

**ISSUED FOR BID,
NOT FOR CONSTRUCTION**

**TECHNICAL SPECIFICATIONS FOR INSTALLATION OF TWO
UPPER FLORIDAN AQUIFER PRODUCTION WELLS AND
REHABILITATION OF NINE SANDSTONE AQUIFER PRODUCTION WELLS
FOR LEE COUNTY UTILITIES GREEN MEADOWS WTP,
LEE COUNTY, FL**

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TABLE OF CONTENTS

		<u>PAGE</u>
TABLE OF CONTENTS.....		2
SECTION 1	SCOPE OF WORK	4
SECTION 2	QUALIFICATION REQUIREMENTS FOR BIDDERS	5
SECTION 3	EXAMINATION OF CONTRACT DOCUMENTS AND SITE	6
SECTION 4	SUBSTITUTE MATERIAL AND EQUIPMENT.....	7
SECTION 5	CONTRACTOR RESPONSIBILITIES.....	8
SECTION 6	PERMITS	12
SECTION 7	EQUIPMENT AND PERSONNEL	13
SECTION 8	MATERIALS	14
SECTION 9	SUBMITTALS/SHOP DRAWINGS	15
SECTION 10	SITE PREPARATION	16
SECTION 11	WELL CONSTRUCTION.....	23
11.1	CONSTRUCTION SEQUENCE FOR UFA PRODUCTION WELLS	23
11.2	REHABILITATION SEQUENCE FOR SSA PRODUCTION WELLS	25
11.3	FORMATION AND WATER SAMPLES	27
11.4	WELL PLUMBNESS AND ALIGNMENT	27
11.5	GEOPHYSICAL LOGGING	28
11.6	WELL TOP TERMINATIONS	29
11.7	WELL DEVELOPMENT	29
11.8	VIDEO LOGGING	30
11.9	SPECIFIC CAPACITY AND CONSTANT-RATE PUMPING TESTS	30
11.10	DRILLER'S LOG	31
SECTION 12	WELL ACIDIZATION.....	32
12.1	INTRODUCTION AND SCOPE.....	32
12.2	PERMITS	32
12.3	EQUIPMENT AND PERSONNEL	32
12.4	PROCEDURE SEQUENCE	33
12.5	MATERIALS	34
12.6	SAFETY.....	35
SECTION 13	RESPONSIBILITY FOR MATERIALS	36
SECTION 14	HANDLING OF MATERIALS	37
SECTION 15	ENGINEER'S REPORT	38
SECTION 16	CONSTRUCTION PROGRESS MEETINGS.....	39
SECTION 17	TIME OF COMPLETION	40
SECTION 18	EXTRA WORK	41
SECTION 19	STANDBY TIME	42
SECTION 20	PROTECTION OF PROPERTY.....	43
SECTION 21	CERTIFICATION OF CHEMICALS.....	44

TABLE OF CONTENTS - CONTINUED

		<u>PAGE</u>
SECTION 22	SITE RESTORATION.....	45
SECTION 23	DISINFECTION	46
23.1	PRODUCTION WELL DISINFECTION.....	46
23.2	DISINFECTANTS	46
23.3	DISINFECTION PROCEDURE.....	46
23.4	BACTERIOLOGICAL SAMPLING.....	46
SECTION 24	WELL ABANDONMENT, IF NEEDED	47
SECTION 25	RECORD DRAWINGS AND OPERATIONS AND MAINTENANCE MANUALS	48
SECTION 26	PAY ITEMS.....	49
A.	TWO (2) UPPER FLORIDAN AQUIFER PRODUCTION WELLS	49
B.	NINE (9) SANDSTONE AQUIFER PRODUCTION WELLS.....	53

FIGURES

FIGURE 1	AERIAL PHOTO SHOWING LOCATION OF WELLS	
FIGURE 2	SCHEMATIC WELL CONSTRUCTION DIAGRAM FOR UFA WELLS	
FIGURE 3	SCHEMATIC WELL CONSTRUCTION DIAGRAM FOR SSA WELLS	
FIGURE 4	AERIAL PHOTO SHOWING SITE FOR WELL 3F	
FIGURE 5	AERIAL PHOTO SHOWING SITE FOR WELL 10F	
FIGURE 6	NOTES AND BMP FOR SITE WORK	
FIGURE 7	SCHEMATIC DIAGRAM FOR TEMPORARY WELLHEAD	
FIGURE 8	SCHEMATIC DIAGRAM OF ACIDIZATION	
FIGURE 9	SCHEMATIC DETAILS FOR SURFACE APPURTENANCES FOR SSA WELLS	
FIGURE 10	PHOTO OF TYPICAL SURFACE FACILTIES FOR SSA WELLS	

SECTION 1 – SCOPE OF WORK

The Scope of Work of this project includes furnishing all labor and materials for the construction and possible acidization of two (2) Upper Floridan aquifer (UFA) production wells and rehabilitation of nine (9) Sandstone aquifer (SSA) production wells for the Lee County Utilities (OWNER) Green Meadows water treatment plant (WTP). An aerial photo showing the location of the wells is provided as Figure 1. The scope includes, but is not limited to:

- As necessary, installing temporary graded access to each well site.
- As necessary, clearing, grubbing, and site preparation for the wells.
- Construction, development, and testing of two (2) 16-inch diameter by approximately 850 feet deep production wells, cased to approximately 600 feet with Certa-Lok PVC casing (Figure 2).
- Rehabilitating up to nine (9), either 10 or 16-inch diameter, SSA production wells by removing existing casing/screen assembly and constructing new 16-inch diameter by approximately 180 feet deep production wells, cased to approximately 100 feet with Certa-Lok PVC casing (Figure 3).
- Conducting specific capacity pumping tests in each of the production wells.
- Acidizing each of the production wells, as necessary.
- Repeating the specific capacity pumping tests in each of the production wells, as necessary.
- Installing a flange on each UFA wellhead at an elevation shown in the engineering drawings and providing an as-built drawing and survey plat with horizontal and vertical control information for the two UFA production wells.
- Reinstalling pump and surface appurtenances for the nine (9) SSA production wells.
- Chlorination of the production wells and completing a two-point bacteriological sampling.
- Site restoration for the wells.

SECTION 2 – QUALIFICATION REQUIREMENTS FOR BIDDERS

2.1 Bidders shall be qualified and experienced in the construction and acidization of large diameter, brackish water municipal supply wells and other deep wells. Companies bidding on this project will need to provide documentation to show the successful construction of at least 5 UFA supply wells or other deep wells, with minimum diameter of 12 inches and minimum depth of 650 feet, within the last 10 years. Similarly, companies bidding on this project will also need to provide documentation showing the successful acidization of 3 similarly constructed UFA supply wells or other deep wells within the last 10 years.

Bidders shall provide a list of equipment and personnel planned to be utilized for the work. Qualifications for the listed personnel shall also be provided. In addition, the bidders shall provide three references with contact names, addresses, and telephone numbers for each of the relevant listed projects. Lee County (OWNER) reserves the right to inspect bidder's equipment.

2.2 Only one proposal from an individual, firm or partnership, or corporation under the same or different names will be considered. Should it appear that any Bidder is interested in more than one proposal for the work contemplated, all proposals in which such Bidder is interested will be rejected.

Should there be any reasonable grounds to believe that a collusion or combination exists between Bidders, all proposals may be rejected and all such Bidders or participants in such combination or collusion will be disqualified from any future bidding for the same project.

SECTION 3 – EXAMINATION OF CONTRACT DOCUMENTS AND SITE

3.1 Before submitting a Bid, each Bidder shall (a) examine the Contract Documents thoroughly, (b) visit the site to familiarize himself with local conditions that may in any manner affect cost, progress or performance of the Work, (c) familiarize himself with federal, state and local laws, ordinances, rules and regulations that may in any manner affect cost, progress or performance of the Work; and (d) study and carefully correlate Bidder's observations with the Contract Documents.

3.2 Reference is made to the Consultant Reports summarizing production well construction details and subsurface conditions at the site(s) or otherwise affecting cost, progress or performance of the Work which have been relied upon by the ENGINEER in preparing the Specifications. Such reports will be made available to any Bidder requesting them. These reports are not guaranteed as to accuracy. For their Bid each Bidder will, at his own expense, make such additional investigations and tests as the Bidder may deem necessary to determine his Bid for performance of the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

3.3 The lands upon which the Work is to be performed are identified in the Specifications and Drawings. The two sites for which site layouts are provided in the enclosed engineering drawings are either owned by the County or the County has an easement. The properties for the nine existing SSA production wells are also Lee County easements. The locations for the two UFA production wells and the nine SSA production wells are shown in Figure 1.

3.4 The submission of a Bid shall constitute an incontrovertible representation by the Bidder that he has complied with every requirement of this Section 3 and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the Work.

SECTION 4 – SUBSTITUTE MATERIAL AND EQUIPMENT

The Contract, if awarded, will be based on material and equipment described in the Drawings or specified in the Specifications. Whenever it is indicated in the Drawings or specified in the Specifications that a substitute or "or equal" item of material or equipment may be furnished or used by CONTRACTOR if acceptable to ENGINEER, application for such acceptance will not be considered by ENGINEER until after the "effective date of the Agreement." The procedure for submittal or any such application by CONTRACTOR and consideration by ENGINEER is set forth in the General Conditions.

SECTION 5 – CONTRACTOR RESPONSIBILITIES

5.1 General

The work herein described consists of the installation of two (2) UFA production wells for the Lee County Utilities Green Meadows water treatment plant (WTP) and the rehabilitation of nine (9) SSA production wells. The work is referred to as the Green Meadows Wellfield Expansion and Rehabilitation.

The purpose of these technical specifications is to provide for the furnishing of all labor, equipment, material and performing all operations for the installation and testing of up two (2) UFA production wells and the rehabilitation of nine (9) SSA production wells.

The CONTRACTOR shall be responsible for all labor, materials, taxes, transportation, tools, supplies, equipment, and appurtenances necessary to construct, develop, and test the wells as specified herein. In general, all methods and material used under this section shall be in accordance with the latest revisions of the American Water Works Association Standard for Deep Wells (AWWA A100-20) and the National Ground Water Association Standards as they apply to the particular needs or conditions encountered in the proposed work.

The CONTRACTOR shall be responsible for securing the services of a registered land surveyor to perform the following tasks:

- (1) Establish a permanent reference point datum at each well site with the vertical elevation, referenced to NGVD, identified.
- (2) Perform construction staking of the well locations and well parcel corners.
- (3) Perform construction stakeout of the horizontal alignment of the wellhead discharge piping, for the CONTRACTOR to use for alignment of the bolt holes on the 24-inch wellhead flange, as shown on the Drawings.

5.2 Schedule and Working Hours

The CONTRACTOR shall submit a detailed schedule prior to mobilization or commencement of any site work. The schedule shall include proposed mobilization, completion, and demobilization dates for each site. The CONTRACTOR'S schedule shall account for the following requirements:

- (1) Working hours shall be 7:00 AM to 7:00 PM, Monday through Friday, excluding holidays recognized by Lee County, unless prior written approval from the ENGINEER and the OWNER has been obtained.

- (2) The CONTRACTOR shall provide ENGINEER advance notice and closely coordinate all relevant drilling, construction, and testing activities with the ENGINEER. No drilling and testing shall be conducted without a representative of the ENGINEER present.
- (3) The CONTRACTOR shall obtain written approval from the OWNER and ENGINEER prior to mobilization to each site. The only work that shall be permitted at a site prior to approval from the OWNER and ENGINEER shall be field survey work.
- (4) Approval for mobilization and commencement of work at the first site will be granted upon review and acceptance of all necessary submittals and receipt of all necessary permits. The CONTRACTOR can work simultaneously at one UFA site and only one SSA site. No work can occur at two SSA sites simultaneously.
- (5) Approval for mobilization and commencement of work at each subsequent site will be granted after the CONTRACTOR has provided an acceptable schedule (in the opinion of the OWNER and ENGINEER) that identifies dates for all demobilization and restoration work for the site where work is currently in progress. Should the CONTRACTOR fail to complete demobilization and restoration at a site in accordance with the schedule provided, the OWNER may issue a stop-work order that will remain in place until the demobilization and restoration work is complete.
- (6) Best management practices for erosion control (e.g., silt fence) shall be installed prior to clearing and grubbing. The only clearing and grubbing work that shall be permitted prior to the installation of silt fence shall be the clearing and grubbing that is necessary to facilitate the installation of silt fence.
- (7) The CONTRACTOR shall commence well drilling work at a production well site promptly following the completion of clearing and grubbing at the site.
- (8) The CONTRACTOR shall restore a site promptly following the completion of well drilling at the site.

5.3 Remedial Work

If remedial work proves to be necessary to make the well acceptable to the OWNER to comply with the regulations and/or Specifications because of accident, loss of tools, defective material, or for any other cause, the CONTRACTOR shall propose a method of correcting the problem, in writing. Suggested methods shall be reviewed and approved by the ENGINEER before work proceeds. Such work shall be performed at no additional cost to the OWNER and it shall not

extend the length of the Contract. The CONTRACTOR is notified that all specifications shall be met, including hole straightness and setting of casings to the points designated by the ENGINEER.

5.4 Contractor's Daily Log

The CONTRACTOR shall maintain a detailed daily log of the drilling and testing operations. The logs shall be on printed forms and shall give a brief description of all field activities and pertinent data as may be required by the ENGINEER. The CONTRACTOR shall email the daily logs to the ENGINEER on a weekly basis.

5.5 Guarantee and Warranty

The CONTRACTOR guarantees that the work and service to be performed under the Contract and all workmanship, materials, equipment performed, furnished, used, or installed in the work shall be free from defect and flaws, and shall be performed and furnished in strict accordance with the Contract documents; that the strength of all parts of all manufactured equipment shall be adequate and as specified; and that the performance test requirements of the Contract documents shall be fulfilled. The CONTRACTOR shall repair, correct or replace all damage to the work resulting from failures covered by the guarantee. The CONTRACTOR shall provide a one-year warranty for all work undertaken as part of this contract.

5.6 Regulatory Requirements

The CONTRACTOR shall comply with all requirements and conditions of all permits related to the work of this contract and shall comply with the provisions of any permits issued. The CONTRACTOR shall be responsible for obtaining any necessary licenses and permits, and for complying with any applicable federal, state, and municipal laws, codes and regulations, in connection with the execution of the Work. The CONTRACTOR shall take proper safety and health precautions to protect the Work, the workers, the public and the property of others.

5.7 Referenced Standards

All design, material and work shall be in strict accordance with all applicable governmental, regulatory and testing organizations including, but not limited to the following:

ANSI – American National Standards Institute
API – American Petroleum Institute

ASTM – American Society of Testing and Materials
AWWA – American Water Works Association
FDEP – Florida Department of Environmental Protection
FDOT – Florida Department of Transportation
LCDOT – Lee County Department of Transportation
NGWA – National Ground Water Association
NSF – National Sanitation Foundation
OSHA – United States Occupational Safety and Health Administration
SFWMD – South Florida Water Management District
USEPA – United States Environmental Protection Agency

5.8 Noise Control

Noise produced by field operations shall be kept to a minimum. Noisy operations shall be conducted whenever possible during daylight hours and scheduled to minimize duration. The CONTRACTOR shall comply with all applicable federal, state, and Lee County noise pollution control regulations. Noisy equipment shall be kept as far as possible from noise sensitive site boundaries. Equipment shall be properly maintained to reduce noise from excessive vibration, faulty mufflers, or other sources. No equipment shall be left idling unnecessarily.

SECTION 6 – PERMITS

The CONTRACTOR shall procure all permits, certificates, and licenses required by law for the execution of the work. The CONTRACTOR shall comply with all Federal, State, and local regulations and ordinances relating to the performance of the work. The ENGINEER will provide the CONTRACTOR with pertinent information related to the permitting. However, it shall be the CONTRACTOR'S responsibility to file the permit applications, supply the permit application fees, and comply with the conditions of the relevant permits. The following permits, at a minimum, will be needed for the project: (1) Lee County Department of Natural Resources (LCDNR) well construction (UFA wells) and repair (SAS wells) permits, (2) FDEP Generic Permit for Groundwater Discharge during Dewatering Operations, and (3) LCDNR clearing permits, if needed. The ENGINEER must be furnished a copy of each permit prior to commencing work for a specific well.

A SFWMD water use permit has previously been obtained by the ENGINEER which includes the referenced wells.

SECTION 7 – EQUIPMENT AND PERSONNEL

The CONTRACTOR shall furnish capable personnel and equipment to construct the wells by rotary drilling with mud and reverse-air circulation as outlined in Section 11. The OWNER shall reserve the right to inspect the equipment of bidding contractors to assess qualification.

The equipment utilized by the CONTRACTOR shall be suitable for use in the construction of deep, large-diameter municipal water supply wells. Equipment commonly used for small-diameter domestic supply wells, such as small capacity paddle cement mixers, will not be approved by the OWNER or ENGINEER.

The CONTRACTOR shall furnish a list of equipment and personnel with their bid.

SECTION 8 – MATERIALS

Well construction materials shall be in accordance with the following requirements:

- 8.1 Drilling Fluid: No drilling fluid other than clear water will be used in the open-hole section of the UFA production wells below the production casing. Drilling fluids used during drilling of the pilot hole, reaming of the cased portion of hole, and open-hole for SSA production wells shall be approved for use in construction of municipal public water supply wells. If drilling mud is used as the drilling fluid for the portion of the hole prior to setting casing, portable mud pits must be used. Construction of in-ground mud pits at the site will not be allowed. The CONTRACTOR shall dispose of all drilling fluids in accordance with applicable regulations at a site approved by the Florida Department of Environmental Protection (FDEP) and shall provide the ENGINEER with a copy of the FDEP approval.
- 8.2 Well Casing: All casings shall be new, approved for use in municipal public water supply wells and to specifications as outlined under "Well Construction Sequence" in this section. Centralizers shall be installed on the casings at the intervals specified herein (see Section 11.4). The contract will indicate an estimate of the amount of casing for the well; however, actual field conditions will dictate the exact amount of casing. This will be determined by the ENGINEER.
- 8.3 Annular Grout: The deep permanent well casing grout shall be API Class B (ASTM Type II) or Type IL Portland cement mixed with no more than 5.5 gallons of water per sack of cement. The cement for the bottom 150 feet of the production casing shall be neat and the rest can contain up to 8% bentonite. Surface casing grout may be API Class A or B (ASTM Type I or II) or IL cement mixed with no more than 5.5 gallons of water per sack and up to 8% bentonite. Only fresh water may be used for grout mix. A cementing plan for each stage of cement shall be submitted to the ENGINEER for approval prior to emplacement of any cement grout. The first stage of each cementing operation for the final casing shall be performed using the pressure grout method. For all subsequent stages, shall be performed using the tremie method, the bottom of the tremie pipe shall be set no more than ten feet above the bottom of the interval to be grouted. A verifiable method to measure cement volumes and weight shall be approved by the ENGINEER prior to the cementing operations. Annular grout for the final casing shall be mixed on-site immediately after setting casing. The use of other cementing sources as an alternative to mixing cement on-site for grouting casings may be considered but may not be approved by the ENGINEER.

SECTION 9 – SUBMITTALS/SHOP DRAWINGS

9.1 Before submitting each Shop Drawing or Sample, CONTRACTOR shall have determined and verified:

- (1) All field measurements, quantities, dimensions, specified performance, and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
- (2) The suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;
- (3) All information relative to the CONTRACTOR'S responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;
- (4) That each Shop Drawing or Sample has been cross-checked with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

9.2 Each submittal shall bear a stamp or specific written certification that CONTRACTOR has satisfied CONTRACTOR'S obligations under the Contract Documents.

9.3 All Submittals shall be conveyed to the ENGINEER for review and approval, allowing for sufficient time for such review. Each submittal shall be provided to the ENGINEER via e-mail. No submittal shall be deemed to have been approved by the ENGINEER without the CONTRACTOR having received approval in writing.

SECTION 10 – SITE PREPARATION

10.1 Summary

- (1) Requirements include clearing of all access and work areas within the OWNER's project site(s) and right(s)-of-way as necessary to complete the Work, including work designated in permits and other agreements. Note that most of the well sites are in cleared areas. Only areas within the clearing limits indicated on the Drawings shall be cleared and grubbed, as needed. No clearing outside of the clearing limits shall be permitted without prior written approval from the ENGINEER and OWNER. Access to each site shall be by means similar to the final permanent access route and shall minimize damage to natural areas to be permanently retained. Aerial photos for well sites 3F and 10F are provided as Figures 4 and 5, respectively. Notes and Best Management Practices are provided in Figure 6.
- (2) Related work includes introduction of fill material as necessary, grading, backfilling, and site cleanup. Acceptable temporary fill materials shall include limerock, shell base, shell-rock, or cemented coquina meeting the requirements of FDOT Section 911. Other materials may be accepted with written approval from the ENGINEER. All temporary fill materials shall be removed from each site by the CONTRACTOR upon completion of well drilling at the site unless written approval is given by the ENGINEER to allow temporary fill materials to remain.

10.2 Definitions

- (1) Clearing: the removal from the ground surface and disposal, within the designated areas, of trees, brush, shrubs, down timber, decayed wood, other vegetation, rubbish and debris, as well as the removal, as directed by the ENGINEER, of existing fences.
- (2) Grubbing: the removal and disposal of all stumps, buried logs, roots larger than 1.5 inches in diameter, matted roots, and organic materials.

10.3 Tree Removal

- (1) Tree Removal Within Clearing Limits: Remove trees and shrubs as necessary within the Clearing limits unless otherwise marked or indicated.
 - i) Remove trees and shrubs to avoid damage to trees and shrubs designated to remain.
 - ii) Grub and remove tree stumps and shrubs felled within the Clearing limits and rights-of-way to an authorized disposal site. Fill depressions created by such removal with material suitable for backfill.

- (2) Tree Removal Outside Clearing Limits: Do not cut or damage trees outside the right-of-way and Clearing limits unless shown to be removed or unless written permission has been obtained from the property owner. Furnish three copies of the written permission to ENGINEER before removal operations commence.
- (3) If the OWNER desires the timber or small trees, the CONTRACTOR shall cut and neatly pile it in 4 ft. lengths for removal by the land owner; otherwise, the CONTRACTOR shall dispose of it by hauling it away from the project site.

10.4 Trees and Shrubs to be Saved

- (1) Protection: Protect trees and shrubs within the project area that are delineated or are marked in the field to be saved from defacement, injury and destruction.
 - A. Work within the limits of the tree drip line with extreme care using either hand tools or equipment that will not cause damage to trees. Any work to be done on trees identified as heritage trees shall be done by a licensed arborist.
 - (i) Do not disturb or cut roots unnecessarily. Do not cut roots 1-1/2 inches and larger unless approved.
 - (ii) Immediately backfill around tree roots after completion of construction in the vicinity of trees.
 - (iii) Do not operate any wheeled or tracked equipment within the drip line.
 - B. Protect vegetation from damage caused by emissions from engine-powered equipment.
 - C. During working operations, protect the trunk, foliage, and root system of all trees to be saved with boards or other guards placed as required to prevent damage, injury and defacement.
 - (i) Do not pile excavated materials within the drip line or adjacent to the trunk of trees.
 - (ii) Do not allow runoff to accumulate around the trunk of trees.
 - (iii) Do not fasten or attach ropes, cables, or guy wires to trees without permission. When such permission is granted, protect the tree before making fastening or attachments by providing burlap wrapping and softwood cleats.
 - (iv) The use of axes or climbing spurs for trimming will not be permitted.
 - (v) Provide climbing ropes during trimming.

- D. Remove shrubs to be saved, taking a sufficient earth ball with the roots to maintain the shrub.
 - (i) Temporarily replant if required and replace at the completion of construction in a condition equaling that which existed prior to removal.
 - (ii) Replace in kind if the transplant fails.
 - (iii) Have any tree and shrub repair performed by a tree surgeon properly licensed by the State of Florida and within 24 hours after damage occurred

10.5 Clearing and Grubbing

All best management practices shown on the drawings or necessary to prevent sediment laden water from leaving the site shall be in place prior to commencement of clearing and grubbing activities. The limits of clearing shall be field staked by the CONTRACTOR'S surveyor prior to commencement of clearing and grubbing activities.

- (1) Clearing: Clear all items necessary to prepare a safely accessible worksite and remove cleared and grubbed materials from the site.
 - A. Do not start earthwork operations in areas where clearing and grubbing is not complete, except that stumps and large roots may be removed concurrent with excavation.
 - B. Comply with applicable erosion, sediment control and stormwater management measures.
- (2) Grubbing: Clear and grub areas to be excavated, areas receiving less than 3 feet of fill and areas upon which structures are to be constructed.
 - A. Remove stumps and root mats in these areas to a depth of not less than 18 inches below the subgrade of sloped surfaces.
 - B. Fill all depressions made by the removal of stumps or roots with material suitable for backfill.

Dispose of all material and debris from the clearing and grubbing operation by hauling such material and debris away to an approved dump. The cost of disposal (including hauling) of cleared and grubbed material and debris shall be considered a subsidiary obligation of the Contractor; the cost of which shall be included in the prices bid for the various classes of work.

10.6 Topsoil

Stripping: Strip existing topsoil from areas that will be excavated or graded prior to commencement of excavating or grading and place in well-drained stockpiles in approved locations.

10.7 Preservation of Developed Private Property

- (1) The CONTRACTOR shall exercise extreme care to avoid unnecessary disturbance of developed private property along the route of the construction. Trees, shrubbery, gardens, lawns, and other landscaping, which in the opinion of the ENGINEER must be removed, shall be replaced, and replanted to restore the construction easement to the condition existing prior to construction.
- (2) All soil preservation procedures and replanting operations shall be under the supervision of a nursery representative experienced in such operations.
- (3) Improvements to the land such as fences, walls, outbuildings, and other structures which of necessity must be removed, shall be replaced with equal quality materials and workmanship.
- (4) Clean up the construction site across developed private property immediately after construction has been completed to the satisfaction of the ENGINEER.
- (5) Any commercial signs, disturbed or removed, shall be restored to their original condition within 24 hours.

10.8 Preservation of Public Property

The appropriate paragraphs of Articles 10.5 and 10.6 of these Specifications shall apply to the preservation and restoration of public lands, parks, rights-of-way, easements, and all other damaged areas.

10.9 Reference Points

The CONTRACTOR shall provide vertical elevation reference points at each well site. The CONTRACTOR shall preserve these reference points during the Work and shall use these reference points for determining final grade and piping elevations for each well.

10.10 Turbidity Control and Water Storage

The CONTRACTOR shall provide up to 200 feet of temporary discharge piping from each of the well sites to locations determined by the ENGINEER. The CONTRACTOR shall obtain applicable permits for the discharge of water at each specific location. The

CONTRACTOR shall dispose offsite only clean, settled water meeting turbidity levels from each well during reverse-air drilling, well development, geophysical logging, pumping tests, and other drilling activities. CONTRACTOR shall not discharge offsite without applicable authorizations. The CONTRACTOR is responsible for inspecting each site to verify field conditions for groundwater discharge and logistics prior to bid submittal. The type and size of pipeline is the CONTRACTOR'S choice. The CONTRACTOR is responsible for the integrity of the piping throughout the project and for removal of the piping when the project is completed. The piping should be able to handle a water flow rate of 2,000 gpm.

The CONTRACTOR shall provide storage of all discharged water during and testing operations from the wells to allow settling of suspended solids prior to being discharged offsite, if applicable. Any water discharged offsite, after obtaining applicable authorizations, shall have a turbidity of less than 29 NTU. This operation may require settling tanks and the use of flocculent material such as Applied Polymer Systems 700 Series Floc Logs or approved equivalent. After the water passes the turbidity control measures, turbidity will be monitored daily at the point of discharge during discharge operations. If turbidity exceeds 29 NTU, discharged rates shall be reduced and additional settling time shall be provided to allow for a reduction in turbidity levels below 29 NTU. Turbidity monitoring records for each day when water is discharged offsite shall be maintained on-site by the CONTRACTOR. The records shall include date and time of collection of the sample, weather conditions at time of collection, approximate rate of water discharged, and turbidity value.

10.11 Erosion Control and Best Management Practices

Erosion control measures shall be in place prior to commencing clearing and grubbing or earth moving activities, and they shall remain in place until after sod has fully established.

The CONTRACTOR shall follow the erosion control included in the Best Management Practices included with the Drawings. CONTRACTOR shall maintain access roads in good working condition throughout the project duration.

10.12 Sanitary Facilities

The CONTRACTOR shall furnish temporary sanitary facilities at each site where working is taking place. These facilities shall be properly maintained at all times and serviced at regular intervals, at a minimum of once per week, throughout the construction period.

10.13 Water

The CONTRACTOR shall provide the level of water services required for all construction operations.

10.14 Barriers and Security

Barriers shall be provided by the CONTRACTOR to protect the public safety, other contractors, existing facilities, and adjacent properties from harm during construction operations and to prevent public access to work areas. At the end of each day the work site shall be secured.

10.15 Parking

The CONTRACTOR shall provide and maintain a suitable parking area for use of all construction workers, authorized visitors, and others providing services to the project.

10.16 Traffic Control

The CONTRACTOR shall provide, if so, requested by the ENGINEER, a traffic control plan and shall also submit such plan, after approval by the ENGINEER, to the appropriate traffic control authority for approval.

10.17 Removal of Temporary Materials

At the completion of drilling activities at a site, the CONTRACTOR shall remove all temporary facilities, materials, wastes, and equipment used or accumulated during the construction period to the satisfaction of the ENGINEER. All temporary fill materials shall be removed, and grading shall be restored to the elevations that existed prior to the start of work.

10.18 Sodding

The Contractor shall stabilize all areas within the clearing limits by placing sod.

10.18.1 Types: Sod may be either St. Augustine or Argentine Bahia grass. It shall be well matted with roots. When replacing sod in areas that are already sodded, the sod shall be the same type as the existing sod.

10.18.2 Sod shall be provided as required in accordance with Florida Department of Transportation (FDOT) Specifications 575 and 981. The CONTRACTOR shall furnish sod equal to and similar in type as that disturbed. Placement and watering requirements shall be in accordance with FDOT specifications 575.

10.18.3 The sod shall be taken up in commercial-size rectangles, preferably 12-inch by 24-inch or larger, except where 6-inch strip sodding is called for.

10.18.4 The sod shall be sufficiently thick to secure a dense stand of live grass. The sod shall be live, fresh, and uninjured at the time of planting. It shall have a soil mat of sufficient thickness firmly to the roots to withstand all necessary

handling. It shall be reasonably free of weeds and other grasses. It shall be planted as soon as possible after being dug and shall be shaded and kept moist from the time it is dug until it is planted.

10.18.5 Sod should be handled in a manner to prevent braking or other damage. Sod shall not be handled by pitch forks or by dumping from trucks or other vehicles. Care shall be taken at all times to retain the native soil on the roots of each sod roll during stripping and handling. Sod that has been damaged by handling during delivery, storage, or installation will be rejected.

10.18.6 The CONTRACTOR shall perform all necessary work, including watering and fertilizing, to sustain the sod until final acceptance. Prior to final completion, the sod shall have an established root system (leaf blades break before seedlings or sod can be pulled from the soil by hand) and no bare spots larger than one square foot shall be present. During the entire establishment period, the CONTRACTOR shall continue inspection and maintenance of erosion and sedimentation control items to prevent sediment laden runoff from impacting off-site areas. Removal and disposal of all erosion and sedimentation control items shall occur after sod has been fully established.

SECTION 11 – WELL CONSTRUCTION

11.1 Construction Sequence for UFA Production Wells

11.1.1 Install approximately 60 feet of 24-inch diameter, 0.375-inch wall thickness, steel surface casing. Installation method is CONTRACTOR'S choice to the satisfaction of the ENGINEER.

11.1.2 Drill a nominal 12-inch diameter borehole to a depth of approximately 600 feet using the mud rotary method. All wellbores drilled as part of this contract shall meet the plumbness and alignment conditions set forth in Section 11.4.

Prepare the hole for geophysical logging by circulation of the drilling fluid until it is uniform and free of drill cuttings. Perform geophysical logging (Dual Induction, Gamma Ray/Caliper, Spontaneous Potential, and Borehole Compensated Sonic).

11.1.3 Ream the pilot hole to a nominal 24-inch diameter using the mud rotary method. A staged drill bit of appropriate dimensions should be used to assure a hole that is straight and plumb. The borehole should be prepared for casing installation by continuation of fluid circulation until drill cuttings have been completely removed and the drilling fluid is uniform. A minimum of 8 hours of hole conditioning including wiper trips must occur prior to installing casing in the hole. Perform geophysical logging (Gamma Ray/Caliper) immediately prior to commencing installation of casing on the same day. Should any hole restrictions be noted on the Caliper log, the CONTRACTOR shall ream the hole to the proper diameter and rerun the GR/Caliper log to the satisfaction of the ENGINEER.

11.1.4 Install approximately 600 feet of 16-inch outside diameter SDR 17 Certa-Lok PVC casing with centering guides as specified. The casing shall be of sufficient collapse resistance and tensile strength to withstand downhole stress during construction and development.

11.1.5 Grout the annular space between casing and borehole with neat cement for the bottom 150 feet immediately after setting the casing. Grouting shall be accomplished in a minimum of two stages. The first stage shall be pressure grouted by pumping cement behind the casing from bottom to a depth of approximately 300 feet above the base of the casing and may include cement mixed with bentonite above the bottom 150 feet. The first stage grout should be allowed to set for at least 12 hours and its height "tagged" by tremie pipe before proceeding with the second stage. The second, and any subsequent cement stages, shall be emplaced using the tremie method with cement with up to 8% bentonite. If, after emplacement and during hardening, any shrinkage occurs in the final stage grout, cement shall be added by the tremie method to bring the grout level to land surface. Perform temperature logging subsequent to each grout stage unless cement is within the surface casing. A minimum of eight hours shall elapse

between pumping of a grout stage and conducting the temperature log for that stage. Allow annular grout to cure for 24 hours before continuance of drilling operations.

- 11.1.6 Drill a nominal 14-inch diameter borehole to a depth of up to 250 feet below the depth of the production casing using the reverse-air method. No drilling mud will be allowed in the open-hole section of the well. Until the formation produces enough water to allow reverse-air drilling, the borehole may be drilled with clean water as a drilling fluid. CONTRACTOR shall conduct air-lift specific capacity tests every thirty or forty feet (i.e. length of one or two drilling rods) during reverse-air drilling of the open-hole section of each well. CONTRACTOR is responsible for measuring and recording pumping rate and water level during the specific capacity tests. Static water levels shall be collected after approximately 20 minutes or at the beginning of the day. Any groundwater produced during reverse air drilling that is leaving the site shall have a turbidity equal to or below 29 nephelometric turbidity units (NTU). If turbidity exceeds 29 NTU, the CONTRACTOR shall set up a treatment system to reduce turbidity levels prior to leaving the site. Applicable authorizations shall be obtained for any offsite discharge.
- 11.1.7 Develop the well. This shall include reverse-air development from the bottom of the hole until the discharge is free from sediment and straight-air development from inside the casing to the satisfaction of the ENGINEER. The well shall be surged on a regular basis during development. Development water leaving the site shall meet turbidity levels.
- 11.1.8 Subsequent to development, a suite of geophysical logs (Gamma Ray/Caliper, Dual Induction, Spontaneous Potential, Borehole Compensated Sonic, Static and Dynamic Flowmeter, Static and Dynamic Fluid Conductivity/Temperature, and dynamic video) shall be run to the satisfaction of the ENGINEER.
- 11.1.9 Install a test pump to a depth of 160 feet below land surface and conduct a five-stage step-drawdown pumping test to the satisfaction of the ENGINEER and as specified in Section 11.9. Additional pump development may be required by the ENGINEER.
- 11.1.10 As determined to be necessary by the ENGINEER, acidize each newly installed well using approximately 16,000 gallons of 7.5% hydrochloric acid, following the procedures detailed in Section 12. Conduct air development for approximately 16 hours.
- 11.1.11 Reinstall a test pump and conduct additional development to the satisfaction of the ENGINEER. Repeat the specific capacity pumping test of each production well, if necessary.
- 11.1.12 Disinfect the well to the satisfaction of the ENGINEER and conduct a 2-point bacteriological sampling, as specified in Section 23.

- 11.1.13 Conduct up to two separate 48-hour constant-rate pumping test, using the temporary test pump, set at a depth of 160 feet below land surface, in one of the newly constructed wells during each test, to the satisfaction of the ENGINEER and as specified in Section 11.9. The CONTRACTOR shall be responsible for maintaining and fueling the pump throughout the constant-rate pumping test. If the pump stops, the test shall be repeated to the satisfaction of the ENGINEER, at no additional cost to the OWNER. The CONTRACTOR shall be responsible for providing water level measuring equipment capable of recording data at small intervals for up to two wells during the constant-rate pumping tests.
- 11.1.14 Complete the well with a flange, as specified in Figure 7. The 2-inch diameter ball valve shall be equipped with a threaded connection to allow for installation of a pressure transducer or water level meter. Provide as-built drawing and survey plat with horizontal and vertical control information for each well. Surveying to be conducted by a licensed Land Surveyor.
- 11.1.15 Restore the site. The well shall be left clean; free of oils, grease, foreign matter, or other substances used during well construction and testing.

11.2 Rehabilitation Sequence for SSA Production Wells

- 11.1.1 Remove a portion of perimeter fence, as needed, disconnect well from power, disassemble wellhead, and remove pump/motor from well. Conduct a video survey of the well interior to total depth.
- 11.1.2 Break up pedestal and well pad, as necessary to remove all surface materials around the well casing (Figures 9 and 10).
- 11.1.3 Remove casing/screen assembly for the wells. Existing casing/screen diameters are either 10 or 16 inches in diameter. CONTRACTOR options for removal of the casing/screen assembly may include overshot, dual rotary drilling, and any other CONTRACTOR suggested option. If removal of the existing casing/screen assembly is not possible, as directed by the ENGINEER, plug and abandon the well and drill a new one within 10 feet of existing well, at a location provided by the ENGINEER. Construction of the well for either option shall follow the procedure outlined below.
- 11.1.4 Install approximately 60 feet of 24-inch diameter, 0.375-inch wall thickness, steel surface casing to the satisfaction of the ENGINEER.
- 11.1.5 Drill a nominal 24-inch diameter borehole using the mud rotary method to approximately 100 feet, as directed by the ENGINEER. A staged drill bit of appropriate dimensions should be used to assure a hole that is straight and plumb. The borehole should be prepared for casing installation by continuation of fluid circulation until drill cuttings have been completely removed and the drilling fluid is uniform. A minimum of 2 hours of hole conditioning including wiper trips must occur prior to installing casing

in the hole. Perform geophysical logging (Gamma Ray/Caliper) immediately prior to commencing installation of casing on the same day. Should any hole restrictions be noted on the Caliper log, the CONTRACTOR shall ream the hole to the proper diameter and rerun the GR/Caliper log to the satisfaction of the ENGINEER. If the borehole is determined to extend beyond the casing setting depth, the CONTRACTOR shall use gravel to backplug the borehole to the base of the casing.

- 11.1.6 Install approximately 100 feet of 16-inch outside diameter SDR 17 Certa-Lok PVC casing with centering guides as specified. The Contractor's means and methods shall be as such that the casing collapse resistance and tensile strength withstand downhole stress during construction and development.
- 11.1.7 Grout the annular space between casing and borehole with neat cement immediately after setting the casing. Grouting shall be accomplished in one stage by pressure grouting through the casing by pumping cement behind the casing from bottom to land surface. If, after emplacement and during hardening, any shrinkage occurs, cement shall be added by the tremie method to bring the grout level to land surface. Allow annular grout to cure for 24 hours before continuance of drilling operations.
- 11.1.8 Drill a nominal 14-inch diameter borehole to a depth of up to 100 feet below the depth of the production casing using the reverse-air or mud rotary methods. No drilling mud will be allowed in the open-hole section of the well. Until the formation produces enough water to allow reverse-air drilling, the borehole may be drilled with clean water as a drilling fluid. Any groundwater produced during reverse air drilling that is leaving the site shall have a turbidity equal to or below 29 NTU. If turbidity exceeds 29 NTU, the CONTRACTOR shall set up a treatment system to reduce turbidity levels prior to leaving the site. Applicable authorizations shall be obtained for offsite discharges.
- 11.1.9 Develop the well. This shall include reverse-air development from the bottom of the hole until the discharge is free from sediment and straight-air development from inside the casing to the satisfaction of the ENGINEER. The well shall be surged on a regular basis during development. Development water leaving the site shall meet turbidity levels.
- 11.1.10 Subsequent to the air development, a suite of geophysical logs (Gamma Ray/Caliper, Dual Induction, Spontaneous Potential, Borehole Compensated Sonic, Static and Dynamic Flowmeter, Static and Dynamic Fluid Conductivity/Temperature, and dynamic video) shall be run to the satisfaction of the ENGINEER.
- 11.1.11 Install a temporary line shaft vertical turbine pump to a depth of five feet above the base of the casing (i.e. approximately 90 feet below land surface) and conduct pump development to the satisfaction of the ENGINEER. Conduct a five-stage step-drawdown pumping test to the satisfaction of the ENGINEER and as specified in Section 11.9. Additional pump development may be required by the ENGINEER after completion of the pumping test.

- 11.1.12 As determined to be necessary by the ENGINEER, acidize each well using approximately 8,000 gallons of 7.5% hydrochloric acid, following the procedures detailed in Section 12. Air develop the well for approximately 16 hours.
- 11.1.13 Reinstall the temporary vertical line shaft turbine pump in the well, conduct pump development to the satisfaction of the ENGINEER, and repeat the specific capacity pumping test of each production well, as necessary.
- 11.1.14 Complete a full suite of geophysical logs (Gamma Ray/Caliper, Dual Induction, Spontaneous Potential, Borehole Compensated Sonic, Static and Dynamic Flowmeter, Static and Dynamic Fluid Conductivity/Temperature, and dynamic video) to the satisfaction of the ENGINEER.
- 11.1.15 Reinstall the permanent submersible pump to its original depth. Reinstall the wellhead and other surface appurtenances.
- 11.1.16 If the well is installed at a nearby location, install additional pipeline and electrical. A maximum of 15 feet for pipeline and electrical is anticipated. Additionally, a 10-point bacteriological clearance shall be conducted after disinfection.
- 11.1.17 Disinfect the well to the satisfaction of the ENGINEER and conduct a 2-point bacteriological sampling, as specified in Section 23.
- 11.1.18 Restore the site. The well shall be left clean; free of oils, grease, foreign debris, or other substances used during well construction and testing.

11.3 Formation and Water Samples

A representative of the ENGINEER will collect formation and water samples during drilling. Formation samples will be collected continuously and bagged every ten feet. Clear water samples will be collected every 10 feet during reverse air drilling from the discharge point and at the connection of each drill rod. The contractor shall provide an appropriate location for the collection of formation samples and a sampling port in the discharge line for collection of reverse air water samples, as approved by the ENGINEER.

11.4 Well Plumbness and Alignment

The completed well shall be sufficiently plumb and straight so that there will be no interference with installation, alignment, operation, or future removal of the permanent well pump. The maximum allowable inclination from the vertical at any portion of a hole or survey point shall be one (1) degree; the maximum allowable difference between any two successive survey points shall be 0.5 degree. Any deviation greater than one (1) degree or difference greater than 0.5 degree between two surveys shall be corrected by the CONTRACTOR at his own expense.

Well plumbness shall be determined using a TOTCO type wireline inclination survey tool during the drilling operations, or other method approved by the ENGINEER. Wireline deviation surveys should be recorded at 90-foot intervals during the pilot-hole drilling and reaming operations. Use of wireline methods during drilling does not relieve the CONTRACTOR of the responsibility of installing a plumb completed well. Should the ENGINEER request, the alignment shall also be tested by lowering into the well to a depth of at least 250 feet, a section of pipe 20 feet long or a dummy of the specified pump length. The outer diameter of the test pipe or dummy shall not be more than 1-inch smaller than the inside diameter of that part of the casing or hole being tested. The lowered unit shall pass freely through the entire tested depth.

Centralizers shall be installed on the casing during casing setting operations at the following depths: (a) one set 20 feet from the base of casing, (b) three sets at 40-foot intervals above the bottom centralizers and at 200-foot intervals thereafter (i.e. at 60 feet, 100 feet, 140 feet, 340 feet, 540 feet, etc. above the casing seat), and (c) one set 20 feet from the surface.

If the well fails the well plumbness and alignment tests during drilling, the well shall be repaired as directed by the ENGINEER. If, in the opinion of the ENGINEER, the well cannot be repaired, the well shall be plugged as per current state and/or local requirements and a new well constructed, all at the CONTRACTOR'S expense. The CONTRACTOR shall perform additional well plumbness and alignment tests at no cost to the OWNER.

11.5 Geophysical Logging

When the borehole has been drilled to a depth determined by the ENGINEER, it must be prepared for geophysical logging. The geophysical logging company to be used for each logging event shall be approved in advance by the ENGINEER. Borehole preparation shall include, but not be limited to: 1) continuation of circulation until drill cuttings have been removed from the borehole; and 2) during rotary mud drilling, circulation of the drilling mud in the borehole until it is uniform. The CONTRACTOR must make all reasonable efforts to leave the borehole free from obstructions in preparation for geophysical logging. The log(s) must be made immediately following the completion of borehole preparation unless otherwise stated in the contract or as stipulated by the ENGINEER.

The following sequence of logging should be performed:

- (1) In the pilot hole, prior to reaming for production casing:
 - Dual Induction
 - Gamma Ray/Caliper
 - Spontaneous Potential
 - Borehole Compensated Sonic

- (2) At production casing setting depth, in the reamed hole, immediately prior to setting casing:
 - Gamma Ray/Caliper

- (3) At casing setting depth, subsequent to setting casing after each stage of cementing unless cement is within the surface casing:
 - Temperature

- (4) At total depth and prior to acidization:
 - Dual Induction
 - Gamma Ray
 - Spontaneous Potential
 - Caliper
 - Flowmeter (Static and Dynamic)
 - Fluid Conductivity/Temperature (Static and Dynamic)
 - Borehole Compensated Sonic
 - Video

- (5) After acidization:
 - Dual Induction
 - Gamma Ray
 - Spontaneous Potential
 - Caliper
 - Flowmeter (Static and Dynamic)
 - Fluid Conductivity/Temperature (Static and Dynamic)
 - Borehole Compensated Sonic
 - Video

Field copies and final copies of all geophysical logs shall be provided in both paper and electronic formats (pdf and LAS formats) acceptable to the ENGINEER. The number of paper copies of each log shall be 4, unless otherwise directed by the ENGINEER.

11.6 Well Top Terminations

At all times during the progress of the work and at completion, the CONTRACTOR shall use reasonable precautions to prevent either tampering with any of the wells or the entrance of foreign material into any of the wells. At the end of each workday, each well shall be sealed to prevent it from free flowing. Upon completion of the work, the UFA production wells shall be completed as shown in Figure 7. The final flange elevation will be provided by the ENGINEER.

11.7 Well Development

The CONTRACTOR shall air develop each well, using a sequential combination of reverse air in the open-hole then straight air in the casing, until, to the satisfaction of the ENGINEER, the discharge water is free of sediment. The CONTRACTOR shall place the drill stem in the open-hole section and vary this height during reverse air development to enhance development of the entire open-hole section. The CONTRACTOR shall frequently and regularly surge the well. Thereafter, the well should be developed with a temporary pump capable of pumping 2,000 gpm.

The discharge line on the wellhead shall be equipped with a valve and a ¼-inch diameter access port which can be utilized by the ENGINEER to install silt density index (SDI) and sand test equipment. Additional air and pump development time will be required if the well is acidized, as requested by the ENGINEER.

Pump development for the SSA wells shall be completed by over pumping. CONTRACTOR shall furnish and install a vertical line shaft turbine pump without a suction screen or approved equal by the ENGINEER. The CONTRACTOR will not be reimbursed for wear and tear of the pump assembly. ENGINEER will determine the peak pumping rate of the well and duration to pump develop the well. Sand produced from the SSA wells shall remain within the construction limits. The CONTRACTOR shall remove and dispose of sand from the site, as needed and at no extra cost to the OWNER, if sand accumulation is too great to remain within construction limits.

11.8 Video Logging

The CONTRACTOR shall perform a video of the entire interior of the cased and open-hole portions of the wells to the satisfaction of the ENGINEER. The CONTRACTOR shall provide two (2) high quality field copies of the video and 4 final copies of the video, all in DVD or digital format. Video logging is to be conducted twice in each well, once prior to and once after acidization. The video logging contractor must be approved in advance by the ENGINEER.

11.9 Specific Capacity and Constant-Rate Pumping Tests

The CONTRACTOR shall furnish, install and remove the necessary appurtenances and pumping equipment capable of pumping 2,000 gpm with a throttling device so that the discharge may be reduced to 200 gpm. The CONTRACTOR shall install appropriate valving and flow measurement devices on the discharge line. The discharge line on the wellhead shall be equipped with a valve and a ¼-inch diameter access port which can be utilized by the ENGINEER to install silt density index (SDI) and sand test equipment. The discharge rate may be varied at the ENGINEER'S direction. Discharged water shall be conducted from the pumped well to the nearest surface-water body, storm sewer or ditch, as approved by the ENGINEER and as permitted by an applicable generic discharge permit and LCDNR authorization. A minimum distance of 300 feet to discharge point through approved piping or lined ditches to prevent movement of the discharged water into the surficial aquifer near the well is required. Storm drains shall be protected by sediment screens and hay bales.

The CONTRACTOR shall ensure easy access to the water surface to be measured and shall provide and install, to the satisfaction of the ENGINEER, an electronic pressure transducer and pressure recording device in each well for which water levels are to be measured during the pumping test. CONTRACTOR shall provide calibration certificate for the flowmeter completed within the six months prior to the pumping test.

Each of the newly installed production wells shall be specific capacity tested twice, once after completion and once after acidization. Each specific capacity pumping test shall consist of five steps of one hour each. The pumping rate for each step shall be specified by the ENGINEER.

Following the completion of the final specific capacity testing of the two UFA production wells, two extended-duration constant-rate pumping test shall be conducted. The CONTRACTOR shall install the necessary pumping, flow measuring, valving, and discharge equipment to conduct a 48-hour pumping test at a pumping rate of at least 800 gpm. A minimum of twenty-four hours of background water level data shall be collected prior to the start of the constant-rate pumping test. A minimum of forty-eight hours of recovery water level data shall be collected after the constant-rate pumping test. The CONTRACTOR shall furnish the necessary equipment to measure water levels in the pumped well. The equipment shall be capable of recording water levels in small time increments as approved by the ENGINEER.

Throughout the duration of the pumping tests, the CONTRACTOR shall provide personnel to maintain the operation of the pumping equipment, including fueling. If a pump ceases to operate during the pumping tests, the pump shall either be repaired or replaced, and the pumping test shall be repeated to the satisfaction of the ENGINEER at no cost to the OWNER.

11.10 Driller's Log

The driller shall keep and maintain a log indicating the general lithology, hardness, and bit penetration rate of the material through which each well has been drilled.

SECTION 12 – WELL ACIDIZATION

12.1 Introduction and Scope

Any of the wells to be acidized will be identified by the ENGINEER after the wells are installed and specific capacity tested.

The selected well CONTRACTOR shall be responsible for all labor, personal protective gear, materials, transportation, tools, supplies, equipment, and appurtenances necessary to perform the work as specified herein. In general, all methods and materials used shall be in accordance with the latest revisions of the American Water Works Association (AWWA) Standards for Deep Wells (AWWA A100-20) as they apply to the particular needs or conditions encountered in the proposed work.

12.2 Permits

The CONTRACTOR shall procure all permits, certificates, and licenses required by law for the execution and completion of the work. The CONTRACTOR shall comply with all federal, state, and local regulations and ordinances relating to the performance of the work. The ENGINEER must be furnished a copy of each permit prior to commencing work.

12.3 Equipment and Personnel

The CONTRACTOR shall furnish capable personnel and adequate equipment to perform the work as described below. Because of the hazardous nature of some of the materials used in the procedure, the CONTRACTOR shall conduct all work in accordance with the requirements of Code of Federal regulations Title 29, Chapter XVII, Part 1910: Occupational Safety and Health Standards.

The CONTRACTOR shall furnish an on-site water-tight holding tank with a minimum capacity of 12,000 gallons for collection of post-acidization discharged well fluids. Water and spent neutralized acidization fluids shall be piped from each well site to a stormwater discharge point previously identified at each well site in an FDEP Generic Discharge permit. The end of pipe discharge points shall be equipped with sediment screens or hay bales to filter the water discharged from the holding tank or from the well during air development and pumping test. Air development will occur after water pumped from the wells into the holding tank has a pH of less than 6.0 SU. The water shall be neutralized in the holding tank with soda ash until pH is more than 6.0 SU, as determined by the ENGINEER. The OWNER reserves the right to inspect the equipment of bidders to assure qualification.

12.4 Procedure Sequence

1. Remove wellhead flange. Install up to 800 feet of 2-inch inside diameter tubing, with a packer assembly, if needed, attached to an acidization well header and seal the wellhead. Some portions of the tubing in the borehole may be perforated for the release of the acid, a packer may be used to isolate a portion of the borehole, or the tubing bottom may be plugged or open-ended, as instructed by the ENGINEER. A check valve should be integrated into each packer assembly. Appropriate valving and flow measurement devices shall be installed on the acid and water injection lines and on the discharge line. A schematic diagram for acidization is provided in Figure 8. Proposed CONTRACTOR modifications to the well header will be considered, subject to review and written approval by the ENGINEER.
2. Pump approximately 16,000 (for UFA wells) or 8,000 gallons (for SSA wells) of 7.5% hydrochloric acid through the tubing. More concentrated acid may be brought to the site and diluted at the wellhead with fresh water. A written acidization plan shall be submitted to and approved by the ENGINEER. Pumping equipment and supply lines shall be equipped with flowmeters to allow accurate determination of pumping rates and total volumes pumped. The maximum pumping rate is anticipated to be approximately 80 gallons per minute. If excessive pressure buildup occurs, the injection rate should be reduced accordingly. A pressure bleed-off line and pressure relief valve should be included in the wellhead assembly. The bleed-off line should extend a minimum of 75 feet from the well and its distal terminus should be located away from any populated areas and buildings.
3. Displace acid solution into the formation by chasing with a minimum of 12,000 gallons of fresh water through the tubing and/or wellhead. To obtain freshwater for dilution and chasing purposes, the CONTRACTOR may either lay a temporary line from the nearest Surficial aquifer well, from the raw water main with a backflow preventer, or truck the water to the site.
4. Allow the acidization reaction with the formation to proceed for a minimum of 24 hours after the chase water is emplaced. Monitor wellhead pressure continuously during the reaction and release built up gas pressure as needed, allowing only gas to vent. If necessary, open the butterfly valve on the discharge line to the holding tank to provide excess capacity and limited release of well fluids. The gas pressure release line should extend a minimum of 75 feet from the well work area and gas dispersion should be away from populated areas and vehicular traffic.
5. After allowing the reaction to occur, discharge recovered fluids into the minimum 12,000-gallon capacity holding tank. Direction of the discharge fluids to the holding tank

should occur until the recovered fluid is clear and has a pH of more than 6.0. Before any discharge of holding tank water, the fluid should be neutralized with soda ash to a pH of between 6.0 and 8.0. Water in the holding tank may then be released at the site, with the approval of the ENGINEER, to a discharge location described in Section 12.3. Water with a pH of less than 6.0 should not be released at the site.

6. Develop the well with compressed air discharged at a depth of approximately 300 feet BLS for the UFA wells and 80 feet BLS for the SSA wells. The air compressor used should be capable of a rate of 900 cubic feet per minute (cfm) at a pressure of 100 pounds per square inch (psi). Periodically surge the well for maximum development effect. The well should be developed for a minimum of 16 hours in this manner or until the water is free from visible entrained sediment for a period of one hour, whichever period is longer. Official development hours start after spent acid is evacuated and water is produced from the well with a pH of more than 6.0 SU.
7. Supply and install a test pump capable of pumping at rates of 200 to 2,000 gallons per minute (gpm). Set the pump at a depth of approximately 160 feet BLS in the UFA wells and within five feet of base of casing for the SSA wells. The discharge line on the wellhead shall be equipped with a valve and a ¼-inch diameter access port which can be utilized by the ENGINEER to install SDI and sand test equipment. Conduct pump development for up to 100 hours until SDI and sand content are at acceptable levels, as determined by the ENGINEER. Conduct a five-step specific capacity test as specified in Section 11.9.
8. Conduct a full suite of geophysical and video logs of the entire length of the well (i.e. open-hole and casing sections).
9. Disinfect the well and reinstall the wellhead flange.
10. Remove all equipment and clean the site.

12.5 Materials

All materials used shall be compatible with the characteristics of the proposed workscope considering that contact with strong acids necessitates the use of appropriate acid-resistant materials. All pumps, headers, tubing, piping, and other appurtenances shall be approved for use with the chemicals specified herein.

Hydrochloric Acid: Hydrochloric acid should be brought to the site at a concentration of at least 7.5%. Dilution to concentrations of 7.5% should be accomplished either by mixing with water at the wellhead or prior to pumping into the well. No concentrations greater than 7.5% should be

injected into the formation in the acidization procedure. Proper precautions should be observed at all times in handling of this material.

Hydrochloric Acid Additives: In order to minimize the potential for acid corrosion of any steel well fixtures, an iron chelating agent, such as citric acid, should be added to the hydrochloric acid during the injection into the well. A mix concentration of 10 pounds dry weight per 1,000 gallons should be achieved.

Only freshwater shall be used for the purpose of dilution of the hydrochloric acid and for displacement of the acid solution into the formation. The CONTRACTOR is responsible for laying a hose from a nearby Surficial aquifer supply well, backfeed from the raw water main using a backflow preventer or trucking the freshwater to each production well site. The CONTRACTOR shall provide tanker trucks, the interiors of which have been cleaned and disinfected prior to being brought to the project site. The CONTRACTOR shall provide the ENGINEER with proof of such cleaning and disinfection.

12.6 Safety

Nothing in these specifications shall be construed as requiring the CONTRACTOR to perform the proposed work in an unsafe manner. Alternate techniques to accomplish the acidization may be proposed by the CONTRACTOR. Because of the use of highly caustic chemicals and the potential for high pressure buildup from a reaction between hydrochloric acid and the carbonate rock formation, the CONTRACTOR shall use every precaution necessary to ensure a safe work area and procedures. It is the responsibility of the CONTRACTOR to be knowledgeable of and to comply with all U.S. Occupational Safety and Health Administration (OSHA) and U.S. Environmental Protection Agency (USEPA) regulations regarding the types of work described herein.

SECTION 13 – RESPONSIBILITY FOR MATERIALS

The CONTRACTOR shall be responsible for all material furnished by it and shall replace at its own expense all such material found defective in manufacture or damaged in handling.

The CONTRACTOR shall be responsible for the safe storage of material. The interior of all pipe, fittings and other accessories shall be kept free from dirt and foreign matter at all times.

SECTION 14 – HANDLING OF MATERIALS

All materials shall be delivered and distributed to the site by the CONTRACTOR. All casing, fittings, and accessories shall be loaded and unloaded to avoid shock or damage. Handling of casing and fittings shall conform to all manufacturers' recommendations. Pipe handled on skidways shall not be skidded or rolled against pipe already on the ground.

SECTION 15 - ENGINEER'S REPORT

The ENGINEER will prepare a daily report reflecting on the pay items completed by the CONTRACTOR during the day. Each report will be signed by the ENGINEER and an authorized individual from the CONTRACTOR.

SECTION 16- CONSTRUCTION PROGRESS MEETINGS

The CONTRACTOR shall prepare for and provide a qualified representative to attend periodic (i.e. biweekly or monthly) Construction Progress Meeting to be held at the construction site, at the Green Meadows WTP, or held virtually, as determined by the OWNER. The meetings shall be attended by representatives of the CONTRACTOR, ENGINEER, and the OWNER. No later than the day prior to each meeting, the CONTRACTOR shall provide an updated project schedule. At each meeting, the CONTRACTOR shall be prepared to detail the work completed since the previous meeting and provide a detailed lookahead for the work scheduled prior to the next meeting.

SECTION 17 - TIME OF COMPLETION

The Contractor shall achieve Final Completion no later than 380 calendar days following the issuance of the Notice to Proceed.

A separate written approval from the OWNER and ENGINEER shall be obtained prior to commencing work for each SSA production well site. The maximum time permitted for substantial completion of an individual SSA production well shall be 42 calendar days and 18 additional days for final completion for a total of 60 calendar days for each SSA production well. The maximum time permitted for substantial completion of an individual UFA production well shall be 120 calendar days and 20 additional days for final completion for a total of 140 days for each UFA production well.

Work Sequence: Work is anticipated to occur simultaneously for the SSA and the UFA production wells. Only one of the SSA production wells 5, 6, 7, 9, 10, and 11 can be out of service at any given time during the project. SSA production wells 8, 12, and 13 can be out of service while working at other production wells. CONTRACTOR shall provide a Project Schedule with the proposed sequencing for the production wells prior to mobilization for OWNER review and approval. The project schedule shall be updated and provided prior to each progress meeting for OWNER review and approval.

SECTION 18 – EXTRA WORK

Extra work can include drilling equipment and drilling crew performing additional tasks as required by the ENGINEER and crew performing extra work as required by the ENGINEER. All extra work must be approved in writing by the ENGINEER at the end of each work day. No payment for extra work will be allowed unless written approval is granted.

SECTION 19 – STANDBY TIME

There are two categories of standby time: 1) standby with the rig and drilling crew on-site, not operating the rig; and 2) standby time with the rig on-site and the crew off-site. All standby time must be approved in writing by the ENGINEER at the end of each workday. No payment for extra work will be allowed unless written approval is granted.

SECTION 20 – PROTECTION OF PROPERTY

The CONTRACTOR shall take special precautions to reduce to a minimum the nuisances and damage to property. Any damage to public or private property shall be immediately repaired or paid for by the CONTRACTOR at no expense to the OWNER. Equipment, tools, and materials shall be located in places where they will produce a minimum of nuisance. Appropriate warning signs shall be posted on the streets and the Lee County Roadwatch shall be informed of the location of the construction site.

A self-contained mud circulation system is required for all mud rotary drilling operations at the site. Construction of mud pits will not be allowed.

The CONTRACTOR shall maintain good housekeeping practices to minimize impact on the public and the environment. This shall include but not be limited to keeping work sites clean and orderly; implementing debris and trash management to minimize the generation of waste and to handle and dispose of waste in a manner that minimizes risks to the environment; designating specific areas at each site for material delivery and storage; inspecting material storage areas for cleanliness, spills, and leaks; storing materials away from drainage ditches, streams, wetlands, and other sensitive areas; inspecting vehicles and equipment for daily leaks; use drip pans or absorbents under leaking vehicles and equipment; and promptly make repairs to leaking vehicles and equipment.

SECTION 21 – CERTIFICATION OF CHEMICALS

All chemicals used during the project must show approval of either USEPA or the U.S. Department of Agriculture (USDA). The CONTRACTOR shall submit the most recent Safety Data Sheets (SDS') in accordance with OSHA Rule 29 Code of Federal Regulations (CFR) 1910.1200 for each chemical to be used during the project. Two copies shall be furnished to the ENGINEER.

SECTION 22 – SITE RESTORATION

Upon completion of drilling activities at each site, the CONTRACTOR shall demobilize all drilling equipment and remove all stored materials. Drill cuttings and other waste materials shall be removed from the site by the CONTRACTOR and legally disposed of off-site. The CONTRACTOR shall remove all temporary fill and restore grading to the elevations that existed prior to the start of work, unless directed otherwise by the ENGINEER in writing. The CONTRACTOR shall provide documentation for each off-site disposal area to show that it has been approved by appropriate regulatory agencies.

The CONTRACTOR shall stabilize all areas within the clearing limits by seeding or placing sod in flat areas and by placing sod in slopes. Any areas outside the clearing limits that are disturbed shall be restored to a condition equal to or better than existing prior to construction, as determined by the ENGINEER, at no additional cost to the OWNER.

The CONTRACTOR shall remove and dispose of all erosion and sedimentation control items until after the sod has fully established. The CONTRACTOR shall sustain the sod until final acceptance.

SECTION 23 – DISINFECTION

- 23.1 Production Well Disinfection. The CONTRACTOR shall disinfect the production well as soon as construction of the well and cleaning procedures have been completed. The CONTRACTOR shall carry out adequate cleaning procedures immediately preceding disinfection where evidence indicates that normal well construction and development work have not adequately cleaned the well. All oil, grease, soil, and other materials, which could protect bacteria from disinfectants shall be removed from the well. The cleaning operation is to be carried out by pumping only. Where test pumping equipment is to be used, such equipment shall be installed prior to or during disinfection and shall be thoroughly hosed, scrubbed, or otherwise cleaned of foreign material.
- 23.2 Disinfectants. Chlorine approved by state or local regulatory agencies shall be used as the disinfectant. The disinfectant shall be delivered to the site of the work in original, closed containers bearing the original label indicating the percentage of available chlorine. During storage, disinfectants shall not be exposed to the atmosphere or to direct sunlight. Unless superseded by governmental regulation, the quantity of chlorine compounds used for disinfection shall be sufficient to produce a minimum of 100 ppm and not more than 200 ppm residual chlorine in solution when mixed with the total volume of water in the well.
- 23.3. Disinfection Procedure. Disinfection procedures shall ensure that the disinfecting agent is uniformly applied throughout the entire depth of the well. For this purpose, the disinfecting agent shall be furnished or prepared in liquid form and pumped in the well through the wellhead. A minimum of two well volumes as calculated by the ENGINEER shall be pumped into the well.
- The disinfecting agent shall be left in the well for a period of at least 24 hours. After a 24 hour or longer contact period, the well is to be pumped to clear it of the disinfecting agent. The disposal point for the purged water shall be selected so as to minimize potential damage to aquatic life or vegetation.
- 23.4. Bacteriological Sampling. Conduct a two-point bacteriological sampling of each UFA and repaired SSA production well including above ground discharging piping, if needed. The water samples collected for each sampling event shall be transported to a State of Florida approved analytical laboratory and analyzed for total coliforms and if detected, for *Escherichia coli*. A complete chain-of-custody should be maintained throughout the sampling, transport, and analytical procedures. If any of the two samples failed, the well should be disinfected from the surface by pumping an appropriate volume and concentration of disinfection solution into the well and allowing sufficient time for reaction before pumping the spent solution from the well and conducting additional two-point bacteriological sampling. The procedure shall be repeated until two consecutive samples are clear of total coliforms. If new SSA wells are constructed, 10-point bacteriological sampling shall be successfully completed for each of the new wells and two points for the above ground discharge piping.

SECTION 24 – WELL ABANDONMENT, IF NEEDED

In the event that the CONTRACTOR shall fail to drill a well to the depth specified or to such lesser depth as requested by the ENGINEER, or fail to set or grout the casing to SFWMD and Lee County Department of Natural Resources standards, or must abandon a well because of loss of tools or for any other cause, then CONTRACTOR shall, if requested by the ENGINEER, plug the well in accordance with standards and procedures specified in the Rules of the SFWMD, Chapter 40D-3, F.A.C, and the Lee County Department of Natural Resources and install a replacement well at no additional cost.

SECTION 25 – RECORD DRAWINGS AND OPERATIONS AND MAINTENANCE MANUALS

- 22.1 CONTRACTOR shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Field Directives, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record drawings along with all approved Samples and a counterpart of all approved Shop Drawings shall be available to the ENGINEER for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings shall be delivered to the ENGINEER.
- 22.2 CONTRACTOR shall provide ENGINEER, at the completion of the Work, copies of all equipment manuals, and as applicable written operating instructions.

SECTION 26 – PAY ITEMS

1. FINAL MEASUREMENT

- A. The CONTRACTOR shall make all measurements and check all dimensions necessary for the proper construction of the work called for by the Drawings and Specifications, and during the prosecution of the work he shall make all necessary measurements to prevent misfitting in said work and shall record such accurate measurements of the construction as provided for herein and as to be submitted to the ENGINEER.
- B. The method of measuring the work for payment under the various items shall be as indicated below. In any event, the unit or lump sum price for the respective items shall include the installation complete in all details and ready for use.

2. PAY ITEMS

The unit prices stated in the Contract for the respective items shall be considered as the CONTRACTOR'S Schedule of Values for payment purposes. The unit prices shall be paid at the completion of work for each item. Payment will be made under each item only for work as it is not specifically included under other items. The OWNER shall retain 5% of payment for each item until the entire work is deemed complete and is accepted by the OWNER.

A. Two Upper Floridan Aquifer Production Wells.

The CONTRACTOR shall furnish all material, labor, taxes, tools, and equipment required to complete the construction and testing of two (2) Upper Floridan Aquifer Production Wells as follows:

ITEM NO. 1 – MOBILIZATION, SITE WORK, SURVEYING, AND PERMITTING

Mobilization, site work, pre-construction surveying, and permitting will be paid for at the lump sum price per well as listed in the Bid Proposal. The said unit price shall include the furnishing of all material, labor, and equipment necessary to complete the work, including bonds and insurance; conducting pre-construction surveying; site work including any clearing, grubbing, grading, temporary fill, temporary fencing, erosion and sedimentation control measures, access to the well site; setting up of all equipment necessary to complete the work; establishment of temporary facilities; having OSHA-required notices and establishing safety programs; obtaining all necessary permits including permit application fees; maintaining up-to-date project schedule; and coordination with the OWNER and ENGINEER, including meetings.

ITEM NO. 2 – PROVIDE AND INSTALL 24” DIAMETER STEEL SURFACE CASING

The actual length of surface casing installed shall be measured from land surface to depth of casing. It will be paid for at the unit price per foot as listed in the Bid Proposal including time, equipment, tools, taxes, and materials necessary for proper casing installation and grouting.

ITEM NO. 3 – DRILL 12” DIAMETER PILOT HOLE

The actual length of hole drilled shall be measured vertically from the bottom of surface casing to bottom of the hole. The pilot hole will be paid for at unit price per foot as listed in the Bid Proposal. The said unit price shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM NO. 4 – CONDUCT GEOPHYSICAL LOGGING PRIOR TO SETTING PRODUCTION CASING

Conducting geophysical logging in the pilot hole prior to reaming for setting the production casing in the well will be paid at the lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM NO. 5 – HOLE REAMING TO 24” DIAMETER

Reaming of the pilot hole to 24-inch diameter and running a Caliper log prior to setting casing will be paid for at unit price per foot as listed in the Bid Proposal. The said unit shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work. The actual length of hole reamed shall be measured from the bottom of the surface casing to the bottom of the reamed hole and may or may not be equivalent to the pilot-hole length.

ITEM NO. 6 – PROVIDE AND INSTALL 16” DIAMETER SDR 17 CERTA-LOK CASING

The actual length of 16-inch outside diameter SDR 17 PVC casing installed shall be measured from land surface to depth of the bottom of the casing. It will be paid for at the unit price per foot as listed in the Bid Proposal and shall include all materials, tools, taxes, labor, and equipment necessary to complete the work.

ITEM NO. 7 – GROUT 16” DIAMETER CASING AND CONDUCT TEMPERATURE LOGS

Grout in place for the production casing and running temperature logs will be paid for at the unit price per 94 lb. bag of cement equivalent as listed in the Bid Proposal. The unit price includes all required labor, materials, tools, taxes, additives, operations, set up, and removal of equipment for grout emplacement.

ITEM NO. 8 – DRILL 14” DIAMETER HOLE BY REVERSE AIR ROTARY

The actual depth of hole drilled shall be measured vertically from bottom of the production casing to the bottom of well. The open hole will be paid for at unit price per foot as listed in the Bid Proposal. The said unit shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM NO. 9 – WELL DEVELOPMENT (AIR AND PUMP)

Air development of wells will be paid for at the specified unit price based on air and pump development time per hour used after construction of the well. The said price per hour shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the development of the wells.

ITEM NO. 10 – GEOPHYSICAL AND VIDEO LOGGING AT TOTAL DEPTH

Geophysical and video logging at total depth shall be paid at the specified lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified. Geophysical logging and video conducted after acidization is not part of this Item.

ITEM NO. 11 – SPECIFIC CAPACITY PUMPING TESTS

The specific capacity pumping tests will be paid for at the specified lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the test as stipulated in the Specifications, including the installation of the temporary test pump, piping, valves, and water level measuring equipment.

ITEM NO. 12 – ACIDIZATION OF WELLS, AS NECESSARY

Acidization of each well will be paid for at the lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work stipulated in the Specifications.

ITEM NO. 13 – POST-ACIDIZATION GEOPHYSICAL AND VIDEO LOGGING

Geophysical and video logging after acidization shall be paid at the specified lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM NO. 14 – POST-ACIDIZATION SPECIFIC CAPACITY PUMPING TESTS

The specific capacity pumping tests after acidization will be paid for at the specified lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM NO. 15 – CONSTANT-RATE PUMPING TESTS

The constant-rate pumping tests will be paid for at a lump sum price, as listed in the Bid Proposal. The said unit price shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the test as stipulated in the Specifications, including the installation of the temporary test pump, piping, valves, and water level measuring equipment in the wells.

ITEM NO. 16 – DISINFECTION AND 2-POINT BACTERIOLOGICAL CLEARANCE

Disinfection and two-point bacteriological clearance of each well will be paid for at the lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as stipulated in the Specifications.

ITEM NO. 17 - EXTRA WORK

Extra work performed by drilling equipment and drilling crew will be paid for at the specified unit price based on the amount of approved time used.

ITEM NO. 18 – STANDBY TIME WITH RIG AND DRILLING CREW ON SITE

If standby time is required with the rig and drilling crew on site, payment will be made at the specified unit price based on the number of hours approved.

ITEM NO. 19 – STANDBY TIME WITH RIG ON SITE AND CREW OFF SITE

If standby time is required with the rig on site and drilling crew off site, payment shall be made at the specified unit price based on the number of hours approved.

ITEM NO. 20 – DEMOBILIZATION, RESTORATION, EQUIP WELLS WITH WELHEAD, AND PROVIDE AS-BUILT SURVEY

After completion of all drilling and testing, all equipment shall be demobilized and removed from the site. The sites shall be restored to its original contours; all drilling fluids, cuttings, and

temporary fill removed; and sod established. The wells shall be equipped a 24-inch diameter stainless steel casing and blind flanges as specified, and as-built drawings and survey plats shall be completed by a Florida licensed Professional Surveyor. Payment for this item shall be on a lump sum price per well site.

B. Nine (9) Sandstone Aquifer Production Wells.

The CONTRACTOR shall furnish all material, labor, taxes, tools, and equipment required to complete the rehabilitation of nine (9) Sandstone Aquifer Production Wells as follows:

ITEM NO. 1 – MOBILIZATION, SITE WORK, AND PERMITTING

Mobilization, site work, and permitting will be paid for at the lump sum price as listed in the Bid Proposal. The said unit price shall include the furnishing of all material, labor, and equipment necessary to complete the work; removing any fencing and site work; setting up of all equipment necessary to complete the work; establishment of temporary facilities; having OSHA-required notices and establishing safety programs; and obtaining all necessary permits including permit application fees.

ITEM NO. 2 – DISASSEMBLE WELLHEAD, REMOVE PERMANENT PUMP, AND REMOVE PEDESTAL

Payment for this item is on a lump sum basis as listed in the Bid Proposal. The work includes disassembling the wellhead, removing electrical and instrumentation, and removing pedestal and any well pad. The said unit price shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work and safely store pump, motor, drop pipe, pressure transducer, and wiring.

ITEM NO. 3 – REMOVE CASING/SCREEN ASSEMBLY FROM WELL

Removing the casing/screen assembly will be paid on a lump sum basis as listed in the Bid Proposal. If the casing/screen cannot be removed, the well shall be plugged and abandoned. The said unit price shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM NO. 4 – PROVIDE AND INSTALL 24” DIAMETER STEEL SURFACE CASING

The actual length of surface casing installed shall be measured from land surface to depth of casing. It will be paid for at the unit price per foot as listed in the Bid Proposal including time, equipment, tools, taxes, and materials necessary for proper casing installation and grouting.

ITEM NO. 5 – HOLE REAMING TO 24” DIAMETER

Reaming the borehole to 24-inch diameter and running a Caliper log prior to setting casing will be paid for at unit price per foot as listed in the Bid Proposal. The said unit shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work. The actual length of hole reamed shall be measured from the bottom of the surface casing to the bottom of the reamed hole.

ITEM NO. 6 – PROVIDE AND INSTALL 16” DIAMETER SDR 17 CERTA-LOK CASING

The actual length of 16-inch outside diameter SDR 17 PVC casing installed shall be measured from land surface to depth of the bottom of the casing. It will be paid for at the unit price per foot as listed in the Bid Proposal and shall include all materials, tools, taxes, labor, and equipment necessary to complete the work.

ITEM NO. 7 – GROUT 16” DIAMETER CASING

Grout in place for the production casing will be paid for at the unit price per 94 lb. bag of cement equivalent as listed in the Bid Proposal. The unit price includes all required labor, materials, tools, taxes, additives, operations, set up, and removal of equipment for grout emplacement.

ITEM NO. 8 – DRILL 14” DIAMETER HOLE BY REVERSE AIR ROTARY

The actual depth of hole drilled shall be measured vertically from bottom of the production casing to the bottom of well. The open hole will be paid for at unit price per foot as listed in the Bid Proposal. The said unit shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM NO. 9 – WELL DEVELOPMENT (AIR AND PUMP)

Air development of wells will be paid for at the specified unit price based on air and pump development time per hour used after construction of the well. The said price per hour shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the development of the wells.

ITEM NO. 10 – GEOPHYSICAL AND VIDEO LOGGING AT TOTAL DEPTH

Geophysical and video logging at total depth shall be paid at the specified lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to

complete the work as specified. Geophysical logging and video conducted after acidization is not part of this Item.

ITEM NO. 11 – SPECIFIC CAPACITY PUMPING TESTS

The specific capacity pumping tests will be paid for at the specified lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the test as stipulated in the Specifications, including the installation of the temporary test pump, piping, valves, and water level measuring equipment.

ITEM NO. 12 – ACIDIZATION OF WELLS, AS NECESSARY

Acidization of each well will be paid for at the lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work stipulated in the Specifications.

ITEM NO. 13 – POST-ACIDIZATION GEOPHYSICAL AND VIDEO LOGGING

Geophysical and video logging after acidization shall be paid at the specified lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM NO. 14 – POST-ACIDIZATION SPECIFIC CAPACITY PUMPING TESTS

The specific capacity pumping tests after acidization will be paid for at the specified lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM NO. 15 – REINSTALL PERMANENT PUMP, ASSEMBLE WELLHEAD, AND CONSTRUCT PEDESTAL

Payment for this item is on a lump sum basis as listed in the Bid Proposal. The work includes reinstalling the permanent pump, assembling the wellhead, reinstalling electrical and instrumentation, and constructing pedestal and well pad. The said unit price shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM NO. 16 – PROVIDE ADDITIONAL PIPING AND ELECTRICAL, IF NEEDED

If a new well is constructed proximal to the existing well, additional piping and electrical will be paid on a lump sum basis as listed in the Bid Proposal. The work includes providing and

installing up to an additional 15 feet of piping and electrical from the current location to the new location and completing a 10-point bacteriological clearance. The said unit price shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM NO. 17 – DISINFECTION AND 2-POINT BACTERIOLOGICAL CLEARANCE

Disinfection and two-point bacteriological clearance of each well will be paid for at the lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as stipulated in the Specifications.

ITEM NO. 18 – DEMOBILIZATION AND SITE RESTORATION

After completion of all drilling and testing, all equipment shall be demobilized and removed from the sites. The sites shall be restored to their original contours; all drilling fluids, cuttings, and temporary fill removed; and sod established. Payment for this item shall be on a lump sum price per well site.

FIGURES

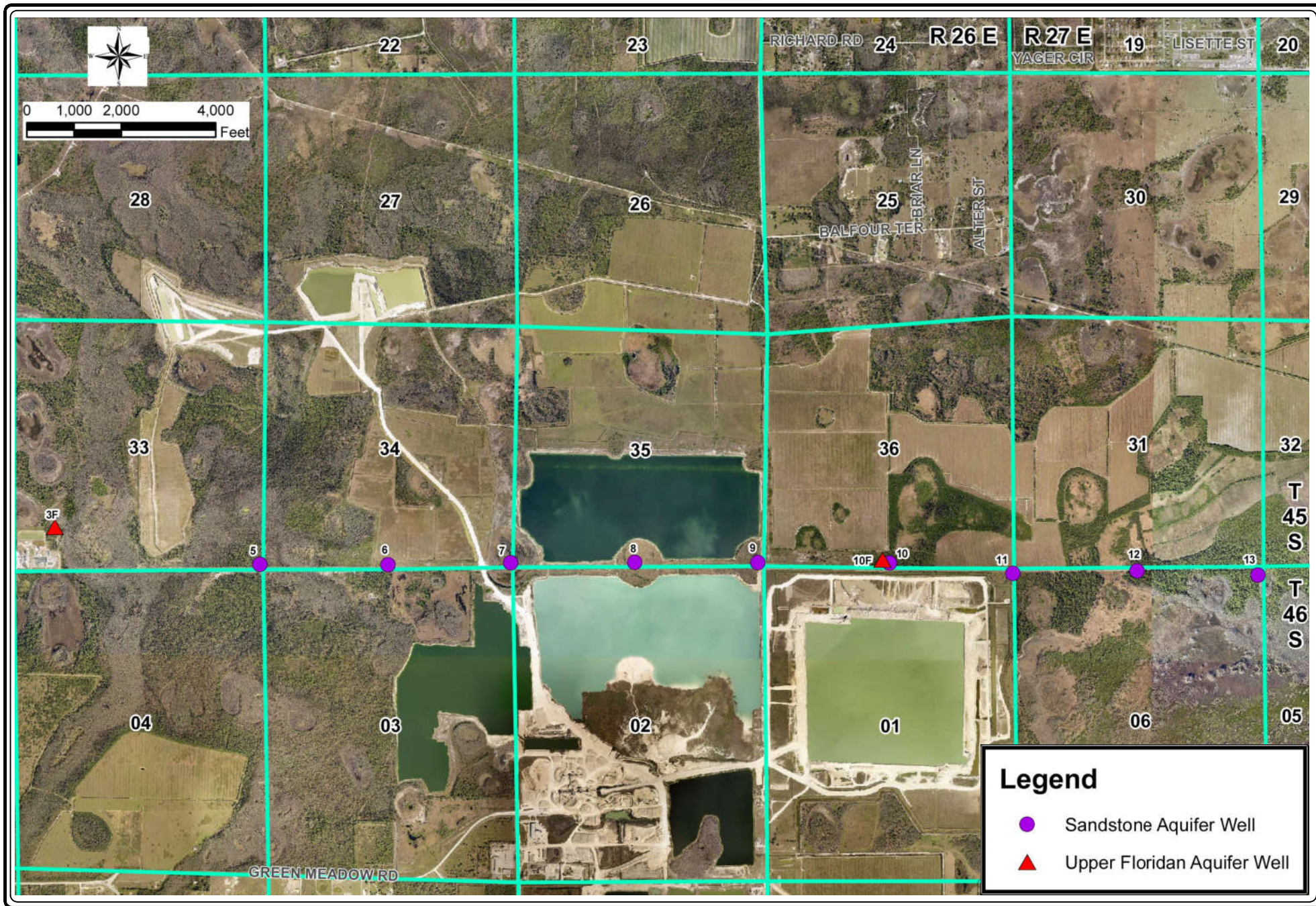


FIGURE 1. AERIAL PHOTO SHOWING LOCATION OF WELLS.

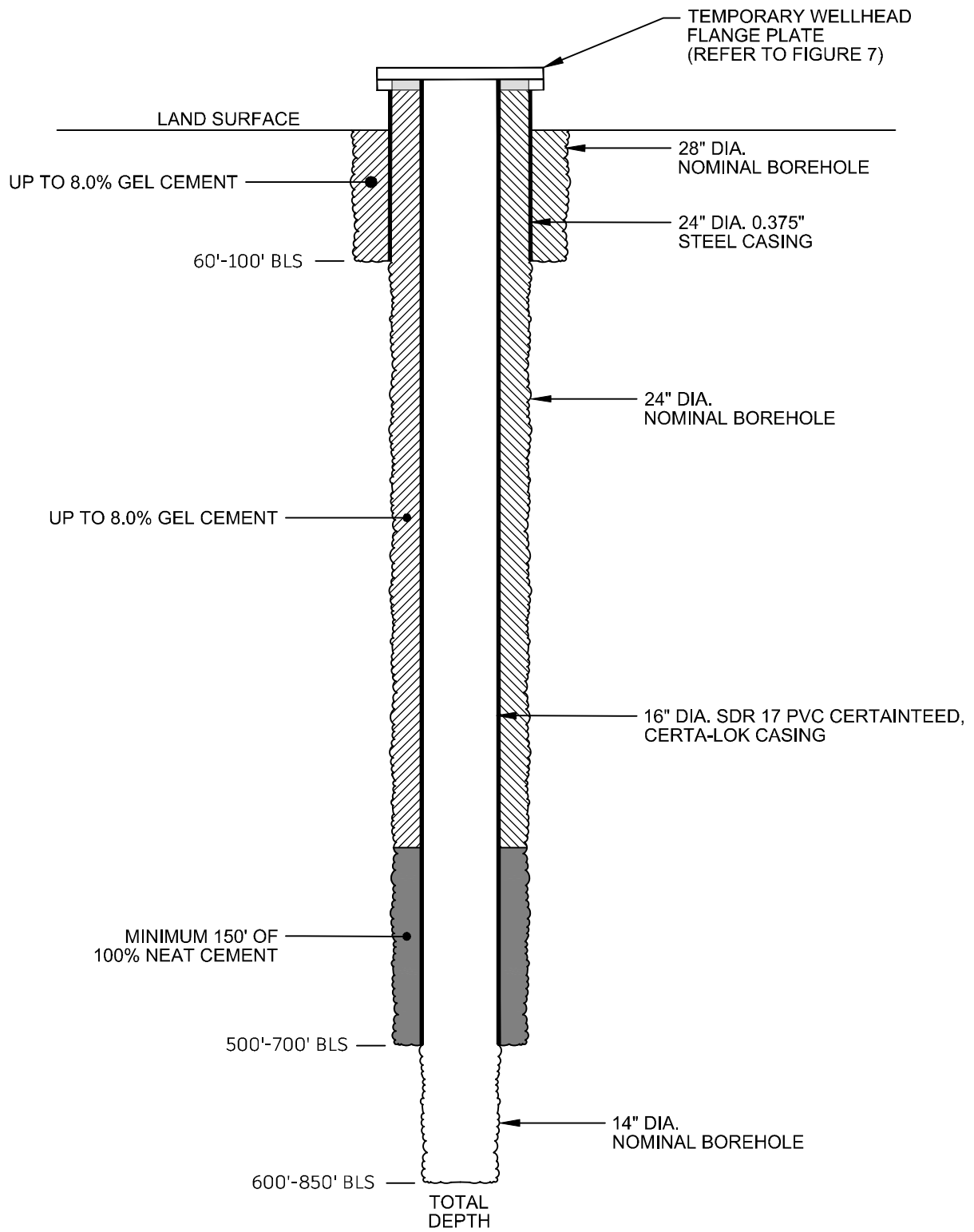
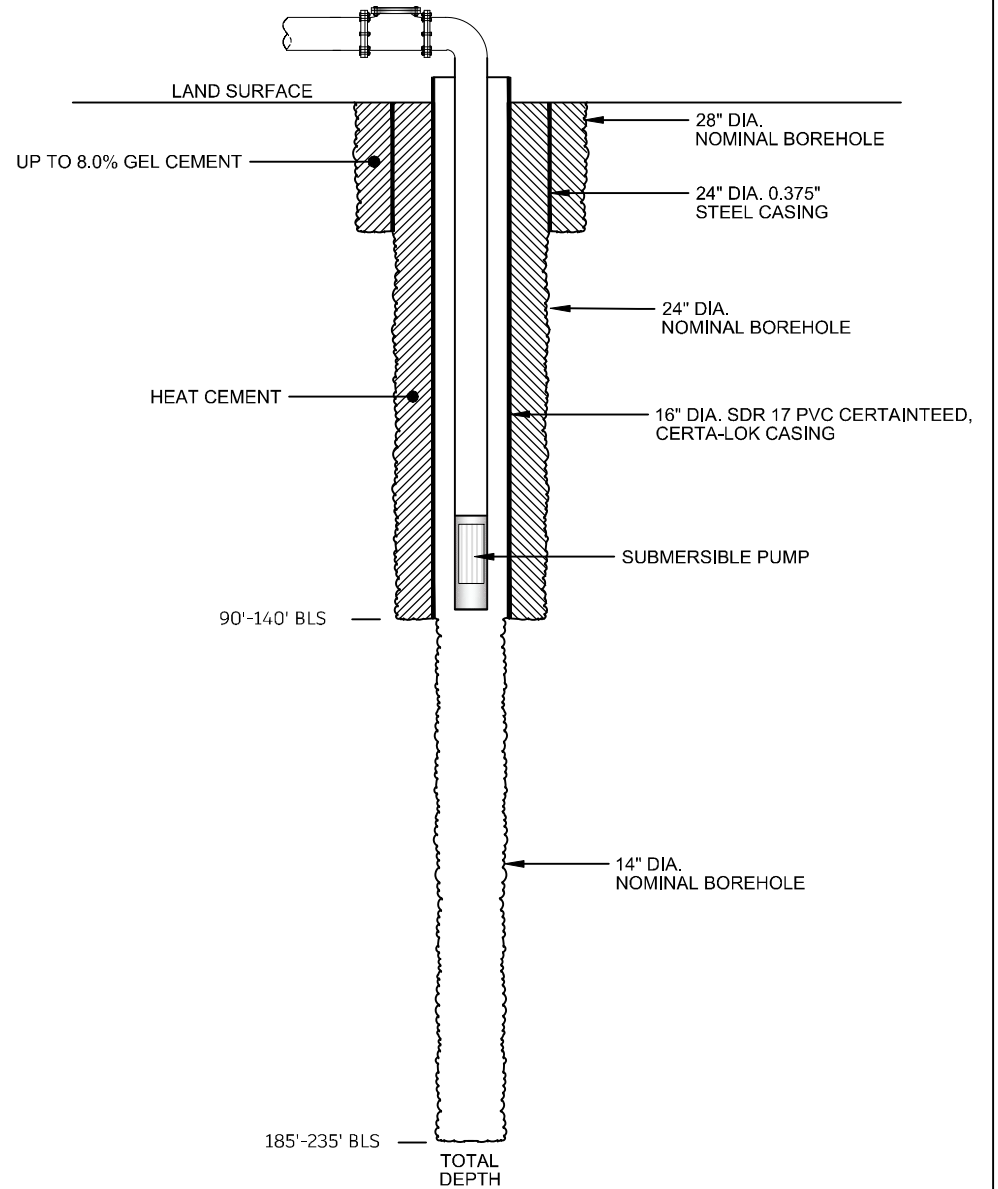
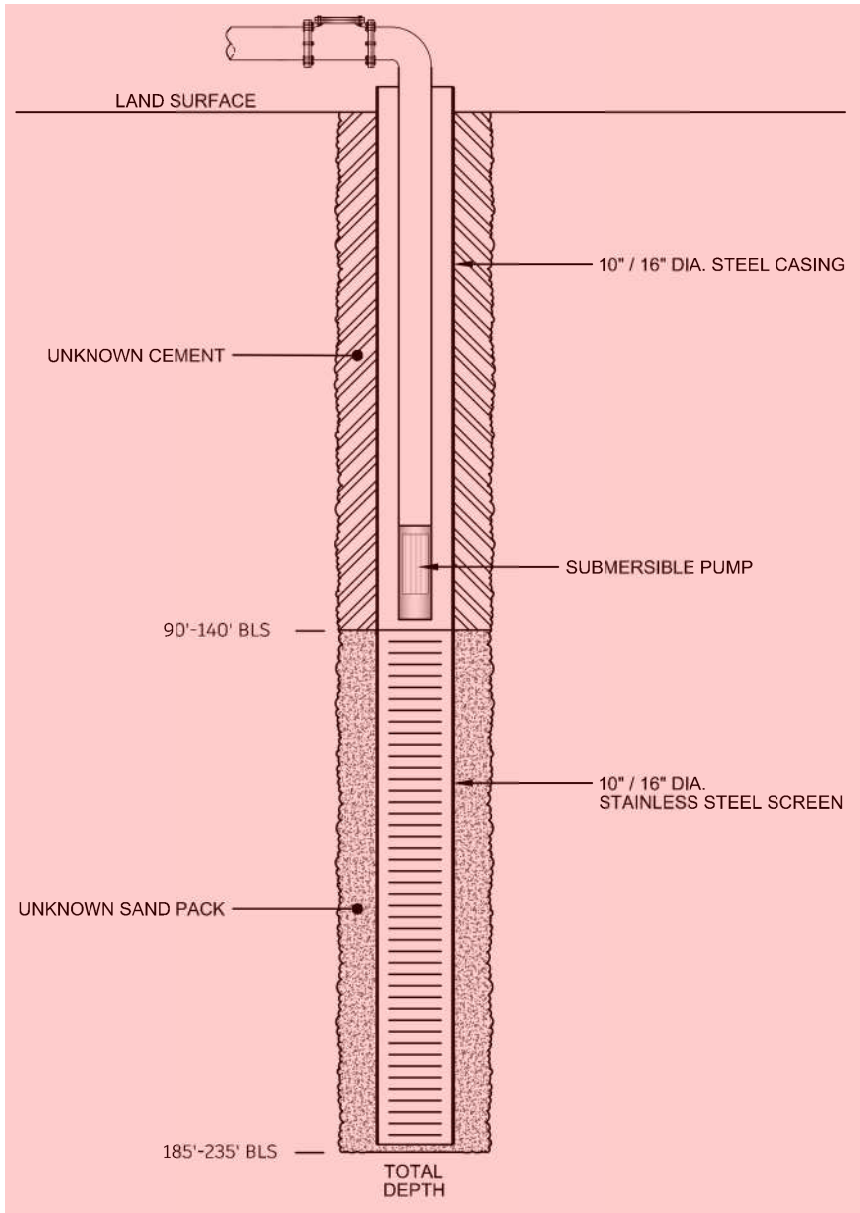


FIGURE 2. SCHEMATIC WELL CONSTRUCTION DIAGRAM FOR UFA WELLS.



- TO BE REMOVED

FIGURE 3. SCHEMATIC WELL CONSTRUCTION DIAGRAM FOR SSA WELLS.




	PROJECT NAME: GREEN MEADOWS WELLFIELD EXPANSION	DATE: 04/22/24
	PROJECT NUMBER: 23-567	

FIGURE 4. AERIAL PHOTO SHOWING SITE FOR WELL 3F.

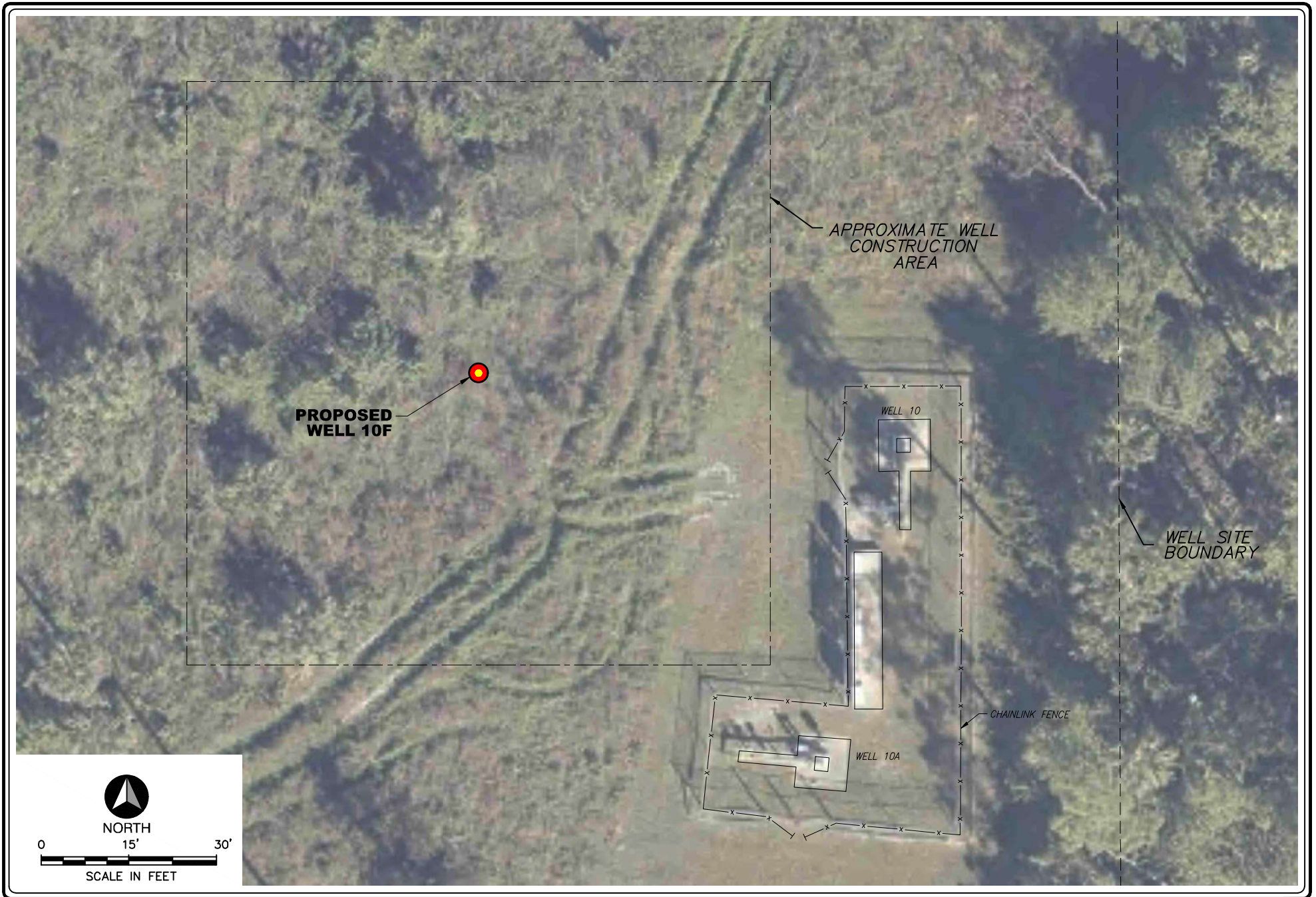
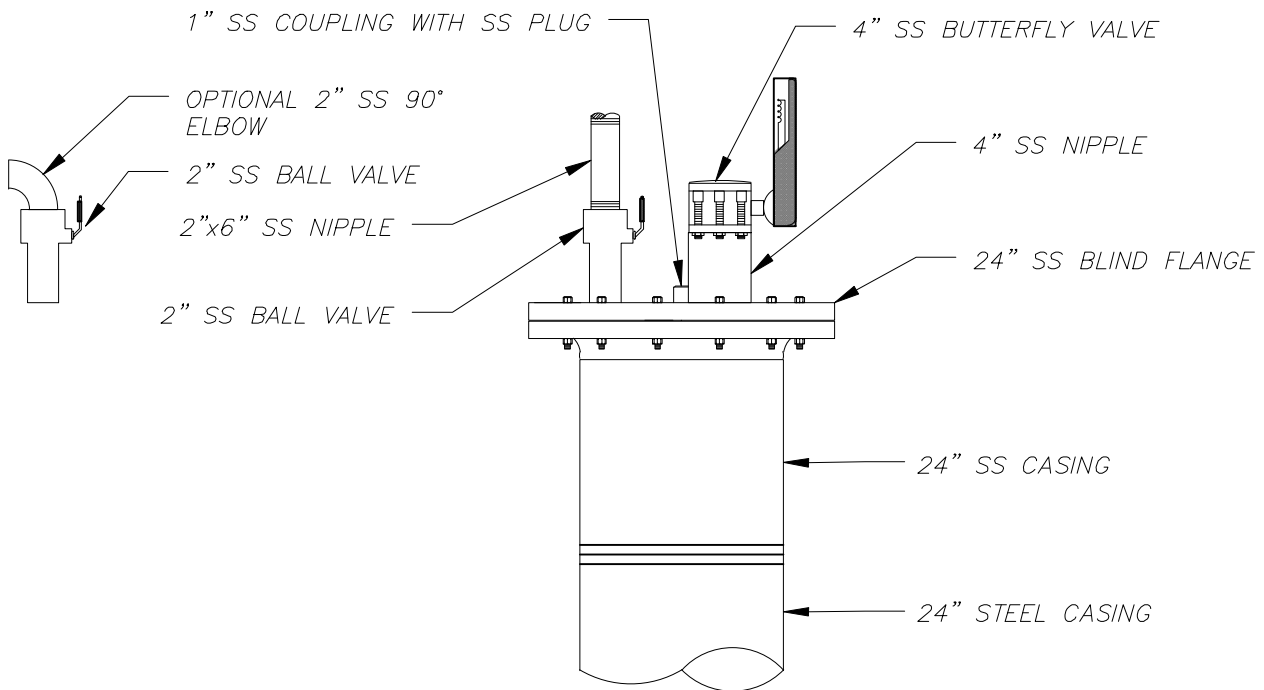
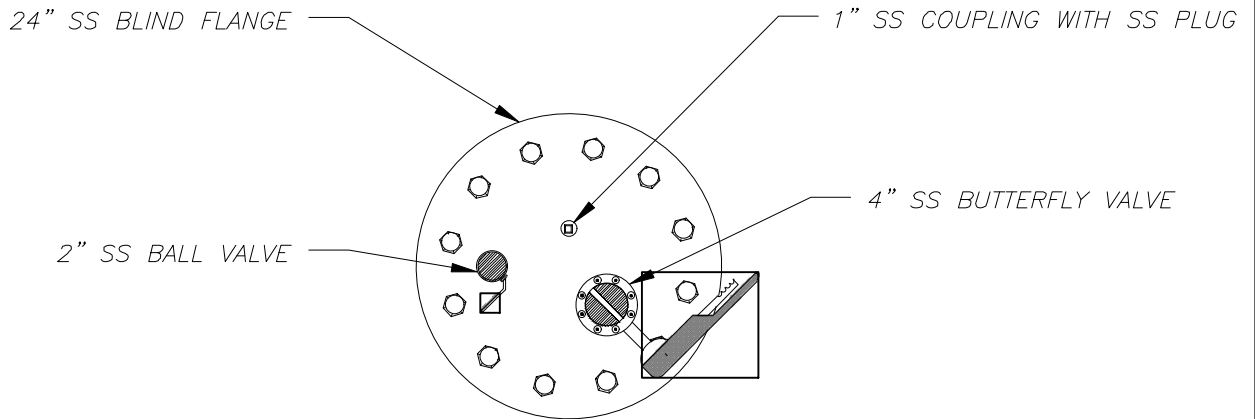


FIGURE 5. AERIAL PHOTO SHOWING SITE FOR WELL 10F.



TEMPORARY WELLHEAD FOR UFA WELLS

N.T.S.

FROM JOHNSON ENGINEERING

FIGURE 7. SCHEMATIC DIAGRAM FOR TEMPORARY WELLHEAD.

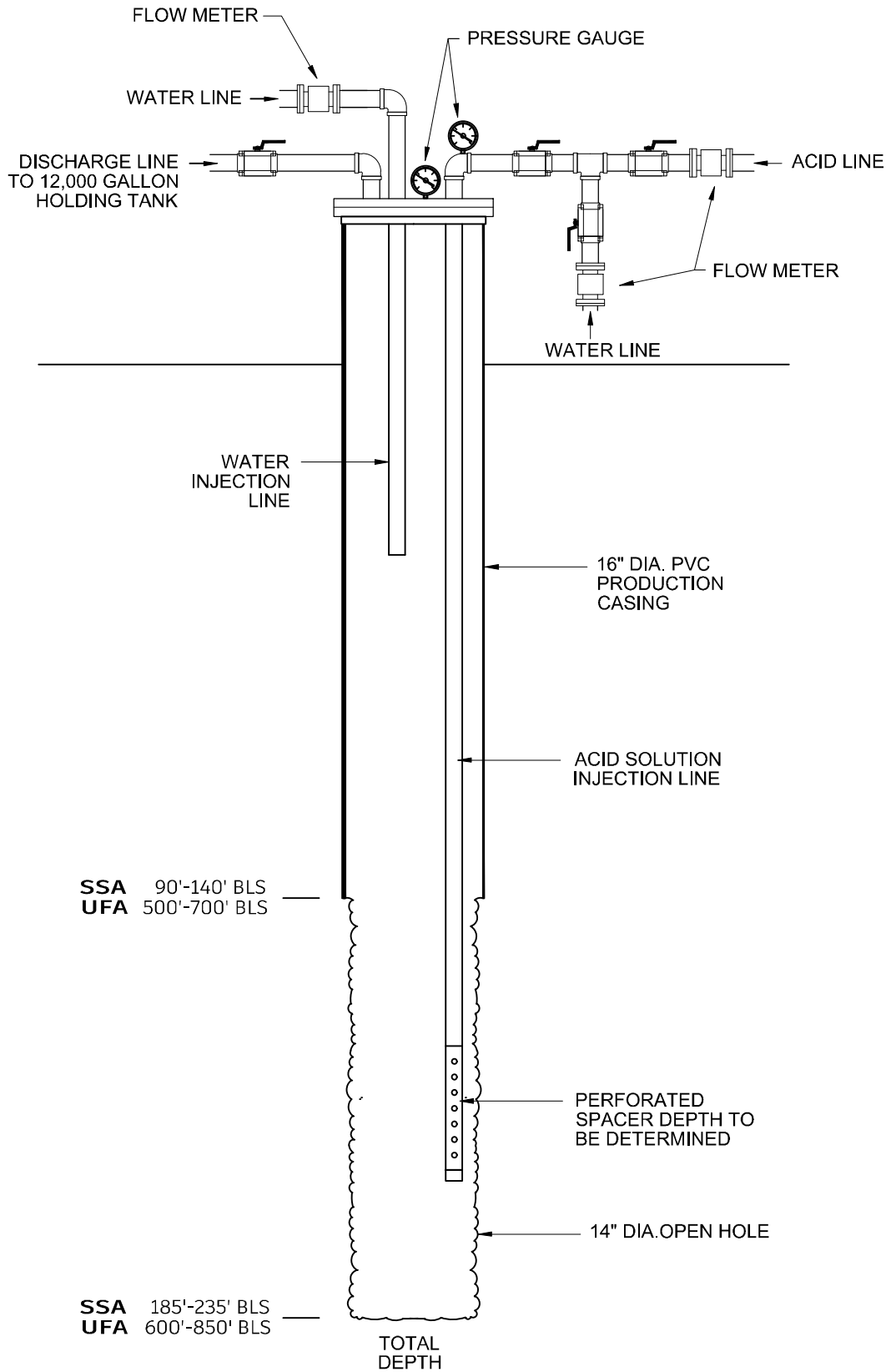


FIGURE 8. SCHEMATIC DIAGRAM FOR ACIDIZATION.

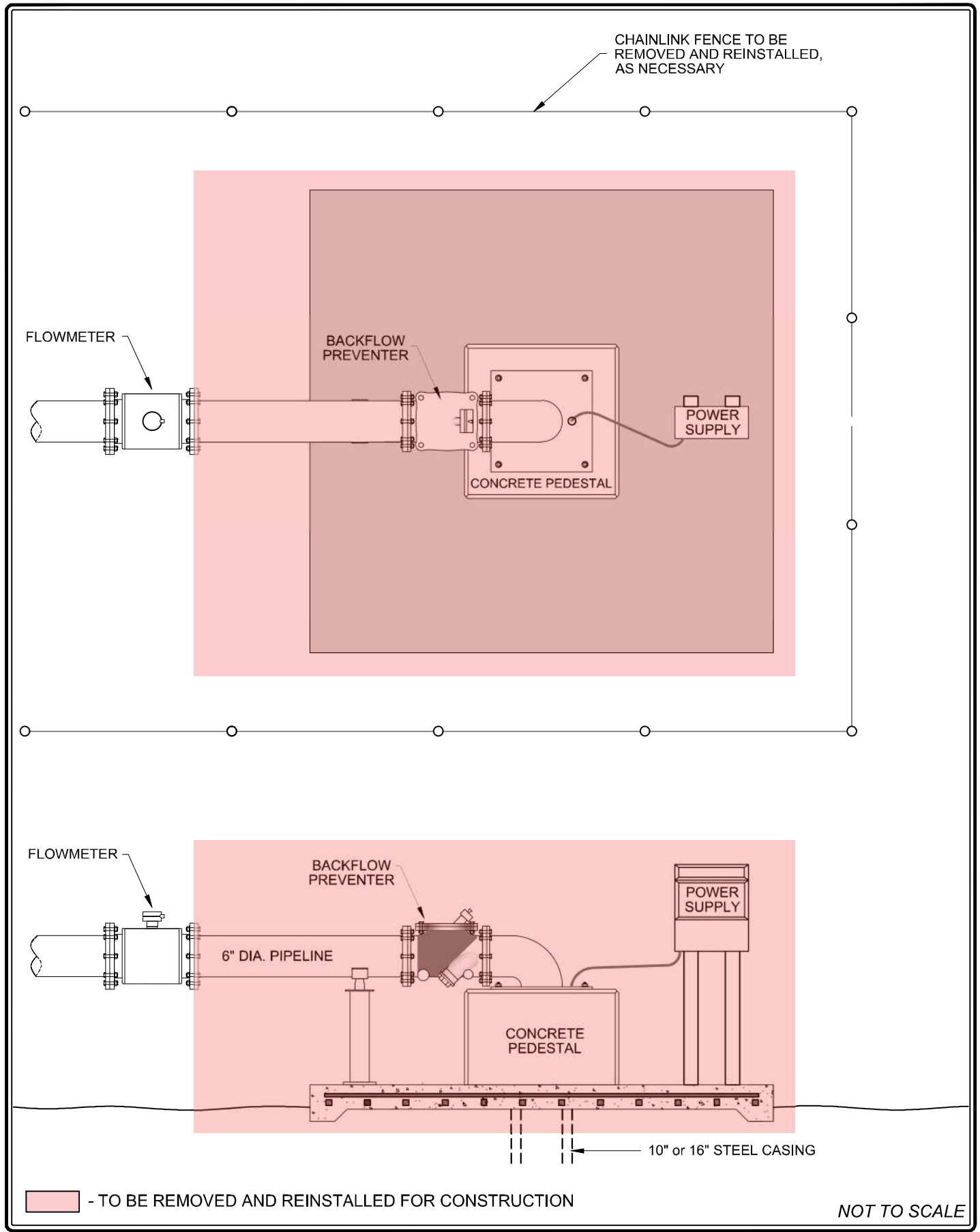


FIGURE 9. SCHEMATIC DETAILS FOR SURFACE APPURTENANCES FOR SSA WELLS .



FIGURE 10. PHOTO OF TYPICAL SURFACE FACILITIES FOR SSA WELLS.