

WINTER HAVEN

The Chain of Lakes City

February 9, 2012

Addendum 4

ITB-12-14

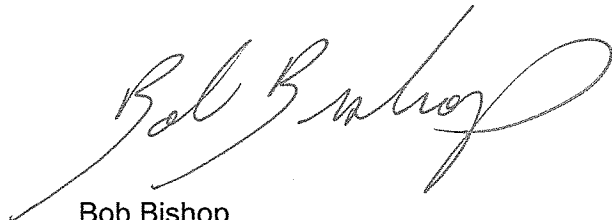
The Invitation To Bid – Winterset Gardens Back-up Well Project, ITB-12-14, is hereby changed by correction of the following:

1. ITB-12-14 Proposal and Bid Form Addendum 4 has been posted on the website.
2. Specification Section 01150 Revised Addendum 4 attached.
3. Specification Section 02050 Revised Addendum 4 attached.
4. Specification Section 02080 Revised Addendum 4 attached.
5. Specification Section 02090 Revised Addendum 4 attached.

All other terms and conditions remain the same.

Sincerely,

CITY OF WINTER HAVEN



Bob Bishop
Procurement Services Division Director

ADDENDUM 4

SECTION 01150

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SCOPE

- A. The scope of this section of the Contract Documents is to further define the items included in each Bid Item in the Bid Form section of the Contract Documents. Payment will be made based on the specified items included in the description in this section for each bid item.
- B. All contract prices included in the Bid Form section will be full compensation for all shop drawings, working drawings, labor, materials, tools, equipment and incidentals necessary to complete the construction as shown on the Drawings and/or as specified in the Contract Documents to be performed under this Contract. Actual quantities of each item bid on a unit price basis will be determined upon completion of the construction in the manner set up for each item in this section of the Specifications. Payment for all items listed in the Bid Form will constitute full compensation for all work shown and/or specified to be performed under this Contract.

1.02 ESTIMATED QUANTITIES

- A. The quantities shown are approximate and are given only as a basis of calculation upon which the award of the Contract is to be made. The OWNER/ENGINEER does not assume any responsibility for the final quantities, nor shall the CONTRACTOR claim misunderstanding because of such estimate of quantities. Final payment will be made only for satisfactorily completed quantity of each item.

1.03 WORK OUTSIDE AUTHORIZED LIMITS

- A. No payment will be made for work constructed outside the authorized limits of work.

1.04 MEASUREMENT STANDARDS

- A. Unless otherwise specified for the particular items involved, all measurements of distance shall be taken horizontally or vertically.

1.05 AREA MEASUREMENTS

- A. In the measurement of items to be paid for on the basis of area of finished work, the lengths and/or widths to be used in the calculations shall be the final dimensions measured along the surface of the completed work within the neat lines shown or designated.

1.06 LUMP SUM ITEMS

- A. Where payment for items is shown to be paid for on a lump sum basis, no separate payment will be made for any item of work required to complete the lump sum items. Lump sum contracts shall be complete, tested and fully operable prior to request for final payment.

1.07 UNIT PRICE ITEM

- A. Separate payment will be made for the items of work described herein and listed on the Bid Form. Any related work not specifically listed, but required for satisfactory completion of the work shall be considered to be included in the scope of the appropriate listed work items.
- B. No separate payment will be made for the following items and the cost of such work shall be included in the applicable pay items of work. Final payments shall not be requested by the CONTRACTOR or made by the OWNER until as-built (record) drawings have been submitted and approved by the ENGINEER.
 - 1. Shop Drawings, Working Drawings.
 - 2. Clearing, grubbing and grading except as hereinafter specified.
 - 3. Trench excavation, including necessary pavement removal and rock removal, except as otherwise specified.
 - 4. Dewatering and disposal of surplus water.
 - 5. Structural fill, backfill, and grading.
 - 6. Replacement of unpaved roadways, and shrubbery plots.
 - 7. Cleanup and miscellaneous work.

8. Foundation and borrow materials, except as hereinafter specified.
9. Testing and placing system in operation.
10. Any material and equipment required to be installed and utilized for the tests.
11. Pipe, structures, pavement replacement, asphalt and shell driveways and/or appurtenances included within the limits of lump sum work, unless otherwise shown.
12. Maintaining the existing quality of service during construction.
13. Maintaining or detouring of traffic.
14. Appurtenant work as required for a complete and operable system.
15. Seeding and hydromulching.
16. As-built Record Drawings.

1.08 BID ITEMS

A. BID ITEM #1 - MOBILIZATION

1. Measurement and payment for this Bid Item shall include full compensation for the required 100 percent (100%) Performance Bond, 100 Percent (100%) Payment Bond, all required insurance for the project, acquisition of all required well construction permits. The following permits are required at a minimum: Southwest Florida Water Management District Well Construction; Polk County Department of Health; and Polk County Building Permit. Mobilization shall also include the transportation and delivery of all required equipment for construction of the well, establishment of temporary sanitary facilities and drinking water, a field office, noise control, and secure storage for required tools and equipment at the site. The CONTRACTOR'S mobilization and demobilization costs as shown in the Bid Form.
2. Payment for mobilization shall not exceed 10 percent (10%) of the total Contract cost unless the CONTRACTOR can prove to the OWNER that his actual mobilization cost exceeds 10 percent (10%).

B. BID ITEM #2 – GENERAL CONDITIONS

1. Payment shall include full compensation for project photographs, as-builts record drawings, project signs, rubbish and spoil removal any and all other items required to complete the project in accordance with Contract Documents.

C. BID ITEM #3 – WELL SURFACE CASING

1. Payment shall be on a linear foot basis for installed 24-inch surface casing and required grouting. Payment shall include all equipment and materials necessary for drilling of pilot hole, testing of hole, geophysical testing, caliper testing, plumbness and alignment testing of casing, and reaming of hole as required to install casing. Please refer to Specifications 02050 and 02080 for specific items included in bid item.

D. BID ITEM #4 – WELL PILOT HOLE

1. Payment shall be on a linear foot basis for all equipment, testing (including lithological), and materials required to drill final pilot hole to depth required for well.

E. BID ITEM #5 – REAMING OF SURFACE CASING PILOT HOLE

1. Payment shall be on a linear foot basis for all equipment, testing (including water), and materials required to ream out surface casing pilot hole to 28-inch to depth required for well.

F. BID ITEM #6 – REAMING OF FINAL CASING PILOT HOLE

1. Payment shall be on a linear foot basis for all equipment, testing (including water), and materials required to ream out final casing pilot hole to 20-inch to depth required for well.

G. BID ITEM #7 – REAMING OF BORE HOLE

1. Payment shall be on a linear foot basis for all equipment, testing (including water), and materials required to ream out final bore hole to 15-inch to depth required for well.

H. BID ITEM #8 – FINAL 16-INCH CASING

1. Payment shall be on a linear foot basis for installed 16-inch final casing and required grouting. Payment shall include all equipment and materials necessary for testing of hole, geophysical testing, caliper testing, plumbness and alignment testing of casing as required to install casing. Please refer to Specifications 02050 and 02080 for specific items included in bid item.

I. BID ITEM #9 – TESTING OF WELL

1. Payment shall be on a lump sum basis for testing of completed well as defined in Specification 02050. Testing shall include two sets of primary and secondary samples, well development testing, and well flow, step draw down, constant rate, flow meter survey, and video survey log of well.

J. BID ITEM #10 – MECHANICAL / STRUCTURAL / CIVIL / ELECTRICAL WORK

1. Payment for all work included under this Bid Item shall represent full compensation in accordance with the lump sum price bid for supply and installation of a 60 hp vertical turbine well pump, underground piping, electrical/instrumentation and all other labor, materials and equipment required to perform all the work as shown on the Contract Drawings and specified herein and any other miscellaneous work not specifically included for payment under other Bid Items obviously necessary to complete the Contract, ready for approval by the ENGINEER and acceptance by the OWNER.
2. Measurement for periodic payments of this lump sum bid item will be in accordance with the approved Schedule of Values, to be supplied by the CONTRACTOR in accordance with the Contract Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTIONS (NOT USED)

END OF SECTION

ADDENDUM 4

SECTION 02050

DRILLING

PART 1 GENERAL

1.01 Scope of Work

- A. Work included in this section includes all equipment, personnel and materials to complete conventional mud rotary or reverse circulation rotary drilling in which uncased wall of the drill hole is held in place at all times with circulating fluid. Also included are associated testing operations as specified in these documents and as shown on the Drawings.
- B. The work described herein consists of drilling and testing one 16-inch diameter Upper Floridan aquifer (UFA) back-up production well in accordance with these specifications in the location using only accepted industry standards, procedures and materials. Provide drilling unit, tools, accessories, power, lighting, experienced personnel and other equipment necessary to perform an efficient drilling operation at the site.
- C. Work shall include the Southwest Florida Water Management District application for well construction and required NPDES construction permitting for discharge of groundwater generated during construction. Work shall not commence until it is confirmed that all required permits, include the Polk County Health Department, are in place and in good standing.

PART 2 PRODUCTS

2.01 Personnel

- A. The CONTRACTOR shall furnish capable personnel including skilled and experienced drillers and an adequate number of competent helpers to construct and test the well as specified.

2.02 Equipment

- A. The CONTRACTOR shall provide appropriate drilling equipment capable of drilling boreholes and completing the wells as specified.
- B. Only mud rotary and reverse circulation rotary drilling techniques will be utilized for the well construction.

- C. The CONTRACTOR shall provide use to the ENGINEER two 50 psi pressure transducers with level indicators and an on-board data logging function with a minimum of 200 feet of cable capable of indicating changes in water level to the nearest 0.1 foot.

2.03 Drilling Fluids

- A. The ENGINEER, prior to use, must approve drilling fluids used during all drilling operations. Any water used during the drilling operation or cementing operations must be potable water. The CONTRACTOR shall make arrangements to secure the volume of potable water required to complete the work.
- B. Use only fresh potable water in the drilling fluids. Biodegradeable muds will not be allowed in drilling. If additives are required, CONTRACTOR must maintain a qualified mud or field engineer, with a minimum of five (5) years of experience in well drilling, onsite during the drilling operation.
- C. When drilling mud is used in drilling, only high-grade approved clays in common usage for oil field drilling shall be used in the makeup of the drilling fluid. Drilling additives are to be NSF approved for use in a potable water, public supply well. Drilling with a mixture of water and unprocessed mud, clay, or other objectionable material will not be permitted. The drilling fluid shall possess such characteristics as are required to adequately condition the walls of the hole to prevent caving of the walls as drilling progresses.
- D. Mud weights shall be maintained between 8.75 and 9.3 lb/gal during mud rotary drilling, with mud viscosity determined using a Marsh funnel. Mud weight and viscosity to be determined at least 3 times daily during use and shall be recorded in driller's logs.
- E. Record depths at which changes in mud makeup were required, and indicate the variation in logs. This would include the amount of clays or chemical additives utilized to condition all drilling fluids.
- F. Drilling fluids and cuttings are to be disposed of at CONTRACTOR's expense, with the value paid for as part of demobilization.

PART 3 EXECUTION

3.01 General

- A. The CONTRACTOR will notify the ENGINEER five (5) days prior to initiating drilling operations.

- B. The CONTRACTOR will coordinate all drilling and testing activities with the ENGINEER in advance.
- C. No drilling operations will be allowed until the CONTRACTOR has provided all of the necessary permits (Federal, State and Local) to the ENGINEER.
- D. All drilling operations will be in strict conformance with all Federal, State and local laws regulating the drilling of water wells.
- E. The CONTRACTOR will take all necessary precautions to prevent contamination of the well during the course of drilling activities. All extraneous fluids on-site and fluids generated during drilling operations will be controlled at all times.
- F. The boreholes shall be drilled so as to permit the installation of the casing, straight and plumb, to the tolerances specified in Section 02080 CASING.
- G. The boreholes for the back-up production well shall be drilled at the approximate locations shown on the drawings.
- H. All drilling will be measured to the nearest linear foot of completed borehole depth below land surface (bls). Confirmation of well depth will be facilitated with direct measurements utilizing geophysical logging equipment noted in Section 4.02.
- I. The CONTRACTOR shall measure and record the water level in a well to the nearest 0.01 of a foot from a permanent measuring point at the beginning and end of each shift.
- J. To ensure the alignment of the well is within requirements, CONTRACTOR shall supply and utilize a self-checking mechanical drift indicator measuring the borehole deflection. A three degree unit shall be used with the indicator and the survey record shall be capable of reading to the nearest 0.1 degree. The maximum allowable deviation from vertical in the pilot hole shall be 0.5 degree. Perform drift surveys at intervals not greater than 50 feet. Survey results should be supplied to the ENGINEER at the time each is complete. Where borehole does not meet specifications, deviations shall be corrected immediately.
- K. INITIAL EXPLORATORY DRILLING-The CONTRACTOR shall collect continuous split barrel samples in accordance with ASTM standard D1586-99 from land surface to the top of the UFA at an estimated depth of 150 feet bls during drilling of the back-up production well. The CONTRACTOR shall place

each sample in a container (sample bag) labeled with the date, well identification, and depth interval from which the sample was collected.

- L. FORMATION SAMPLES OPEN-HOLE INTERVAL-A set of representative formation samples shall be collected by the CONTRACTOR during drilling of the back-up production well at 5-foot depth intervals and at major lithologic contacts from approximately 150 to 740 feet bls. Each sample must be representative of the actual depth to which drilling has progressed. Samples shall be approximately 1 cup in volume. Place each sample in a container (sample bag) labeled with the date, well identification, and depth interval from which the sample was collected. Submit the samples immediately to the ENGINEER as the samples are collected.
- M. Prepare a complete lithologic drilling log each day and furnish to the ENGINEER within 24 hours of the end of each shift.
- N. Take a composite representative formation water sample at the end of the drill pipe length daily during reverse air open circulation drilling operations. Determine field parameters including temperature, pH, and conductivity (uS/cm) using a multi-parameter water quality probe. Results shall be presented in the daily drilling logs.
- O. The CONTRACTOR shall ship, at his expense, the second set of formation samples collected from back-up production well and the necessary well completion forms to the State Geologist at the Florida Geological Survey, 903 West Tennessee St., Tallahassee, Florida, 32304. Additional copies of the well completion forms shall be provided to the ENGINEER.
- P. The CONTRACTOR is responsible for filing all drilling and well completion records with the appropriate agencies.

3.02 Drilling

- A. Install a nominal 16-inch diameter steel casing to approximately 150 feet bls in accordance with Section 02080 CASING and Section 02090 GROUT. Formation samples will be collected at 5-foot intervals and at major lithologic changes. The method of installation is at the discretion of the CONTRACTOR. The CONTRACTOR will utilize the initial SPT exploratory borehole, reamed-to-depth to install the pit and conductor casing. The borehole will be reamed using the appropriate bits, stabilizers and/or drilling collar combinations to accommodate the final casing string. It is the CONTRACTOR'S responsibility to select the appropriate drilling tools to facilitate the placement of the casing string. The CONTRACTOR will install the production casing immediately into or above

the UFA and as such, the completion depth will be determined based on the visual observation of formation samples acquired as part of the initial exploratory drilling and reaming operations noted in Section 3.01 K, L and 3.02 D.

- B. No drilling shall occur before 7 a.m. or after 7 p.m.
- C. PIT-CASING. The CONTRACTOR may elect to install a pit/work casing to facilitate the placement of the final production casing (i.e., 16-inch steel). The CONTRACTOR will select an appropriately sized casing to accommodate a minimum of a 2-inch cement annulus between the production casing and inner diameter of the pit/work casing.
- D. Ream initial exploratory borehole to a nominal 28-inch diameter, approximately 40 feet bls. Condition borehole through circulation of drilling fluids in preparation for well casing installation. 24-inch diameter casing will be installed with a 2-inch cement annulus between the production casing and inner diameter of the pit/work casing.

Subsequent to the placement of the pit/work casing, the borehole will be reamed using an 8 to 10 inch bit to the initial exploratory drilling depth of 150-ft bls. This phase of drilling is required in order to reopen the SPT borehole and remove cuttings from shallower depths. Upon completion of the initial reaming operations, the CONTRACTOR will collect samples as directed by the ENGINEER until the top of the UFA is encountered (~150 ft bls). As before, formation samples will be collected at discrete intervals of 5-ft. The CONTRACTOR will select the smallest diameter tooling as practicable to accommodate the collection of representative formation samples while maintaining circulation and eventual placement of the production casing. It is anticipated that the exploratory borehole will be terminated at or within the top of the UFA and will be visually confirmed based on cuttings samples acquired during the reaming of the pilot-hole.

- E. Ream pilot hole to in Section 3.02 E to a nominal 20-inch diameter to the base of the Intermediate Confining Unit (ICU) top of the UFA (approximately 150 feet bls). Condition borehole through circulation of drilling fluids in preparation for well casing installation.
- F. Following completion of grouting of nominal 16-inch diameter casing, drill nominal 8 to 10-inch diameter pilot hole to approximately 740 feet bls. Collect representative formation samples at 5-foot intervals and at major lithologic changes. Begin water quality sampling on 50 foot intervals below the terminus of the production casing. Reverse circulation discharge will be monitored for specific field parameters; fluid conductivity, pH, and temperature.

- G. Ream the 8 to 10-inch diameter pilot hole to a nominal 15-inch diameter to approximately 740 feet bls. The CONTRACTOR will continue to circulate during reverse-air drilling operations at every drill pipe connection. The process will consist of drilling to the maximum depth of the tooling while rotating and circulating until the RA discharge is free of sediment (i.e., turbidity), tripping up-hole to the prior connection interval and continue circulation and rotation. The RA discharge will be monitored for sediment, cutting discharges. Once the borehole pumps clear, the tooling will be rotated and circulated to the bottom of the hole and then drilling operations will cease. The CONTRACTOR will then connect an additional length of drill-pipe to continue drilling and/or reaming operations. This process will be repeated until the terminus of the borehole as directed by the ENGINEER.
- H. Upon testing of water quality, it may be necessary to plug pilot hole or bore hole to a determined depth to prevent poor quality water from entering well. Plug shall be installed by using a tremie grouting (bottom-up) method to a depth determined by the ENGINEER.

3.03 Hazardous Materials

- A. CONTRACTOR shall submit any material they suspect of being contaminated due to ambient site conditions to a state certified laboratory for analysis. OWNER will dispose of any sample which contains levels of contaminants in excess of federal and state disposal standards.
- B. Hazardous materials generated by CONTRACTOR during the course of work caused by negligence or equipment in the control of the CONTRACTOR (e.g., oil and/or hydraulic spills or leaks) shall be cleaned, removed, and properly disposed of at the sole cost of the CONTRACTOR. The OWNER reserves the right to request CONTRACTOR to send materials suspected of contamination due to CONTRACTOR negligence to a state-certified laboratory for analysis. The sample is to be analyzed by approved state and/or federal methods to determine if the sample contains hazardous materials. Additional testing may be requested by the OWNER if the methods requested by the CONTRACTOR are insufficient to determine the types of potentially hazardous materials. Perform tests within 24 working hours of suspected contamination. Dispose of any sample which contains levels of contaminants in excess of state or federal disposal standards in accordance with applicable federal and state laws within 48 working hours of receiving test results. This will include preparation of a hazardous materials disposal manifest by the CONTRACTOR, and the CONTRACTOR, not the OWNER, shall be listed as the generator of the hazardous waste on all manifests. The CONTRACTOR shall provide the OWNER with a copy of the initial manifest and the final -manifest received at the disposal site.

3.04 Baker Tanks

- A. Utilize as minimum of two 20,000 gallon Baker tanks for the retention of fluids generated during construction prior to the disposal of the fluids. Disposal shall be in accordance with the NPDES construction permit requirements.
- B. Tanks shall be joined to allow fluids to slowly fill all tanks at one time to minimize disturbance and maximize detention time.
- C. Fluids that can be treated to meet NPDSE requirements can be disposed of via storm drainage, if allowable. Otherwise fluids are to be disposed of at CONTRACTOR's expense.
- D. Water generated from initial well development of well shall be run through Baker tanks prior to disposal. Hay bales, silt fencing, and sandbags may be required to filter water to meet discharge quality. The costs for these items shall be considered to be part of mobilization and incidental to the work.

3.05 Drill Cutting Stockpile

- A. Storage and disposal of drill cuttings and fluids shall be the responsibility of the CONTRACTOR. Temporarily store well cuttings generated by the shale shaker and cleaned from the holding tanks on minimum 4-mil-thick plastic sheeting and bermed around the outside to prevent spillover. Decant or pump off any free liquid back into the mud tank or other holding tank that accumulates on the plastic sheeting. The size and location of the temporary drill cutting stockpiles at the well site shall be reviewed by the OWNER or the ENGINEER prior to commencement of the work. At the completion of the project, all cuttings and drilling fluids shall be removed and disposed of by the CONTRACTOR at their expense.

PART 4 TESTING

4.01 Laboratory

- A. The CONTRACTOR shall provide experienced personnel that are to collect water samples in accordance with applicable Florida Department of Environmental Protection (FDEP) Standard Operating Procedures (SOPs) per FDEP quality Assurance Rules, 62-160 of the Florida Administrative Code (F.A.C).
- B. The CONTRACTOR shall provide the services of an environmental testing laboratory to analyze water samples. The laboratory must be certified by the Florida Department of Health Environmental Lab Certification Program in accordance with Chapter 62-160.300, F.A.C.

- C. The CONTRACTOR shall budget for two sets of tests for all primary and secondary drinking water standards, as determined by 62-550.310 and 62-550.320, and as further defined in 62-520 F.A.C. Timing of tests shall be such that the results of the second test can be used for clearance of the Polk County Health Department permit.

4.02 Geophysical Logging and Caliper Survey

- A. Geophysical logging and testing shall be conducted by a firm retained by the CONTRACTOR at the appropriate phase of drilling. Logging shall be performed in the presence of the ENGINEER and/or the OWNER. Geophysical logging requirements will vary and are dependent on the condition of the borehole. Generally, the tooling selected will depend on the presence or absence of steel casing (i.e., a conductive material) as well as the presence of drilling fluids (i.e., mud within the borehole prior to casing cementing operations). The CONTRACTOR will provide tooling and/or services to run the following geophysical logs.
 - 1. Natural gamma ray—response recorded in American Petroleum Institute (API) units.
 - i. Geophysical logging at a horizontal scale of 20 mV/inch. Shallow resistivity trace of 0.2 to 2000 ohm-meter log scale.
 - ii. Gamma ray recording at a horizontal scale of 40 api gamma ray units/inch. Acoustic velocity at a horizontal scale of 20 uSec/foot/in. The trace shall be made for each log at 20 feet/inch.
 - iii. Test uphole for gamma ray log.
 - 2. 4-arm caliper-capable of measuring up to 36 inches in diameter.
 - i. To be run prior to each casing run to provide accurate estimates of seal material needed for installed casing during cementing.
- B. It is anticipated that there will be three distinct phases of geophysical logging that will be characterized as;
 - 1. Phase I – land surface to ~150 feet bls within the reamed hole, annulus section between the pit casing and 16-inch steel production casing (i.e., mudded hole).
 - i. 4-arm caliper and natural gamma ray
 - ii. The contractor will run the natural gamma ray tool first immediately followed by the 4-arm caliper.
 - iii. Results from the 4-arm caliper will be utilized to calculate cement volumes to backfill the annular section.
 - 2. Phase II - ~150-740 ft bls reamed hole below the SPT exploratory borehole, production casing noted in Section 3.01 E above.

3. Natural gamma ray—response recorded in American Petroleum Institute (API) units.
 - i. Geophysical logging at a horizontal scale of 20 mV/inch. Shallow resistivity trace of 0.2 to 2000 ohm-meter log scale.
 - ii. Gamma ray recording at a horizontal scale of 40 api gamma ray units/inch. Acoustic velocity at a horizontal scale of 20 uSec/foot/in. The trace shall be made for each log at 20 feet/inch.
 - iii. Test uphole for gamma ray log.
 4. 4-arm caliper-capable of measuring up to 36 inches in diameter.
 - i. To be run prior to each casing run to provide accurate estimates of seal material needed for installed casing during cementing.
 5. Dual induction, laterolog, and spontaneous potential
 6. Flowmeter—impeller type
 7. Fluid resistivity—(0.1 to 100 ohm-m)
- C. If at any time there is indication from information developed during drilling or testing that the completion of the well will not result in a functional well, as required by all regulatory agencies, the OWNER reserves the right to terminate all further work at the site. In the event a termination of work is required CONTRACTOR will be paid for the value of work performed to date based on the unit prices indicated in the bid schedule.
- D. Payment for caliper surveys and natural gamma logging conducted shall be a portion of the individual casing install costs, and shall be paid for a in linear foot basis. If the caliper surveys indicate the hold to be $\frac{3}{4}$ inch below the specified diameter at any point or the hold is less than the specified depth, the hole shall be rereamed or redrilled and resurveyed.
- E. There shall be no additional payment for rig, idle, or standby time during the tests, including retests that may be required due to an error in an earlier test. The time in which no additional payment is made shall extend to 24 hours beyond the point when the ENGINEER receives copies of the logs to provide sufficient time for determining if there was an error in the testing.
- F. Provide two copies of each geophysical log and caliper survey to the ENGINEER and/or OWNER at the time of the testing. Ten additional final paper reports shall be submitted to the ENGINEER within 5 days of the logs. The time and type of logs run should be noted on the CONTRACTOR daily logs, which should be submitted to the OWNER at the completion of the project. Furthermore, the CONTRACTOR will provide electronic records of all geophysical logs to include, raw digital records from the logging equipment as well as formatted ascii text files that are suitable for additional post-processing as needed. These text files will contain sufficient depth as well as, tool measurement information in

order to post-process the data. All output records will be required in 0.10 ft bepth increments or less.

- G. Logging speed shall not exceed 30 feet per minute. Unusable logs or inaccurate logs, as determined by the ENGINEER or OWNER shall be relogged at no additional cost to the OWNER or ENGINEER.
- H. Lost time or materials for lost tools shall not be reimbursable by the OWNER.

4.03 Alignment Testing

- A. The straightness of the well casing shall be “dummy tested” by lowering a 40-foot long “dummy” section into the well. The outer diameter of the section shall be ½ inch less than the inside diameter of the well casing. The dummy shall consist of heavy gauge pipe with three rings rigidly fixed to the pipe to prevent the rings from moving lengthwise along the section of pipe. The rings shall consist of a material such that they will not harm the internal well casing.
- B. The dummy section shall be lowered through the casing to a depth of at least 120 feet. If the dummy fails to move freely throughout this entire length or if the deviation from the vertical is greater than 0.5 degree, the CONTRACTOR shall make corrective actions at no additional cost to OWNER.
- C. A plumbness and alignment survey shall be run be a firm retained by the CONTRACTOR. The internal 16-inch diameter well casing shall be tested using a gyroscopic probe. The probe shall measure borehole inclination and borehole azimuth at maximum of 20-foot depth intervals. Maximum horizontal deviation from vertical of the finished well shall not exceed the lesser of the two: 2/3 of the inside diameter of the well /100 feet of depth; and the distance between the actual well centerline and a straight line representing the proposed well pump centerline shall not exceed ½ of the difference between the inside diameter of the casing and outside diameter of the proposed 12-inch pump bowl. CONTRACTOR shall demonstrate plumbness and alignment per specifications.
- D. Probe shall be capable of measuring to bottom of proposed 16-inch casing.
- E. Accuracy of azimuth shall be +/- 2%.
- F. Accuracy of inclination shall be +/- 0.25%.
- G. The contractor shall guarantee that the well shall be sufficiently plumb and free from obstructions to facilitate the installation of a vertical turbine well pump installed to a depth of at least 116 feet bls as shown in the plans.

- H. Tests shall be performed in the presence of ENGINEER with the option of allowing OWNER to attend.

4.04 Well Development

- A. The well must be developed by surging and pumping.
- B. For surge development, the development of the well shall begin be gently surging in the blank casing above the open borehole while simultaneously air-lift pumping. Surging and air-lift pumping shall continue downward in the well, to the lowermost part of the open borehole and shall continue until no appreciable quantity of sand, mud, or other various materials is brought into the well. Upon approval by ENGINEER, surge block and air lines shall be removed and foreign material remaining shall be removed by bailing.
- C. As an option to further develop the well, prior to the commencement of well pumping development and as determined by the ENGINEER, by 24 hours, CONTRACTOR shall inject a solution of 32% hydrochloric acid with inhibitor into the well followed by a water flush. Well shall be undisturbed for 24 hours after injection and water flush.
- D. Development of pumping shall begin with the rate of water being pumped at 500 gpm and gradually increased to a maximum of 2500 gpm as the water clears.
 - a. A centrifugal sand separator shall be used for measuring the amount of sand produced during pumping.
 - b. Test pump supplied shall be capable have variable speed prime mover. If an engine is used, appropriate exhaust silencer shall be used. Pump shall be capable of pumping up to 2500 gpm with the bowl setting at approximately 120 feet below land surface. Throttling device must be supplied to allow reduced flow to 500 gpm.
- E. Every 8 to 12 minutes of pumping, the well pump should be stopped to allow the water to flow back through the pump bowls and through the open borehole section. This procedure with increasing pumping rates shall be repeated as development of the well continues and shall be done in a manner satisfactory to the ENGINEER.
- F. Continue development of the well until the well produces not more than 5 mg/l of sand by volume within 60 minutes after pumping at a rate specified by ENGINEER, currently defined as 2500 gpm and until specific capacity remains stable (i.e. drawdown) after pumping and surging at 2500 gpm or until discontinued at the request of the ENGINEER.

- G. Development shall continue until turbidity of well is below 5 NTU and sand volume collected is less than that specified above.
- H. If there is an indication of a possible collapse of the open hole section of the well during the development of the well, report the occurrence to the ENGINEER and OWNER immediately.

4.05 Well Flow, Step Drawdown, and Constant Rate Tests

- A. Qualified personnel must be onsite on a 24-hour/day basis during step tests and drawdown tests.
- B. Location of water discharge shall be determined by the CONTRACTOR before testing begins, and confirmed with OWNER. Confirmation with OWNER does not preclude CONTRACTOR from following NPDES permit requirements.
- C. Well pumping tests, i.e. step test and constant rate tests, shall not be completed until after well development is complete.
- D. Testing must be scheduled well in advance to allow attendance of ENGINEER and OWNER for witnessing.
- E. A discharge line having a capacity of 2500 gpm must be used, along with a calibrated inline flow meter with a totalizer. Appropriate literature indicating calibration date shall be provided, in addition to an orifice weir and plates to confirm discharge rates.
- F. Step drawdown test shall occur before constant rate test. Step test shall consist of pumping at a rate of approximately 500 gpm, increasing at a rate of approximately 500 gpm intervals at uniform one-hour increments up to a final pumping rate of 2500 gpm. During the testing, the CONTRACTOR shall utilize transducers as defined in 2.02(C) for logging levels, and a flow meter shall be utilized to measure discharge rate, and rate of sand production.
- G. When the step drawdown test is complete and the pump stopped, the ENGINEER and CONTRACTOR will measure the water level (i.e. recovery) in the well for a period of 6 hours at 15 minute intervals.
- H. The long term constant rate test shall commence not less than 24 hours and not more than 48 hours after the step drawdown test is complete. The rate of pumping shall be determined by the ENGINEER, preliminarily set at approximately 1635 gpm but may be altered depending on step down testing results.

- I. CONTRACTOR to ensure that pumping rate remains constant during long term testing for the duration of the test, set to be 24 hours unless modified by the ENGINEER and OWNER.
- J. When the constant rate test is complete, ENGINEER and CONTRACTOR shall measure the water level in the well (i.e. recovery) for a period of 12 hours at 15 minute intervals.
- K. If at any time during the constant rate test the discharge rate changes by greater than 5% for 15 minutes or more, the test shall be discontinued and restarted after the well recovers and stabilizes at or near the starting water level, as determined by measuring the static water level every 15 minutes after stopping pumping. No payment shall be made for an incomplete test.
- L. When complete with constant rate test, test pump and appurtenances shall be removed along with debris, accumulated sediment, and foreign materials from the well. Demonstration that the well has been cleaned by measuring depth of well in presence of ENGINEER and/or OWNER.

4.06 Flow Meter Survey

- A. Following constant rate test, and cleaning of foreign materials from well, run a vertical spinner flow meter survey.
- B. The test pump shall be reinstalled, along with flow meter equipment. The meter shall be calibrated within the uppermost and lowermost blank sections of 16-inch internal casing.
- C. Flow meter survey shall be performed only in section of well below test pump bowl setting. Survey shall be run at a constant discharge rate determined by ENGINEER, preliminarily set at 1635 gpm but may be altered. Static and dynamic test shall be performed. Static test shall consist of two-minute readings made at increments as determined by ENGINEER, with a maximum of 25 counts. The dynamic test shall consist of three down runs at varying line speed per test. The line speed will be selected in consultation with CONTRACTOR and ENGINEER. The survey record shall consist of either meter speed or percentage of meter speed with depth.
- D. No additional payment will be provided for flow meter survey, including standby, idle or rig time. Payment for the survey shall be through well testing, constant rate and step test.

4.07 Video Survey of Well

- A. A color video survey shall be provided over the full depth of the well. The survey shall be run by a subcontractor retained by the CONTRACTOR and approved by ENGINEER.
- B. Six digital video discs of the survey shall be provided the ENGINEER within 48 hours of the time of the survey.
- C. Payment of survey shall be a lump sum. No additional payment will be provided for standby, idle or rig time required before, during, or after well video survey.
- D. Survey shall be continuous, from top of casing to bottom of open borehole. Survey shall indicate depth (bls) of camera continuous on video.
- E. Camera equipment shall be equipped with centralizers. Recording equipment shall consist of two on-board color cameras, one for down-hole and one for side viewing. Down hole camera shall have a minimum lens of 3.0 mm and side hole shall have a minimum lens of 7.5 mm. Side camera shall have lensing such that it can provide a full 90-degree view without the use of mirrors, with the capability of full 360 degree continuous rotation. The resolution of the cameras must be a minimum of 430 horizontal by 350 vertical, with a lux of at least 10. Camera shall have remote focusing capability, iris control, and auto white control.
- F. The camera and light shall be fully integrated into one unit with no external wiring. The side camera and light head shall rotate together in one phase for optimum illumination and shall give a perpendicular view. Camera shall have manually adjustable bands for centering the camera in the well. The camera output shall be able to be taped and displayed on a minimum of a 13-inch monitor. The control unit shall have a lamp intensity control, switch for selecting on-board camera, and rotation control for speed, focus, and iris controls. The control unit shall have a depth counter with a manual reset. The control unit shall have a DVD recorder. The winch shall be driven by a variable speed high torque hydraulic motor for conducting video surveys. The winch shall be capable of stopping the camera for an extended period for viewing a specific area of the well. The winch shall have a visual footage counter for on-screen distance traveled, along with actual time. Distance counter to be set at zero when the side view of the camera is level with the ground surface.
- G. The DVD shall indicate the well ID number, date of video, and contractor's name on the cover.
- H. The survey shall indicate all casing sections, perforations, and casing splices, and they must be clearly visible for the entire length of the well to the satisfaction of the ENGINEER. Survey shall side-scan all casing joints and casings with an

unusual appearance. While camera is being lowered, vertical camera is to be used.

- I. Camera shall not be lowered any faster than 20 feet per minute. Entire casing shall be side-scanned not less than every 50 feet for a full 360 degree view. The open hole shall be side scanned periodically, approximately every 50 feet or where anomalies appear present. The log of the survey shall include but not be limited to:
 - a. Depth of cascading water;
 - b. Depth of static water level.
 - c. Types of perforations, if any;
 - d. Debris, if any;
 - e. Bottom of well;
 - f. Any irregular joints.
- J. The survey video log shall be submitted with the DVD, within 48 hours of the performance of the video survey.

END OF SECTION

ADDENDUM 4
SECTION 02080

CASING

PART 1 GENERAL

1.01 Scope of Work

- A. The work included in this section covers the work, materials, labor and equipment necessary for joining and installing the casings for the back-up production well located at the Winterset Gardens Water Production Facility located in Winter Haven, Florida.

PART 2 PRODUCTS

2.01 Personnel

- A. The CONTRACTOR shall furnish capable personnel including certified welders where required to join and install the casings as specified.

2.02 Equipment

- A. The CONTRACTOR shall provide appropriate equipment capable of joining and installing the casings as specified.

2.03 General

- A. All casing utilized in the construction of back-up production well will be new and unused carbon steel pipe free from defects in materials, workmanship and handling, shall be seamless, electric resistance welded, or double submerged arc welded with one longitudinal seam, and shall conform with the latest revision of API 5L Grade B or ASTM A53, Grade B and shall also conform to the American National Standard for Welded and Seamless Wrought Steel Pipe (ANSI/ASME B36.10M-2000). Casing shall be provided in lengths not less than 20 feet, and not more than one seam parallel to the casing axis shall be installed every 10 feet.

- B. Ends of plain end steel pipe shall be perfectly square and shall be furnished beveled for field V-notch butt welding.

- C. Mill certificates or equivalent for all casing material used shall be provided by the CONTRACTOR and approved by the ENGINEER prior to installation. Casing shall be hydrostatically tested by the manufacturer.

2.04 Final Casing –Production Well Completion

- A. Final casing shall be a nominal 16 inches in diameter with a minimum wall thickness of 0.375-inch and extend from 2 feet above land surface to approximately 150 feet bls.
- B. Surface casing shall be a nominal 24 inches in diameter with a minimum with a minimum wall thickness of 0.375-inch and extend from land surface to approximately 40 feet bls.

2.05 Centralizers:

- A. All well casing shall be fitted with Haliburton, Johnson Screens, or Roscoe Moss Company centralizers or approved equal positioned at 0, 90, 180, and 270 degrees. The centralizers will be placed at 5 feet above the bottom of the casing and every 40 feet thereafter with the final centralizers placed at 5 feet below the top of the casing. Centralizers shall be of same chemical and physical properties as well casing.

PART 3 EXECUTION

3.01 General

- A. All casing shall be installed by a method appropriate for the specified task order, as selected by the CONTRACTOR and approved by the ENGINEER.
- B. The CONTRACTOR will provide the ENGINEER with welder certificates before any welding operations are initiated.
- C. The standards of the American Welding Society shall apply. All welds shall be fully penetrating. Welding shall be performed using shielded arc electrodes, in accordance with AWS standards.
- D. Casing lengths shall be joined watertight by a method appropriate to the material used, as selected by the CONTRACTOR and approved by the ENGINEER so that the resulting joint shall have the same structural integrity as the casing itself.
- E. All casing shall be installed as near to plumb and straight as possible, as shown in drilling specifications.

- F. Any casing, which fails, collapses or separates during installation shall be removed from the hole and repaired or replaced at the CONTRACTOR'S sole expense.
- G. Casing shall not be floated into place. The well casing string shall be suspended in tension from the surface by means of a clamp. The bottom of the casing shall be at a sufficient distance from the bottom of the reamed hole to ensure that none of the casing assembly will be supported from the bottom of the hole.
- H. If well casing cannot be installed in location as defined, or at the correct depth or a depth that would meet the intent of design, borehole shall be sealed off with grout according to Polk County Health Department and Southwest Florida Water Management District requirements. Another well shall be constructed at a location determined by the ENGINEER and OWNER in accordance with the specifications at no additional cost.
- I. Final 16-inch casing shall be completed to 2.0 feet above ground surface, as determined by design drawings.

3.02 Straightness and Plumbness Test

- A. If, in the opinion of the ENGINEER, there is reasonable doubt about the plumbness and/or alignment of the well, the CONTRACTOR shall perform the plumbness and alignment test described in Appendix C of AWWA A100-97 at his expense. The test for plumbness and alignment shall be made following construction of the well and before pump equipment is installed.

END OF SECTION

ADDENDUM 4
SECTION 02090

GROUT

PART 1 GENERAL

1.01 Scope of Work

- A. This section covers the work, materials, labor, and equipment necessary for furnishing and installing the grout seal complete at the back-up production well for the Winterset Gardens Water Production facility.

PART 2 PRODUCTS

2.01 Personnel

- A. The CONTRACTOR shall provide capable personnel to install cement grout as specified.
- B. Work covered under Subsection 3.02, ADDITIVES, shall be performed by a service company specialized in the field of grout sealing and cementing of oil, water, and wastewater wells during cementing operations. The service company shall provide the services of an on-site technical representative with demonstrated experience in the field and area related to this project. The cement service company shall be subject to approval by the ENGINEER based upon their experience in Florida.

2.02 Equipment

- A. The CONTRACTOR shall provide appropriate equipment capable of installing the grout seal as specified.
- B. The CONTRACTOR shall provide a standard mud balance to measure cement grout density.

2.03 Cement

- A. All cement used on all work shall be Florida Class H sulfates resistant cement (ASTM C150, Type II) conforming to the "Specifications for Oil-Well Cements and Cement Additives" (API Standard 10A).

2.04 Gravel

- A. Gravel must conform in size to SWFWMD rules, regulations, or permit conditions for well abandonment and the borehole/casing diameter. Gravel or sand shall only be used during grouting activities if pre-approved by the ENGINEER.

2.05 Cement Additives

- A. Cement additives that may be used to cement in zones of high permeability (cavities) after being submitted to and approved approved by the ENGINEER include: calcium chloride, gilsonite, cellophane flakes, kolite or equivalent, and bentonite. Organic polymers, peanut shells, cotton seed hulls may not used as lost circulation materials.

2.06 Accelerants

- A. Up to four percent (4%) CaCl₂ may be used as a hardening accelerant after being approved by the ENGINEER, in which case setting times can be reduced by one half.

PART 3 EXECUTION

3.01 Cement Grout Mix

- A. Portion 1 cubic foot of cement (i.e., one 94 pound sack) to not more than 5.5 gallons of water. Cool clean potable water shall be used to mechanically mix with cement at the site immediately before placement. The CONTRACTOR shall make arrangements to secure the volume of potable water required to complete the work. Consistency and mixing shall be approved by the ENGINEER.
- B. The cement grout may be composed of between four (4) and twelve (12) percent additives if the need for such additives can be justified. A maximum of 12 percent additives may be added to the cement grout, with an average of not more than 10 percent additives when four (4) percent accelerators are used. In the cementing of the upper 100 feet of the final casing only, four (4) percent bentonite may be added. In the lower 100 feet of the final casing, cementing must be attempted with no additives. Should this prove to be impractical, a mixture up to twelve (12) percent bentonite may be used if approved by the SWFWMD in advance.
- C. The CONTRACTOR shall utilize a standard mud balance to measure and verify cement grout density as requested by the ENGINEER.

3.02 Additives

- A. The use of special cements or other admixtures (ASTM C494) to reduce permeability, increase fluidity and/or control set time and the composition of the resultant cement grout must be pre-approved by the ENGINEER.
- B. Consistency and method of mixing shall be reviewed by the ENGINEER prior to grouting.
- C. Furnish all bentonite required for cementing in the proportions specified in the Proposal and as directed by the ENGINEER.
- D. Furnish other cementing additives formulated specifically for well cementing as required by the ENGINEER.
- E. A high shear mixer shall be used for additives and totally hydrated to smooth slurry before cement is added. For each grout batch, approximately five (5) to ten (10) percent of the mixing water shall precede the other components.

3.03 Placing

- A. Prior to cementing any annulus or borehole, the CONTRACTOR shall use the caliper log to calculate cement requirements.
- B. The CONTRACTOR shall submit a cementing plan for approval to the ENGINEER, 24 hours prior to the first stage of cementing. The cementing plan shall detail estimated cement quantities for length of casing to be grouted, the nature of the mix cement slurry including weight per unit volume (density), proposed cementing schedule, expected pressures, and description of the cementing equipment, including the mechanism for measuring the volume of pumped grout, to be used by the CONTRACTOR for the cementing operation.
- C. All cementing of casing shall be accomplished in the presence of the ENGINEER.
- D. After the casing has been installed and aligned, fill the annular space between the hole and the conductor casing from the bottom with the grout mix specified using the pressure grout method bringing cement levels back to land surface.
- E. Do not perform further drilling or operate heavy equipment within 20 feet of the conductor casing during the 24-hour period immediately after the grout seal is set in place.

- F. If cement levels are not at land surface physically tag the cement level using a collar steel tremie pipe. Fill remaining portion of the annulus with the grout mix specified, filling the annulus to surface.
- G. If the borehole or annular space collapses at any time, take whatever steps are necessary to reopen the borehole or annulus and place the seal as specified. Any such remedial action shall be conducted at the Contractor's expense.
- H. If cementing activities require observation by a SWFWMD and/or County Health Department representative, the CONTRACTOR shall notify and coordinate cementing activities to accommodate this requirement at no additional cost to the OWNER.
- I. Samples of each lift of cement grout installed around each of the casings shall be retained by the CONTRACTOR. These grout samples must be collected a minimum of three (3) times for each cement batch pumped; before pumping, in the middle of the batch, and near the end of the batch. Each sample shall be labeled and forwarded to the ENGINEER.
- J. The CONTRACTOR shall submit cement reports to the ENGINEER identifying the mixture and quantity of cement grout utilized for each cementing stage completed.
- K. Staging and use of thixotropic or other high-yield cement types with special additives shall be required through highly permeable intervals, if approved by the ENGINEER and the SWFWMD.
- L. Staging and use of gravel in an open borehole area shall be required if approved by the ENGINEER and the SWFWMD. The gravel shall be introduced at a metered uniform rate in the manner to be approved by the ENGINEER and that shall allow the even placement of gravel. Every precaution shall be taken to ensure placement without bridging of the materials as they are introduced into the well.
- M. The CONTRACTOR shall be solely responsible for any defect in the cementing work and casing deformation due to improper, or lack of, equipment, technology, personnel or experience, either of CONTRACTOR or of any of his Specialty Subcontractors. CONTRACTOR shall pay all costs necessary to correct such defects. Should CONTRACTOR fail to correct defects, the ENGINEER may refuse to accept the well.

3.04 Setting Time

- A. No drilling operations shall be permitted until the grout has cured.
- B. Minimum setting time between stages shall be 24 hours. Longer time shall be necessary when high-yield cement is used. After cementing is completed on a casing, casing and well must remain undisturbed for at least 24 hours for setting of the cement.

3.05 Tag Depth

- A. The CONTRACTOR shall demonstrate the tag depths to the satisfaction of the ENGINEER and regulatory inspector prior to each grouting stage. The depth to the top of the existing grout or borehole shall be determined by washing out the annular space, if necessary, as approved by the ENGINEER and regulatory inspector.

END OF SECTION