carbon
Sulfate	Hydrogen Sulfide	Color
Chloride	Barium	Nitrate + Nitrite
Dissolved Oxygen	Strontium	Phosphate (Total)
pH (Lab)	Iron (Total)	Ammonium
Total Alkalinity	Iron (Dissolved)	Remaining Primary
Evaporative TDS	Magnesium	Remaining Secondary
Calcium	Potassium	
Sodium	Fluoride	
Silica (Reactive)	Manganese (Total)	

END OF SECTION

FIGURES

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FIGURE 1: HYDROGEOLOGICAL INVESTIGATION OF THE LOWER FLORIDAN AQUIFER

CROOKED LAKE

POLK COUNTY, FLORIDA

Project Work Area

0 0.5 1

Miles

Southwest Florida Water Management District

WATERMATTERS.ORG · (352) 796-7211

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Southwest Florida Water Management District
WATERMATTERS.ORG · 1-800-423-1476

FIGURE 2: PROPOSED CL-LFA 2A&2B
WELL LOCATION
CROOKED LAKE
POLK COUNTY, FLORIDA

Well Alignment Location
Project Work Area

0 100 200
Feet

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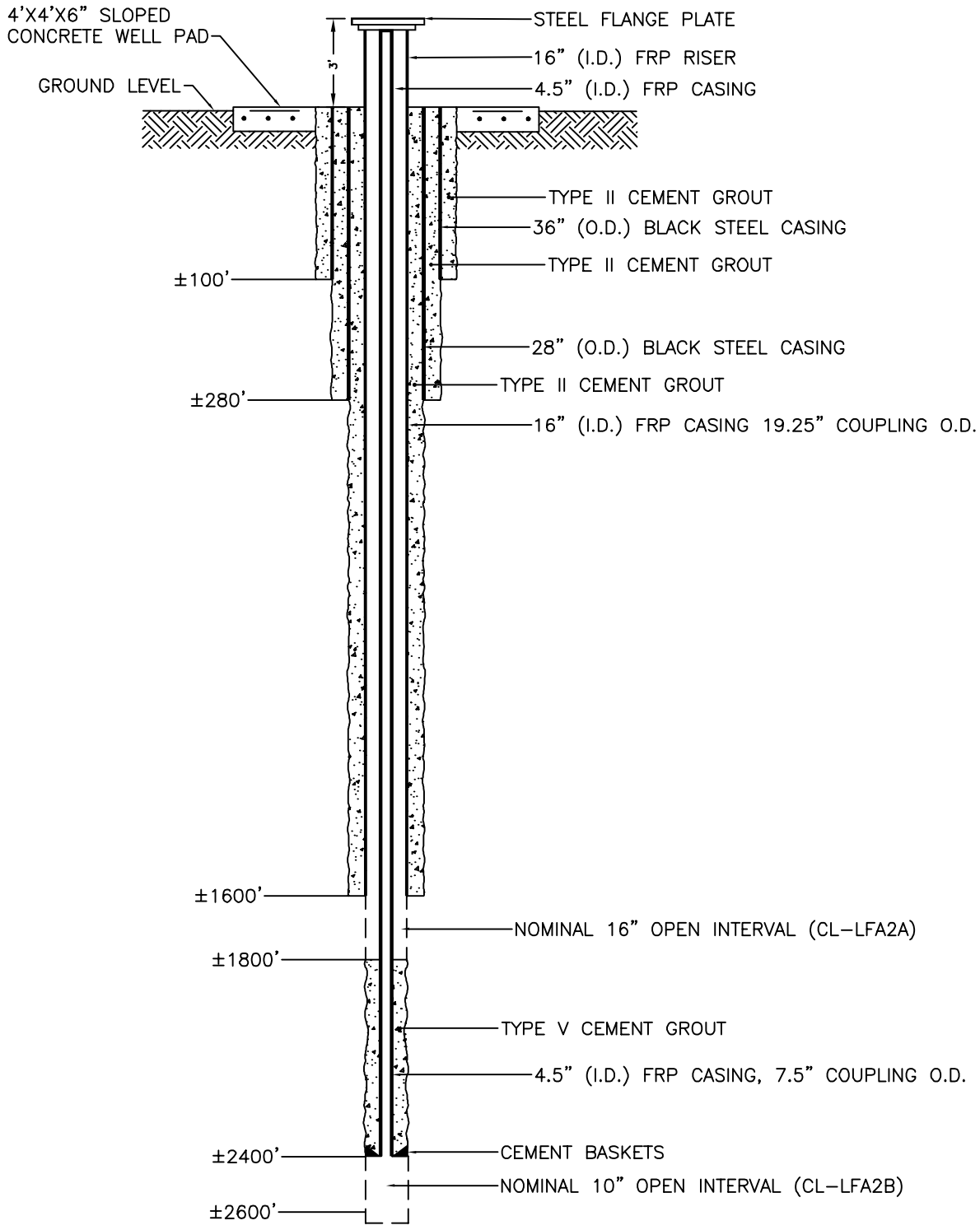

NOT TO SCALE

NOTE: ALL DEPTHS ARE APPROXIMATE AND WILL BE DETERMINED FROM SITE SPECIFC HYDROGEOLOGIC INFORMATION.

PROPOSED DUAL ZONE MONITOR WELL
CROOKED LAKE WELLSITE
POLK COUNTY, FLORIDA

FIGURE 3

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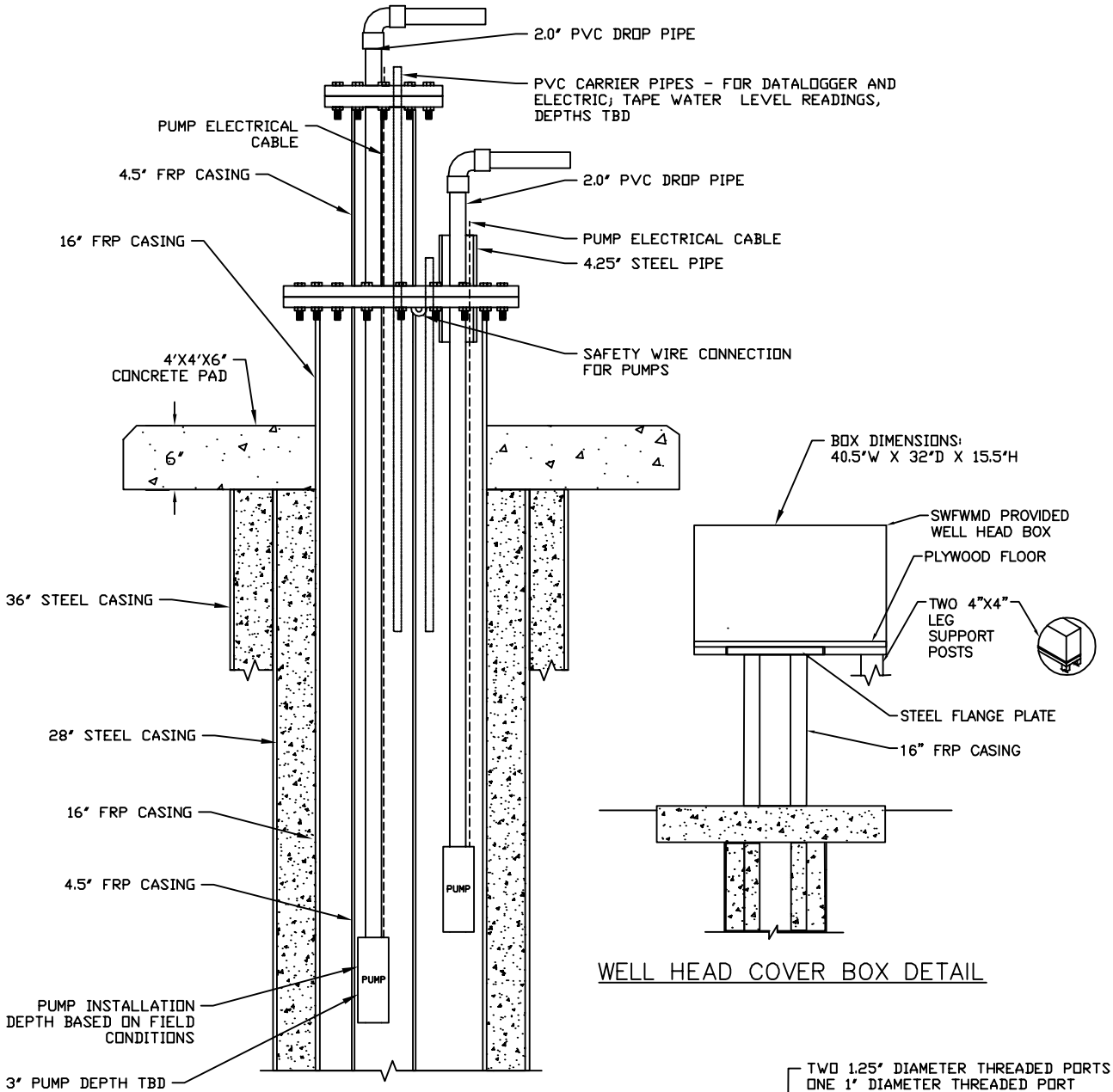
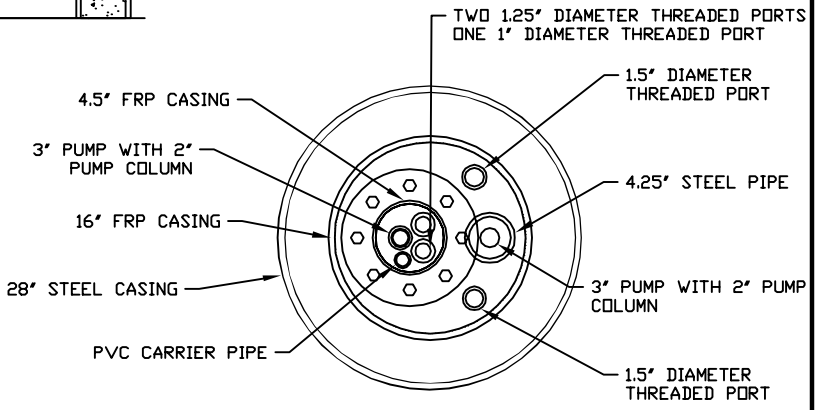


WELL HEAD COVER BOX DETAIL



FLANGE PLATE DETAIL

NOT TO SCALE

PROPOSED DUAL ZONE MONITOR WELL CL-LFA2A & LFA2B
CROOKED LAKE POLK COUNTY, FLORIDA

FIGURE 4

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