POTABLE WELL ACIDIZATION, WELL ABANDONMENT & MONITORING WELL CONSTRUCTION

FEBRUARY 18, 2014

PREPARED FOR:

CITY OF NAPLES
735 8TH STREET
NAPLES, FLORIDA 34102

PREPARED BY:

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ENGINEERS, SURVEYORS, PLANNERS AND ECOLOGISTS
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Johnson Engineering, Inc.
E.B. #642 & L.B. #642

CITY OF NAPLES
POTABLE WELL ACIDIZATION, WELL ABANDONMENT & MONITORING WELL CONSTRUCTION TECHNICAL SPECIFICATIONS

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All materials and construction methods used for the proposed improvements shall conform to the approved Construction Documents and Technical Specifications provided by Johnson Engineering, Inc. and City of Naples Utilities Specifications and Standards Manual (latest approved edition), whichever is more stringent, and all federal, state and local regulations.

END OF SECTION

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SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Description of Work

B. Constraints

C. Work by Others

D. CONTRACTOR's Use of Site

E. Work Sequence

F. Owner Occupancy

1.2 DESCRIPTION OF WORK

A. General: The Work to be done under this Contract consists of the acidization of potable water production wells, video logging of rehabilitated production wells, video and geophysical logging monitoring wells, plug and abandoning monitoring wells and construction monitoring wells consisting of some or all of the following:

Pre and post-acidization step-drawdown test
Well acidization
Successful Bacteriological Survey Analysis
Video and geophysical logs
Plug and Abandonment of monitoring wells
Construction of monitoring wells

as shown and specified in Contract Documents.

B. The Work includes:

1. Furnishing of all labor, material, superintendence, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies, services and other means of construction necessary or proper for performing and completing the Work.

2. Sole responsibility for adequacy of wells and equipment.

3. Maintaining the Work area and site in a clean and acceptable manner.

4. Maintaining existing facilities in service at all times except where specifically provided for otherwise herein.

5. Protection of finished and unfinished Work.

6. Repair and restoration of Work damaged during construction.

7. Furnishing as necessary proper equipment and machinery, of a sufficient capacity, to facilitate the Work and to handle all emergencies normally encountered in Work of this character.

8. Furnishing, installing, and protecting all necessary guides, track rails, bearing plates, anchor and attachment bolts, and all other appurtenances needed for the installation of the devices included in the equipment specified. Make anchor bolts of appropriate size, strength and material for the purpose intended. Furnish substantial templates and shop drawings for installation.

9. Storing OWNER's equipment.

C. Implied and Normally Required Work: It is the intent of these Specifications to provide the OWNER with complete operable systems, subsystems and other items of Work. Any part or item of Work which is reasonably implied or normally required to make each installation satisfactorily and completely operable is deemed to be included in the Work and the Contract Amount. All miscellaneous appurtenances and other items of Work incidental to meeting the intent of these Specifications are included in the Work and the Contract Amount even though these appurtenances may not be specifically called for in these Specifications.

D. Quality of Work: Regard the apparent silence of the Contract Documents as to any detail, or the apparent omission from them of a detailed description concerning any Work to be done and materials to be furnished as meaning that only the best general practice is to prevail and that only materials and workmanship of the best quality are to be used. Interpretation of these specifications will be made upon this basis.

1.3 CONTRACTOR'S USE OF SITE

A. In addition to the requirements of the General Conditions, limit use of site and premises for work and storage to allow for the following:

1. Coordination of the Work under this CONTRACT with the work of the other contractors where Work under this CONTRACT encroaches on the Work of other contractors.

2. OWNER occupancy and access to operate existing facilities.

3. Coordination of site use with ENGINEER.

4. Responsibility for protection and safekeeping of products under this CONTRACT.

5. Providing additional off site storage at no additional cost to OWNER as needed.

1.4 WORK SEQUENCE

A. Construct Work in stages to accommodate OWNER's use of premises during construction period and in accordance with the limitations on the sequence of construction specified. Coordinate construction schedules and operations with ENGINEER.

The contractor shall perform the work such that a maximum of three wells are out of service at any one time. Well rehabilitation will be at the determination of the OWNER and the specific work at each well will consist of the following:

1. Submit detailed schedule.
2. Video and photo archive existing well site condition.
3. Remove existing pump, drop pipe, wire, equipment, etc and store.
4. Perform video log as decided by ENGINEER.
5. Install test pump and perform step-drawdown test.
6. Acidize well per appropriate specification as decided by ENGINEER.
7. Air develop well.
8. Develop well by over pumping.
9. Perform step-drawdown test.
10. Perform video log.
11. Install permanent pump.
12. Disinfect the well.
13. Complete bacteriological clearance of the well.

The contractor shall perform video and geophysical logging of well at the determination of the OWNER and the specific work at each well will consist of the following:

1. Mobilizing and prepare site.
2. Perform video and/or geophysical logging of 2 to 16-inch diameter well.
3. Demobilize site.

The contractor shall plug and abandon monitoring well at the determination of the OWNER and the specific work at each well will consist of the following:

1. Mobilizing and prepare site.
2. Plug and Abandon 2 to 4-inch diameter well less than 200 feet.
3. Demobilize site.

The contractor shall construct monitoring well at the determination of the OWNER and the specific work at each well will consist of the following:

1. Mobilizing and prepare site.
2. Drill to 300 feet BLS, collecting lithologic and water quality samples.
3. Perform video and geophysical logging.
4. Construct 4-inch monitoring well to 200 feet BLS.
5. Demobilize site

B. Coordinate Work of all subcontractors.

1.5 OWNER OCCUPANCY

A. OWNER will occupy premises during entire period of construction in order to maintain normal operations. Cooperate with OWNER's representative in all construction operations to minimize conflict, and to facilitate OWNER usage.

B. Conduct operations so as to inconvenience the general public in the least.

1.6 LIST OF DRAWINGS

The drawings listed below, following "END OF SECTION," are a part of this Specification.

FIGURE #	TITLE
1	Groundwater Rule Compliance- Golden Gate Wellfield
2	Groundwater Rule Compliance- Coastal Ridge Wellfield
3	Typical Monitoring Well
4	Temporary Wellhead

Table #	TITLE
1	Golden Gate Wellfield- Well Locations & Well Specifications
2	Coastal Ridge Wellfield- Well Locations & Well Specifications

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

A. Starting Work: Start Work within 10 days following the date stated in the Notice to Proceed and execute with such progress as may be required to prevent delay to other contractors or to the general completion of the project. Execute Work at such items and in or on such parts of the project, and with such forces, material and equipment, as to complete the Work in the time established by the Contract. At all times, schedule and direct the Work so that it provides an orderly progression to completion within the specified time for completion.

END OF SECTION

Figure 1
Ground Water Rule Compliance – Eastern Golden Gates Wellfield
Representative Source Water Sampling Locations

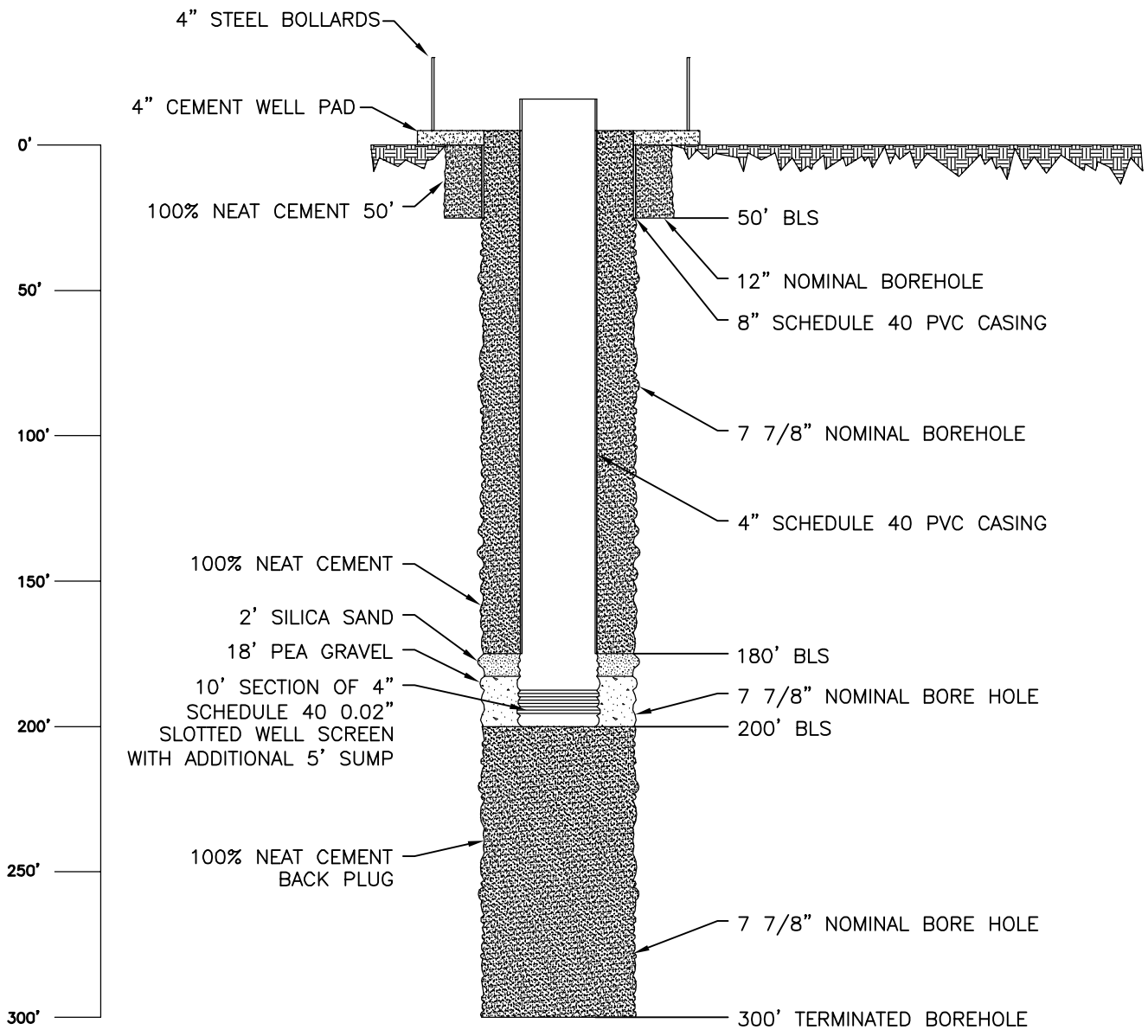
HAZEN AND SAWYER
Environmental Engineers & Scientists

4100-003fig 0.ai

Figure 2
Ground Water Rule Compliance – Coastal Ridge Wellfield
Representative Source Water Sampling Locations

HAZEN AND SAWYER
Environmental Engineers & Scientists

41000-003R2.cdr



TYPICAL MONITORING WELL

0:\2012\20129093-000\Water Mgmt\Drawings\Typical Monitoring Well.dwg (Typical Monitoring Well) mll2 Feb 17, 2014 - 3:56pm

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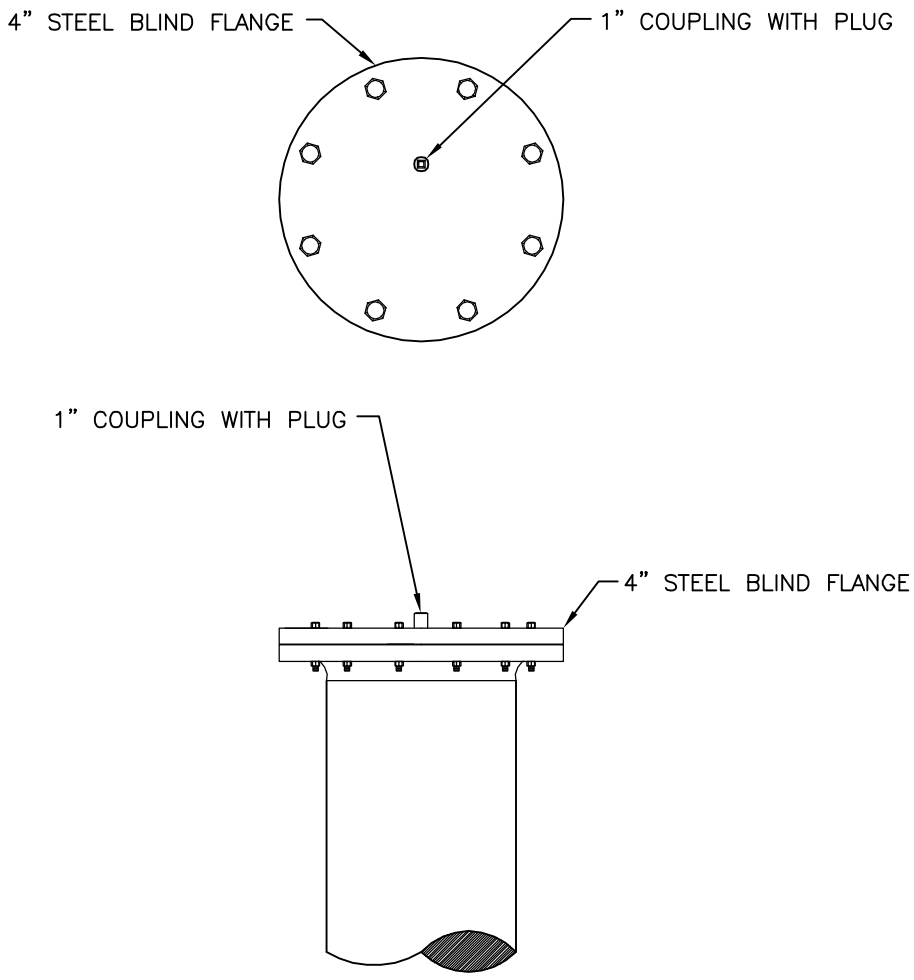
Figure 3
Monitoring Well Design

DATE	PROJECT NO.	FILE NO.	SCALE	SHEET
February 2014	20129093-002		As Shown	1 Of 1



TEMPORARY WELLHEAD

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Figure 4
Temporary Wellhead

DATE	PROJECT NO.	FILE NO.	SCALE	SHEET
February 2014	20129093-002		As Shown	1 Of 1

Table 1- Golden Gate Wellfield: Well Locations and Well Specifications

SITE #	DESCRIPTION	ADDRESS_LOCATION	WELL LOCATION (see remarks)	WELL DIAMETER (IN)	WELL DEPTH (FT)	WELL CASING DEPTH (FT)	PUMP CAPACITY (GAL)	RECENT ACTUAL FLOW	YEAR DRILLED	PUMP	VOLTS
GOLDEN GATE WELLS (Map Locations on Figure 1											
401	G.G.WELLS	3881 8TH AVE NE	Steel Bldg.	14"	71	42	500	776	1978	40HP	480
402	G.G. WELL	3875 6TH AVE NE	Steel Bldg.	14"	93	47.5	500	786	1978	40HP	480
403	G.G. WELL	3861 4TH AVE NE	Steel Bldg.	14"	80	39	500	575	1978	40HP	480
404	G.G. WELL	3861 2ND AVE NE	Steel Bldg.	14"	81	42	700	788	1978	40HP	480
405	G.G WELL	3861 GG blvd.	Steel Bldg.	14"	98	42	900	1202	1978	40HP	480
406	G.G. WELL	3871 2nd ave SE	Steel Bldg.	14"	101	42	500	746	1978	40HP	480
407	G.G. WELL	3875 4th Ave SE	Steel Bldg.	14"	109	47	900	951	1978	60HP	480
408	G.G. WELL	3871 6th Ave SE	Steel Bldg.	14"	133	42	900	928	1978	60HP	480
409	G.G. WELL	3861 8th Ave SE	Steel Bldg.	14"	82	42	700	852	1978	60HP	480
410	G.G. WELL	3875 10th Ave SE	Steel Bldg.	14"	131	42	700	442	1978	40HP	480
411	G.G. WELL	3861 12th Ave SE	Steel Bldg.	14"	112	37	600	1030	1981	60HP	480
412	G.G. WELL	3865 14th Ave SE	Steel Bldg.	14"	100	37	700	683	1981	40HP	480
413	G.G. WELL	3981 16th Ave SE	Steel Bldg.	14"	100	40	700	908	1981	40HP	480
414	G.G. WELL	3865 18TH AVE SE	Steel Bldg.	14"	80	38	700	976	1981	40HP	480
416	G.G. WELL	3861 12TH AVE NE	Steel Bldg.	14"	137	39	1000	812	1981	60HP	480
417	G.G. WELL	3871 14TH AVE NE	Steel Bldg.	14"	117	40	1000	736	1981	40HP	480
418	G.G. WELL	3851 16TH AVE NE	Steel Bldg.	14"	100	39	1000	1051	1981	60HP	480
419	G.G. WELL	no site address/east of 3840 18th ave N	Steel Bldg.	14"	85	42	1000	1074	1985	60HP	480
421	G.G. WELL	no site address	Steel Bldg.	14"	78	51	700	1213	1985	60HP	480
420	G.G. WELL	3871 20th Ave NE	Structured Bldg.	14"	86	46	1000	1288	1985	75HP	480
423	G.G WELL	220 Everglades BLVD N.	Structured Bldg.	14"	75	59	750	975	1988	60HP	480
424	G.G. WELL	3011 4TH AVE NE	Structured Bldg.	16"	105	57	400	673	2010	40HP	480
425	G.G. WELL	3870 24TH AVE NE	Structured Bldg.	16" to 60'	90	60	1000	974	2010	100HP	480

REMARKS: IDENTIFIES IF WELL IS IN A STRUCTURE
OR IN LOCATION WHERE THERE ARE LIMITATIONS
G.G.= Golden Gate Well Field
Median=in middle of 4 lane road
FPL power Lines= inicates may be issues with overhead lines
Steel Bldg.=well is accessed by removing half of structure
Structured Bldg.=well is accessed by removing through roof

Table 2- Coastal Ridge Wellfield: Well Locations and Well Specifications

SITE #	DESCRIPTION	ADDRESS_LOCATION	WELL LOCATION (see remarks)	WELL DIAMETER (IN)	WELL DEPTH (FT)	WELL CASING DEPTH (FT)	PUMP CAPACITY (GAL)	RECENT ACTUAL FLOW	YEAR DRILLED	PUMP	VOLTS
COASTAL RIDGE WELLS Map locations on Figure 2											
302	REUSE/WELL	SOUTH WILDERNESS EASEMENT	behind golf	8"	87	57	350	208	1958	10HP	240
303	C.R. WELL	SOUTH WILDERNESS EASEMENT	Near golf course	8"	89	56	350	315	1958	10HP	240
317	C.R. WELL	5100 GOODLETTE RD	FPL Power lines	8"	80	56	350	215	1969	20HP	240
318	C.R. WELL	5300 GOODLETTE RD	FPL Power lines	8"	80	56	350	405	1969	20HP	240
319	C.R. WELL	5500 GOODLETTE RD	FPL Power lines	8"	77	55	350	421	1969	20HP	240
320	C.R. WELL	5700 GOODLETTE RD	FPL Power lines	8"	77	57	350	351	1969	20HP	240
301	C.R. WELL	2200 GOODLETTE RD	Median	8"	90	56	350	408	1958	20HP	240
304	C.R. WELL	2650 GOODLETTE	Median	8"	82	53	350	427	1962	20HP	240
305	C.R. WELL	2800 GOODLETTE	Median	8"	82	53.5	350	227	1962	10HP	240
306	C.R. WELL	2950 GOODLETTE	Median	8"	82	50.75	350	344	1962	20HP	240
306-A	C.R. WELL	3252 GOODLETTE RD	Median	8"	80	48	350	330	2002	10HP	240
309-A	C.R. WELL	3900 GOODLETTE RD	Median	8"	80	52	350	340	2002	10HP	240
300-1A	WTP WELL	1000 FLIESHMANN BLVD	located at WTP	6"	95.6	84.6	350	N/A	1953	10HP	240
300-2A	WTP WELL	1000 FLIESHMANN BLVD	No limitations	8"	85	58	350	N/A	1976	20HP	480
300-6A	WTP WELL	12TH AVE N. & 15TH STN.	No limitations	10"	95	73.66	350	N/A	1968	20HP	240
307	C.R.WELLS	3100 GOODLETTE	No limitations	8"	89	59.5	350	325	1964	10HP	240
308	C.R. WELL	3300 GOODLETTE	No limitations	8"	80	58.66	350	322	1964	10HP	240
309	C.R. WELL	3600 GOODLETTE	No limitations	8"	87	63	350	291	1964	10HP	240
310	C.R.WELLS	4000 GOODLETTE RD	No limitations	8"	87	53.5	350	351	1964	10HP	240
311	C.R. WELL	BURNING TREE DRIVE	No limitations	8"	80	63.5	350	176	1965	10HP	240
312	C.R. WELL	MOORINGS EASEMENT	No limitations	8"	83	63	350	366	2007	20HP	240
313	C.R. WELL	MOORINGS EASEMENT	No limitations	8"	83	62.58	350	320	1965	20HP	240
314	C.R. WELL	MOORINGS PARK	No limitations	8"	83	63.83	350	395	1965	20HP	240
315	C.R. WELL	N. MOORINGS PARK	No limitations	8"	83	63.5	350	276	1965	10HP	240
316	C.R. WELL	NORTH GATE VILLAGE	No limitations	10"	80	N/A	350	305	1968	10HP	240
321	C.R. WELL	6000 GOODLETTE RD	No limitations	8"	80	55	350	290	1969	20HP	240
322	C.R. WELL	6200 GOODLETTE RD	No limitations	8"	80	56	350	420	1969	20HP	240
323	C.R. WELL	6500 GOODLETTE RD	No limitations	8"	85	61	350	418	1971	20HP	240
324	C.R. WELL	6900 GOODLETTE RD	No limitations	8"	85	63	350	270	1971	20HP	240
327	C.R. WELL	7800 GOODLETTE RD	No limitations	8"	82	55	350	271	1971	20HP	240
328	C.R. WELL	8000 GOODLETTE RD	No limitations	8"	85	61	350	263	1971	20HP	240

317 thru 321 statistics determined by Video

REMARKS: IDENTIFIES IF WELL IS IN A STRUCTURE
OR IN LOCATION WHERE THERE ARE LIMITATIONS
C.R.= Coastal Ridge Well Field
Median=in middle of 4 lane road
FPL power Lines= inicates may be issues with overhead lines
Steel Bldg.=well is accessed by removing half of structure
Structured Bldg.=well is accessed by removing through roof

SECTION 01026

MEASUREMENT AND PAYMENT

Applies only to City of Naples Utilities Projects and Utilities Portions of City of Naples Stormwater, Streets and Traffic Projects, but not to Private Developments

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Explanation and Definitions

B. Measurement

C. Payment

D. Schedule of Values

1.2 EXPLANATION AND DEFINITIONS

A. The following explanation of the Measurement and Payment for the Bid Schedule items is made for information and guidance. The omission of reference to any item in this description shall not, however, alter the intent of the Bid Schedule or relieve the CONTRACTOR of the necessity of furnishing such as a part of the Contract. Measurement and payment for all Contract Items shall made be in accordance with this section or as modified by the Supplemental Terms and Conditions.

1.3 MEASUREMENT

A. The quantities set forth in the Bid Schedule are approximate and are given to establish a uniform basis for the comparison of bids. The CITY reserves the right to increase or decrease the quantity of any class or portion of the work during the progress of construction in accord with the terms of the Contract.

1.4 PAYMENT

A. Make payment for the items listed on the Bid Schedule on the basis of the work actually performed and completed, such work including but not limited to, the furnishing of all necessary labor, materials, equipment, transportation, clean up, restoration of disturbed areas, and all other appurtenances to complete the construction and installation of the work as shown on the drawings and described in the specifications.

B. Unit prices are used as a means of computing the final figures for bid and Contract purposes, for periodic payments for work performed, for determining value of additions or deletions and wherever else reasonable.

1.5 SCHEDULE OF VALUES

A. Approval of Schedule: Submit for approval a preliminary schedule of values, in duplicate, for all of the Work. Prepare preliminary schedule in accordance with the Supplemental Terms and Conditions. Submit preliminary schedule of values within 10 calendar days after the Effective Date of the Agreement. Submit final schedule of values in accordance with the Supplemental Terms and Conditions.

B. Format: Utilize a format similar to the Table of Contents of the Project Specifications. Identify each line item with number and title of the major specification items. Identify site mobilization, bonds and insurance. Include within each line item, a direct proportional amount of CONTRACTOR's overhead profit.

C. Revisions: With each Application for Payment, revise schedule to list approved Change Orders.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 MEASUREMENT AND PAYMENT

A. Make payment on the basis of work actually performed completing each item in the Bid, such work including, but not limited to, the furnishing of all necessary labor, materials, equipment, transportation, cleanup, and all other appurtenances to complete the construction and installation of the work to the configuration and extent as shown on the drawings and described in the specifications. Payment for each item includes compensation for cleanup and restorations. Cost of cleanup and surface restorations (including pavement replacement) will be considered as the percentage retained in accordance with the Contract Documents, and complete payment will not be made until cleanup, restorations and as-builts are completed.

1. Mobilization and Preparation: Payment for Mobilization and Preparation shall include all cost for preparatory work and operations in mobilizing and demobilizing for beginning/ending work, including movement of personnel, equipment, supplies and incidentals to/from the project site, and any other pre and/or post construction expense necessary for the work, restoring the well site to its original condition including well disinfection per the Specifications, all costs for insurance requirements, administrative costs, permitting (less City permitting fees), field engineering, construction schedules, construction photographs, shop drawings, temporary facilities, safety, and first aid supplies, sanitary and other facilities (as required by

specifications), and all other related items as required to complete the proposed work, per the Drawings, Specifications, and City of Naples requirements.

2. Furnish and Emplace Strong Acid: Payment will be made at the Contract lump sum price for the item, which shall be full compensation for providing 32% Inhibited Hydrochloric Acid onsite including delivery and handling charges, emplacement of acid in the borehole as specified in SECTION 02684 WELL ACIDIZATION – 32% and including but not limited to all materials, equipment, labor, and all other incidentals required to complete the work as described in these Specifications.

3. Air Develop Well Clean From Solids: Payment will be made at the Contract unit price for the item, which shall be full compensation for providing all items necessary to air develop the well clean from solids, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications.

4. Install Temporary Pump: Payment will be made at the Contract unit price for the item, which shall be full compensation for providing all items necessary to air develop the well clean from solids, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications.

5. Install Temporary Piping, Throttling Device, Flow Meter: Payment will be made at the Contract lump sum price for the item, which shall be full compensation for providing and installing temporary piping, throttling device, flow meter, pressure transducer, data logger, erosion and turbidity control materials etc. necessary to control water during pumping, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications.

6. Develop Well by Over Pumping: Payment will be made at the Contract unit price for the item, which shall be full compensation for pumping the well continuously at its maximum pumping capacity, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications.

7. Perform 4 Hour Step-Drawdown Test: Payment will be at the Contract unit price for the item which shall be full compensation for pumping the well continuously for four hours at variable rates as determined by ENGINEER, and the collection and distribution of data from manual water level measurements, flow meter readings, and electronic data logger including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications.

8. Video Log Well (DVD Format): Payment will be at the Contract lump sum price for the item which shall be full compensation for video logging the well and providing DVD video recordings, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications

9. Stand By: Payment will be made at the Contract unit price per hour for the item, which shall be full compensation for shutdown time of the equipment and drill crew for any portion of the working day as directed by the OWNER or ENGINEER and detailed in the specifications.

10. Assist Engineer: Payment will be made at the Contract unit price for the item which will be full compensation for completing the work, including but not limited to, equipment, labor, tools, and all other incidentals required to assist ENGINEER as specified by ENGINEER.

11. 2-inch Video Log (DVD Format): Payment will be at the Contract lump sum price for the item which shall be full compensation for video logging a 2-inch diameter well to a maximum depth of 200 feet and providing DVD video recordings, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications. Truck accessible site with readily removable flange or well cap. No lane closures required.

12. 4-inch to 16-inch Video Log (DVD Format): Payment will be at the Contract lump sum price for the item which shall be full compensation for video logging a 4-inch to 16-inch diameter well to a maximum depth of 200 feet and providing DVD video recordings, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications. The site is truck accessible. The well has a readily removable flange or well cap. There will be no lane closures or maintenance of traffic required.

13. Static and Dynamic Geophysical Logs: Payment will be at the Contract lump sum price for the item which shall be full compensation for static and dynamic logging a 4-inch to 16-inch diameter well to a maximum depth of 200 feet and providing digital files of recordings, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications. Requires a 4-inch submersible pump or 2-inch diameter suction end of a 5 horsepower centrifugal pump. The site is truck accessible. The well has a readily removable flange or well cap. There will be no lane closures or maintenance of traffic required.

14. Plug and Abandon 2-inch Well 30 feet or Less BLS : Payment will be at the per sack price for completion of appropriate plugging and abandonment of well from bottom to land surface. The site is truck accessible. The well has

a readily removable flange or well cap. There will be no lane closures or maintenance of traffic required.

15. Plug and Abandon 2-inch Well 31 feet to 150 Feet BLS : Payment will be at the per sack price for completion of appropriate plugging and abandonment of well from bottom to land surface. The site is truck accessible. The well has a readily removable flange or well cap. There will be no lane closures or maintenance of traffic required.

16. Plug and Abandon 4-inch Well 40 Feet or Less BLS : Payment will be at the per sack price for completion of appropriate plugging and abandonment of well from bottom to land surface. The site is truck accessible. The well has a readily removable flange or well cap. There will be no lane closures or maintenance of traffic required.

17. Plug and Abandon 4-inch Well 41 feet to 200 Feet BLS : Payment will be at the per sack price for completion of appropriate plugging and abandonment of well from bottom to land surface. The site is truck accessible. The well has a readily removable flange or well cap. There will be no lane closures or maintenance of traffic required.

18. Mobilization / Site Preparation / Permitting: Payment will be made at the Contract lump sum price for the item, which shall be full compensation for mobilizing all necessary equipment and personnel to the site, site preparation including but not limited to work pad construction, well location staking by a Florida Licensed Professional Surveyor and Mapper, installation of pit casing if necessary, and procurement of all necessary permits, including but not limited to construction permits from the South Florida Water Management District and Collier County.

19. Drill 8-inch Pilot Hole and Collect Samples to 50 feet BLS: Payment will be made at the Contract unit price for the item, which shall be full compensation for providing all items necessary to drill a nominal 7 7/8-inch diameter borehole to approximately 50 feet below land surface using mud rotary drilling techniques and collecting samples as specified in Section 02050 DRILLING, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications.

20. Ream Pilot Hole to 12-inch: Payment will be made at the Contract unit price for the item, which shall be full compensation for providing all items necessary to ream pilot hole to a nominal 12-inch diameter borehole to approximately 50 feet below land surface using mud rotary drilling techniques, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications. The payment shall be based upon actual feet reamed below land surface.

21. Furnish and Install 8-inch Schedule 40 PVC Casing: Payment will be made at the Contract unit price for the item, which shall be full compensation for providing casing onsite including delivery and handling charges and installation of casing in the borehole, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications. The payment shall be based upon actual feet installed below land surface.

22. Cement 8-Inch Casing to Surface with 100% Neat Cement: Payment will be made at the Contract unit price for the item, which shall be full compensation for providing all items necessary to grout annular space from bottom to top with 100% Neat Cement, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications.

23. Drill 7 7/8-Inch Hole Using Reverse Air or Clear Water-Rotary, Collect Water Samples Every 20 feet and Run Flow Test Every 20 feet; Payment will be made at the Contract unit price for the item, which shall be full compensation for providing all items necessary to drill a nominal 7 7/8-inch diameter borehole and collect samples to approximately 300 feet below land surface using reverse or clear water drilling techniques, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications. Measurement shall be made from the bottom of the previous pilot hole to the terminated pilot hole prior to tripping out of the borehole.

24. Perform Geophysical Logs (Gamma, Dual Induction, Conductivity, Caliper, Static and Dynamic): Payment will be at the Contract lump sum price for the item which shall be full compensation for performing a Geophysical Log (Gamma, Conductivity, Caliper, Static and Dynamic) of the well as specified in Section 02160 GEOPHYSICAL LOGGING, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications.

25. Video Log Well (DVD Format): Payment will be made at the Contract lump sum price for the item which shall be full compensation for video logging the well up to a depth of 300 feet and providing DVD video recordings, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications.

26. Backplug Well with 100% Neat Cement: Payment will be made at the Contract unit price for the item, which shall be full compensation for providing all items necessary to cement bore hole with 100% neat cement via tremie method to approximately 200 feet bls or as determined by ENGINEER, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications. Measurement shall be based upon sacks of cement placed.

27. Furnish and Install 4-Inch Casing with 10 Feet of 0,020-Inch Slotted Well Screen and Five Feet Bottom Sump: Payment will be made at the Contract unit price for the item, which shall be full compensation for providing casing onsite including delivery and handling charges and installation of casing in the borehole, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications. The payment shall be based upon actual feet installed below land surface.

28. Place Pea Gravel, 2 Feet of Silica Sand Around Screened Interval: Payment will be made at the Contract unit price for the item, which shall be full compensation for providing all items necessary to pack annular space from bottom to 182 feet BLS with pea gravel and silica sand to 180 feet BLS, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications.

29. Cement 4-Inch Casing to Surface with 100% Neat Cement: Payment will be made at the Contract unit price for the item, which shall be full compensation for providing casing onsite including delivery and handling charges and installation of casing in the borehole, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications. The payment shall be based upon actual feet installed below land surface.

30. Air Develop Well Clean of Solids: Payment will be made at the Contract unit price for the item, which shall be full compensation for providing all items necessary to air develop the well clean from solids, including but not limited to, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications. The well will be deemed sufficiently clean when the pumped water is reasonably free of sand, silt, drilling mud and clay or as determined by ENGINEER. Measurement shall be based on hours of development.

31. Install Well Pad, Blind Flange, Wellhead and 4 Protective Bollards: Payment will be made at the Contract lump sum price for the item, which shall be full compensation for the blind flange wellhead including but not limited to, 3 feet square 4-inch thick concrete pad centered around well, four 4-inch steel protective bollards filled with concrete, all materials, equipment, labor, and all other incidentals required to complete the work as shown on the drawings and included in the Specifications.

B. Prior to submitting first monthly Application for Payment, Contractor shall submit to Engineer, for review and approval, a schedule of values based upon the Contract Price, listing the major elements of the Work and the dollar value for each element. After its approval by the Engineer, this schedule of values shall be used as the basis for the Contractor's monthly Applications for Payment.

C. Prior to submitting first monthly Application for Payment, Contractor shall submit to The City a complete list of all its proposed subcontractors and materialmen, showing the work and materials involved and the dollar amount of each proposed subcontract and purchase order. The first Application for Payment shall be submitted no earlier than thirty (30) days after the Commencement Date.

D. If payment is requested on the basis of materials and equipment not incorporated into the Project, but delivered and suitably stored at the site or at another location agreed to by the City in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice or other documentation warranting that the City has received the materials and equipment free and clear of all liens, charges, security interests and encumbrances, together with evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect the City's interest therein, all of which shall be subject to the City's satisfaction.

E. Contractor shall submit six (6) copies of its monthly Application for Payment to the Engineer on or before the 25th day of each month for work performed during the previous month. Invoices received after the 25th day of each month shall be considered for payment as part of the next month's application. Within ten (10) calendar days after receipt of each Application for Payment, the Engineer shall either:

1. indicate his approval of the requested payment;

2. indicate his approval of only a portion of the requested payment, stating in writing his reasons therefore; or

3. return the Application for Payment to the Contractor indicating, in writing, the reason for refusing to approve payment.

In the event of a total denial and return of the Application for Payment by the Engineer, the Contractor may make the necessary corrections and resubmit the Application for Payment. The City shall, within thirty (30) calendar days after the Engineer's approval of an Application for Payment, pay the Contractor the amounts so approved. Provided, however, in no event shall the City be obligated to pay any amount greater than that portion of the Application for Payment approved by the Engineer.

F. The City shall retain ten (10%) of the gross amount of each monthly payment request or ten percent (10%) of the portion thereof approved by the Engineer for payment, whichever is less. Such sum shall be accumulated and not released to the Contractor until final payment is due.

G. Monthly payments to Contractor shall in no way imply approval or acceptance of Contractor's work.

H. Contractor agrees and understands that funding limitations exist and that the expenditure of funds must be spread over the duration of the Project at regular

intervals based on the Contract Amount and Progress Schedule. Accordingly, prior to submitting its first monthly Application for Payment, Contractor shall prepare and submit for the Engineers review and approval, a detailed Project Funding Schedule, which shall be updated as necessary and approved by the City to reflect approved adjustments to the Contract Amount and Contract Time. No voluntary acceleration or early completion of the Work shall modify the time of payments to Contractor as set forth in the approved Project Funding Schedule.

I. All materials and construction methods used for the proposed improvements shall conform to the approved Construction Documents and Technical Specifications provided by Johnson Engineering, Inc. and City of Naples Utilities Specifications and Standards Manual (latest approved edition), whichever is more stringent, and all federal, state and local regulations.

3.2 PAYMENTS WITHHELD

A. The Engineer may decline to approve any Application for Payment, or portions thereof, because of subsequently discovered evidence or subsequent inspections. The Engineer may nullify the whole or any part of any approval for payment previously issued and the City may withhold any agreement between the City and Contractor, to such an extent as may be necessary in the City's opinion to protect it from loss because of:

1. Defective Work not remedied;

2. Third party claims filed or reasonable evidence indicating probable filing of such claims

3. Failure of Contractor to make payment properly to subcontractors or for labor, materials or equipment;

4. Reasonable doubt that the Work can be completed for the unpaid balance of the Contract Amount;

5. Reasonable indication that the Work will not be completed within the Contract Time;

6. Unsatisfactory prosecution of the Work by the Contractor; or

7. Any other material breach of the Contract Documents.

B. If these conditions in Subsection 5.1 are not remedied or removed, the City may, after three (3) days written notice, rectify the same at Contractor's expense. The City also may offset against any sums due Contractor the amount of any liquidated or unliquidated obligations of Contractor whether relating to or arising out of this Agreement or any other agreement between Contractor and the Engineer.

3.3 FINAL PAYMENT

A. The City shall make final payment to Contractor within thirty (30) calendar days after the Work is finally inspected and accepted by both the City and the Engineer in accordance with Section 20.1 herein provided that Contractor first, and as an explicit condition precedent to the accrual of Contractor's right to final payment, shall have furnished the City with any and all documentation that may be required by the Contract Documents and the City.

B. Contractor's acceptance of final payment shall constitute a full waiver of any and all claims by Contractor against the City arising out of this Agreement or otherwise relating to the Project, except those previously made in writing and identified by Contractor as unsettled at the time of the final Application for Payment. Neither the acceptance of the Work nor payment by the City shall be deemed to be a waiver of the City's right to enforce any obligations of Contractor hereunder or to the recovery of damages for defective Work not discovered by the Engineer at the time of final inspection.

END OF SECTION

NO TEXT FOR THIS PAGE

SECTION 02010
MOBILIZATION AND SITE PREPARATION

PART 1. GENERAL

1.0 SCOPE OF WORK

A. Work included in this section includes all work necessary to transport all materials, equipment, and personnel and prepare site for all well construction modifications, including but not limited to clearing, grubbing, work pad construction, access road or entry way construction and/or temporary culvert installation, well location staking by a Florida Licensed Professional Surveyor and Mapper, installation of pit casing if necessary, demobilization, removal of temporary culvert / fill if required by ENGINEER, and procurement of all necessary permits for construction from The South Florida Water Management District, Collier County and City of Naples.

PART 2. PRODUCTS

2.1 GENERAL

A. The CONTRACTOR is solely responsible for providing security for all materials stored on-site during the work.

PART 3. EXECUTION

3.1 GENERAL

A. The CONTRACTOR shall restrict his operations to the designated work area.

B. The CONTRACTOR is responsible for visually inspecting the site to note obstructions or access difficulties.

C. The CONTRACTOR is responsible for providing access to the work site to facilitate inspection and testing if required.

D. The CONTRACTOR is responsible for providing power, water, sanitary facilities, bafflers, access road, parking, construction area, and construction site safety needed to complete the work.

PART 4. PAYMENT

4.1 GENERAL

A. Payment for all work, materials and equipment specified in this section will be included in the appropriate unit price or lumps sum amount as stated in the CONTRACTOR's Bid Submittal and as described in Section 01026 MEASUREMENT AND PAYMENT.

END OF SECTION

SECTION 02050
DRILLING

PART 1. GENERAL

1.1 SCOPE OF WORK

A. Work included in this section includes all equipment, personnel and materials to complete mud rotary, direct air, and reverse-air drilling techniques alone or in combination, and associated testing operations as specified in these documents and as shown on the Drawing.

B. The work described herein consists of drilling and testing wells in accordance with these specifications in the locations and in the manner shown on the Drawings.

PART 2. PRODUCTS

2.1 PERSONNEL

A. The CONTRACTOR shall furnish capable personnel including skilled and experienced drillers and an adequate number of competent helpers to construct / modify and test all wells as specified.

2.2 EQUIPMENT

A. The CONTRACTOR shall provide appropriate drilling equipment capable of drilling boreholes and completing the wells as specified.

B. Only mud rotary, direct air, and reverse-air rotary drilling techniques, alone or in combination, will be utilized for these specifications.

C. The CONTRACTOR shall provide use to the ENGINEER of an electric water level probe having not less than 300 feet of cable marked in increments of 0.01 feet.

D. The CONTRACTOR shall provide and install a flow measuring device capable of measuring discharge from the wells within +/- 5% of true flow for flow rates ranging from 1 to 500 gallons per minute, or the maximum discharge rate of the drill rig during performance of specific capacity testing conducted during drilling of the pilot holes. The flow-measuring device can consist of machined orifice plate(s) and pipe(s), totalizing flow meter, storage tank or other device

approved by the ENGINEER, installed level, marked at 50 gallon increments as requested by the ENGINEER, and pumped free of discharge water before each flow test.

2.3 DRILLING FLUIDS

A. The ENGINEER must approve drilling fluids used during all drilling operations prior to use. Any water used during the drilling operation or cementing operations must be potable water or suitable groundwater. The CONTRACTOR shall make arrangements to secure the volume of potable water required to complete the work.

B. When drilling mud is used in drilling, only high-grade NSF approved clays in common usage for oil field drilling shall be used in the makeup of the drilling fluid. Drilling with a mixture of water and unprocessed mud, clay, or other objectionable material will not be permitted. The drilling fluid shall possess such characteristics as are required to adequately condition the walls of the hole to prevent caving of the walls as drilling progresses.

C. Drilling mud shall be contained on-site in suitable tanks for later disposal by the CONTRACTOR at an approved facility. Mud pits or lined excavations may be permitted at ENGINEER's discretion. Limestone, dolostone and sand cuttings from reverse air drilling may be utilized as additional cover material on the site access road and/or drilling pad if approved by ENGINEER.

PART 3.0 EXECUTION

3.1 GENERAL

A. The CONTRACTOR will notify the ENGINEER five days prior to initiating drilling operations for each well.

B. The CONTRACTOR will coordinate all drilling and testing activities with the ENGINEER in advance.

C. No drilling operations will be allowed until the CONTRACTOR has provided all of the necessary permits (State and Local) to the ENGINEER.

D. All drilling operations will be in strict conformance with all Federal, State and local laws regulating the drilling of water wells.

E. The CONTRACTOR will take all necessary precautions to prevent contamination of the well during the course of drilling activities. All

extraneous fluids on-site and fluids generated during drilling operations shall be controlled at all times.

F. The boreholes shall be drilled so as to permit the installation of the casing, straight and plumb, to the tolerances specified in Section 02070 CASING.

G. The boreholes for the wells shall be drilled within 1.0 feet of the horizontal locations specified. CONTRACTOR shall employ a Florida Licensed Surveyor and Mapper for well staking. If well is not completed within 1.0 feet of the exact location, ENGINEER may not accept the well.

H. All drilling will be measured to the nearest linear foot of completed borehole depth below land surface (bls).

I. The CONTRACTOR shall measure and record the water level in the well to the nearest 0.01 of a foot from a permanent measuring point at the beginning and end of each shift and during all tests.

J. The CONTRACTOR shall furnish the ENGINEER a daily drill log using the form attached to this specification section. The log shall accurately describe the geological materials and depths encountered; the presence or absence of water; depths of lost circulation zones and methods of regaining circulation; drilling rates; time; depth and description of any unusual occurrences or problems during drilling; description and size of drill bit and bottom hole assembly and diameters and lengths of casing installed. The log shall be kept up to date with the progress of drilling. A copy of the drill log shall be kept at the drill site for inspection by ENGINEER at any time. The daily drill log shall be submitted daily to the ENGINEER via hardcopy and via email as a pdf document.

K. Geophysical logging shall be conducted by the CONTRACTOR at the appropriate phase of drilling as identified in Section 01010 SUMMARY OF WORK and Section 02160 GEOPHYSICAL LOGGING.

L. The CONTRACTOR is responsible for filing all drilling and well completion records with the appropriate agencies.

3.2 DRILLING

A. Drilling through lost circulation zones is considered incidental. The CONTRACTOR recognizes the potential for lost circulation.

B. The CONTRACTOR shall take all precautions necessary to prevent the disturbance of any existing wells. The CONTRACTOR is responsible for ensuring that the existing wells' yield and performance remains intact.

C. Drill the boreholes to the dimensions specified in Section 01026 MEASUREMENT AND PAYMENT or as determined by ENGINEER.

D. Drill pilot holes to depths as determined by ENGINEER in the field.

E. Reaming of the pilot holes shall be done with a stepped bit reamer with a lead bit the size of the pilot hole bit and progressively larger diameter bits up to the reamer size required. Each bit shall be a minimum of two (2) feet apart in the reamer bit assembly to ensure that the reamer assembly follows the pilot hole.

F. The boreholes shall be drilled as to permit the installation of the casings straight and plumb as specified in SECTION 02070 CASING.

G. When recirculating or disposing of formation water during drilling, CONTRACTOR shall allow proper settlement time to prevent cuttings and high turbidity fluids from entering the well or being discharged. Reverse-air drilling is to be performed "Open Loop" and water is to be discharged a minimum 100 feet from well.

H. Whenever a well is being drilled in an area of artesian flow, the CONTRACTOR shall provide for all tools, piping, equipment, and operations necessary to prevent the uncontrolled artesian flow of water.

I. During drilling, the CONTRACTOR shall establish a static water level, whether above or below top of casing, prior to commencement of drilling operations each day. Water level shall be monitored periodically and recorded on the daily drilling report.

3.3 FORMATION SAMPLES

A. Two sets of representative formation samples shall be collected by the CONTRACTOR during drilling operations every 10 feet and at all major lithological changes. Each sample must be representative of the actual depth to which drilling has progressed. Samples shall be approximately 1 cup in volume. The CONTRACTOR shall place each sample in a container labeled with the date, well identification,

and depth interval from which the sample was collected. The CONTRACTOR shall submit the sample immediately to the ENGINEER as the samples are collected.

3.4 DISPOSAL OF CUTTINGS

A. ENGINEER may require removal and disposal of all cuttings, water, or other material generated by drilling operations that are not required to complete the work.

B. If needed, solid materials shall be disposed of by hauling to an FDEP-approved site. The CONTRACTOR shall submit to the ENGINEER a letter from the disposal facility stating FDEP approval.

3.5 COMPLIANCE WITH GOVERNMENTAL REGULATIONS

A. Construct the well in strict conformance with all laws, rules, regulations, and standards related to the construction of wells in the State of Florida, and Collier County.

3.6 WATER SAMPLES

A. Collect water quality samples using Reverse Air (with drill pipe), Direct Air with bit in casing, or Clear Water Circulation with bit at bottom and air line in casing.

B. The CONTRACTOR shall collect three water samples every 20 feet during drilling for water quality sampling. The samples shall be collected once the discharge water is clean and non-turbid. One of the samples shall be collected in a clean 1-liter plastic container and given to the ENGINEER immediately after sampling for field analysis and one sample is for the CONTRACTOR field analysis. The third sample shall be collected in laboratory-supplied bottles and be one quart in volume and submitted by the CONTRACTOR to the CONTRACTOR's lab for analysis. The bottle shall be clearly labeled with the following information: date, time, depth from which the sample was collected, well identification, project name, and the personnel who collected the sample. CONTRACTOR is responsible for analysis of water samples.

3.7 FLOW TESTS

A. Perform flow tests using Reverse Air (with drill pipe), Direct Air with bit in casing, or with bit at bottom and air line in casing.

B. The CONTRACTOR shall perform flow tests every 20 feet during drilling and provide means to measure flow rate at the point of discharge.

C. The flow tests shall include water level measurements

3.8 SUPPLEMENTS

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

1. Forms: DAILY DRILLING REPORT.

PART 4.0 PAYMENT

4.1 GENERAL

A. Payment for all work, materials and equipment specified in this section for drilling, reaming, the performance of air-lift specific capacity tests, the collection of airlift water quality samples, disposal of cuttings, and the collection of formation samples shall be included in the appropriate unit prices for drilling and reaming of various diameter holes as stated in the CONTRACTOR's Bid Submittal and as described in the Measurement and Payment section of these technical specifications.

END OF SECTION

DAILY DRILLING REPORT

Date:_____ Owner:_____

Well No:_____ Casing/Hole Diameter _____inch

Depth of Well (belowground)

Start of Shift _____ feet

End of Shift _____ feet

Depth to Water (Ref. to _____)

Start of Shift _____ feet

End of Shift _____ feet

Log of Materials Encountered

Description	Depth From	To

Remarks: (Character of drilling, casing added, miscellaneous work items)

Driller:_____

Helper:_____

(Use other side for more comments)

SECTION 02060
PLUGGING AND ABANDONING

PART 1. GENERAL

1.1 SCOPE OF WORK

A. This section covers the work, materials, labor, and equipment necessary for plugging and abandoning identified monitoring wells.

PART 2. PRODUCTS

2.1 PERSONNEL

A. The CONTRACTOR shall provide capable personnel to install cement grout as specified.

B. Work covered under Subsection 3.2, ADDITIVES, shall be performed by a service company specialized in the field of grout sealing and cementing of water wells. During cementing operations the service company shall provide the onsite services of a technical representative with demonstrated experience in the field and area related to this project. The cement service company shall be subject to approval by the ENGINEER based upon their experience in Florida.

2.2 EQUIPMENT

A. The CONTRACTOR shall provide appropriate equipment capable of installing the grout seal as specified.

B. The CONTRACTOR shall provide a standard mud balance to measure cement grout density.

2.3 CEMENT

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

2.4 GRAVEL

A. Gravel must conform in size to SFWMD and/or Collier County rules, regulations, or permit conditions for well abandonment and the

borehole/casing diameter. Gravel or sand shall only be used during grouting activities if pre-approved by the ENGINEER.

2.5 CEMENT ADDITIVES

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

2.6 ACCELERANTS

A. Up to four percent $CaCl_2$ may be used as a hardening accelerant after being approved by the ENGINEER, in which case setting times can be reduced by one half.

PART 3. EXECUTION

3.1 100% NEAT CEMENT GROUT MIX

A. Portion 1 cubic foot of cement (i.e., one 94 pound sack) to not more than 6 gallons of water. Cool clean potable water shall be used to mechanically mix with cement at the site immediately before placement. The CONTRACTOR shall make arrangements to secure the volume of potable water required to complete the work. Consistency and mixing shall be approved by the ENGINEER.

B. The CONTRACTOR shall utilize a standard mud balance to measure and verify cement grout density as requested by the ENGINEER

.

3.2 ADDITIVES

A. The use of special cements or other admixtures (ASTM C494) to reduce permeability, increase fluidity and/or control set time and the composition of the resultant cement grout must be pre-approved by the ENGINEER.

B. Consistency and method of mixing shall be reviewed by the ENGINEER prior to grouting.

C. The CONTRACTOR shall furnish all bentonite required for cementing in the proportions specified and as directed by the ENGINEER.

D. The CONTRACTOR shall furnish other cementing additives formulated specifically for well cementing as required by the ENGINEER.

E. A high shear mixer shall be used for additives and totally hydrated to smooth slurry before cement is added. For each grout batch, about 5 to 10 percent of the mixing water shall precede the other components.

3.3 PLACING

A. The CONTRACTOR shall submit a cementing plan for approval to the ENGINEER 48 hours prior to the first stage of cementing. The cementing plan shall detail estimated cement quantities for length of casing to be grouted, the nature of the mix cement slurry including weight per unit volume (density), proposed cementing schedule, expected pressures, and description of the cementing equipment, including the mechanism for measuring the volume of pumped grout, to be used by the CONTRACTOR for the cementing operation.

B. All abandonment of wells shall be accomplished in the presence of the ENGINEER.

C. Cementing activities require observation by a SFWMD and/or Collier County representative, the CONTRACTOR shall notify and coordinate cementing activities to accommodate this requirement at no additional cost to the OWNER.

D. The CONTRACTOR shall sound well to verify depth and modify cementing plan in the field to accommodate field depths. The CONTRACTOR shall install a tremmie pipe to the bottom of the well and shall circulate clear water for to demonstrate tremie and equipment is in operable order. The CONTRACTOR shall pump in one continuous lift, cement until returns begin. The CONTRACTOR shall weight the returned cement to demonstrate adherence to the specifications. The CONTRACTOR shall remove the tremmie pipe at completion of the abandonment. The well shall be cut off at least one foot below grade.

D. The tremmie method is required for all subsequent cement stages. The bottom of the tremmie pipe shall initially be set within one foot of the top of the previous grout stage as determined by the CONTRACTOR and as approved by the ENGINEER. Tremmie pipe

shall be withdrawn before the cement has begun to set or as approved by ENGINEER

3.4 SETTING TIME

B. Minimum setting time between stages shall be 12 hours or a period of time determined by the ENGINEER. Longer time shall be necessary when high-yield cement is used. After cementing is completed on a casing, casing and well must remain undisturbed for at least 12 hours for setting of the cement.

PART 4. PAYMENT

4.1 CEMENT

A. The cost of cement and cement pumping shall be paid at the unit price per sack of cement used as stated in the CONTRACTOR's Bid Schedule. This shall include all necessary equipment, materials, and subcontracted services required to properly cement the casing as specified herein.

B. Payment for all work, materials, and equipment specified in this section, that are required to tag the top of each grout stage shall be included in the unit price per sack of cement as stated in the CONTRACTOR's Bid Schedule.

END OF SECTION

SECTION 02070
CASING

PART 1. GENERAL

1.1 SCOPE OF WORK

A. The work included in this section covers the work, materials, labor and equipment necessary for joining and installing the casings for all wells.

PART 2. PRODUCTS

2.1 PERSONNEL

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

2.2 EQUIPMENT

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

2.3 GENERAL

A. All surface casing utilized in the construction of the Monitoring Well will be new and unused 8-inch diameter Schedule 40 PVC casing free from defects in materials, workmanship and handling, shall conform to requirements of ASTM D 1784 – Standard Specifications for Rigid PVC Compounds and Chlorinated Compounds, and ASTM F480 – Standard Specifications for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40, and SCH 80.

B. All well casing utilized in the construction of the Monitoring Well will be new and unused 4-inch Schedule 40 PVC casing free from defects in materials, workmanship and handling, and shall conform to requirements of ASTM D 1784 – Standard Specifications for Rigid PVC Compounds and Chlorinated Compounds, and ASTM F480 – Standard Specifications for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40, and SCH 80.

C. All well screen utilized in the construction of the Monitoring Well will be new and unused 4-inch 0.020-inch slotted Schedule 40 PVC

casing free from defects in materials, workmanship and handling, and shall conform to requirements of ASTM D 1784 – Standard Specifications for Rigid PVC Compounds and Chlorinated Compounds, and ASTM F480 – Standard Specifications for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40, and SCH 80.

2.4 CENTRALIZERS

A. All well casing shall be fitted with Haliburton-type centralizers or equivalent, as approved by ENGINEER, positioned at 0, 90, 180, and 270 degrees. The centralizers will be placed at 5 and 20 feet above the bottom of the casing and every 20 feet thereafter with the final centralizers placed at 5 and 20 feet below the top of the casing or as approved by ENGINEER.

PART 3. EXECUTION

3.1 GENERAL

A. All casing shall be installed by a method appropriate for the specified task order, as selected by the CONTRACTOR and approved by the ENGINEER.

B. Casing lengths shall be joined watertight by a method appropriate to the material used, as selected by the CONTRACTOR and approved by the ENGINEER so that the resulting joint shall have the same structural integrity as the casing itself.

C. All casing shall be installed as near to plumb and straight as possible. Following the installation and prior to cementing of the surface casing, intermediate casings, and final casing, the entire casing strings will be turned by hand to demonstrate the casings are aligned plumb within the borehole.

D. Any casing, which fails, collapses or separates during installation shall be removed from the hole and repaired or replaced at the CONTRACTOR's sole expense.

3.2 VERTICAL DEVIATION SURVEY

A. CONTRACTOR shall perform the plumbness and alignment test described in Appendix D and Section 4.7.9.3 of AWWA A100-97, respectively. The test for plumbness and alignment shall be made following cementing of the casing.

3.3 PLUMBNESS AND ALIGNMENT REQUIREMENTS

A. Should the vertical deviation survey test data for any well show that the well varies from plumb in excess of 7.33-inches per 100 feet of depth to the bottom of casing or the alignment is not acceptable, the plumbness and/or alignment shall be corrected by the CONTRACTOR at his sole expense. Should the CONTRACTOR fail to correct such faulty alignment and/or plumbness, the ENGINEER or OWNER may refuse to accept the well.

PART 4.0 PAYMENT

4.1 General

A. Installed casing will be measured in linear feet below land surface to the nearest foot.

B. Providing and installing all fittings and centralizers associated with casing installation shall be included in the unit prices stated in the CONTRACTOR's Bid Schedule and described in the Measurement and Payment Section of these documents for casing.

END OF SECTION

SECTION 02080
GROUTING

PART 1. GENERAL

1.1 SCOPE OF WORK

A. This section covers the work, materials, labor, and equipment necessary for furnishing and installing the grout seal complete at all wells.

PART 2. PRODUCTS

2.1 PERSONNEL

A. The CONTRACTOR shall provide capable personnel to install cement grout as specified.

B. Work covered under Subsection 3.3, ADDITIVES, shall be performed by a service company specialized in the field of grout sealing and cementing of water wells. During cementing operations the service company shall provide the onsite services of a technical representative with demonstrated experience in the field and area related to this project. The cement service company shall be subject to approval by the ENGINEER based upon their experience in Florida.

2.2 EQUIPMENT

A. The CONTRACTOR shall provide appropriate equipment capable of installing the grout seal as specified.

B. The CONTRACTOR shall provide a standard mud balance to measure cement grout density.

2.3 CEMENT

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

2.4 GRAVEL

A. Gravel must conform in size to SFWMD and/or Collier County rules, regulations, or permit conditions for well abandonment and the

borehole/casing diameter. Gravel or sand shall only be used during grouting activities if pre-approved by the ENGINEER.

2.5 CEMENT ADDITIVES

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

2.6 ACCELERANTS

A. Up to four percent $CaCl_2$ may be used as a hardening accelerant after being approved by the ENGINEER, in which case setting times can be reduced by one half.

PART 3. EXECUTION

3.1 100% NEAT CEMENT GROUT MIX

A. Portion 1 cubic foot of cement (i.e., one 94 pound sack) to not more than 6 gallons of water. Cool clean potable water shall be used to mechanically mix with cement at the site immediately before placement. The CONTRACTOR shall make arrangements to secure the volume of potable water required to complete the work. Consistency and mixing shall be approved by the ENGINEER.

B. The CONTRACTOR shall utilize a standard mud balance to measure and verify cement grout density as requested by the ENGINEER

3.2 5% GEL CEMENT

A. The cement grout shall be composed of 5 percent high yield bentonite drilling mud additive. The following mixture constitutes a 5 percent mix:

10 gallons of water
0.9 pounds of high yield drilling mud
1 Sack (94 pounds) of cement

B. The CONTRACTOR shall utilize a standard mud balance to measure and verify cement grout density as requested by the ENGINEER.

3.3 ADDITIVES

A. The use of special cements or other admixtures (ASTM C494) to reduce permeability, increase fluidity and/or control set time and the composition of the resultant cement grout must be pre-approved by the ENGINEER.

B. Consistency and method of mixing shall be reviewed by the ENGINEER prior to grouting.

C. The CONTRACTOR shall furnish all bentonite required for cementing in the proportions specified and as directed by the ENGINEER.

D. The CONTRACTOR shall furnish other cementing additives formulated specifically for well cementing as required by the ENGINEER.

E. A high shear mixer shall be used for additives and totally hydrated to smooth slurry before cement is added. For each grout batch, about 5 to 10 percent of the mixing water shall precede the other components.

3.4 PLACING

A. The CONTRACTOR shall submit a cementing plan for approval to the ENGINEER 48 hours prior to the first stage of cementing. The cementing plan shall detail estimated cement quantities for length of casing to be grouted, the nature of the mix cement slurry including weight per unit volume (density), proposed cementing schedule, expected pressures, and description of the cementing equipment, including the mechanism for measuring the volume of pumped grout, to be used by the CONTRACTOR for the cementing operation.

B. All cementing of casing shall be accomplished in the presence of the ENGINEER.

C. Cementing activities require observation by a SFWMD and/or Collier County representative, the CONTRACTOR shall notify and coordinate cementing activities to accommodate this requirement at no additional cost to the OWNER.

D. The pressure grout method of cement placement shall be used for the initial stage of grouting for all non-screened casings. The pressure grout method of cement placement shall be used for the

initial stage of grouting all surface casing. The grouting shall be done in such a manner that shall assure the entire filling of the borehole and annular space from the casing bottom to the vertical stage height obtained. The grouting shall ensure a watertight seal around the well casing to avoid downward or upward movement of water along the casing annulus and borehole. The CONTRACTOR shall monitor temperature and casing pressure during grouting operations if required by ENGINEER. The CONTRACTOR shall perform a temperature log within 12 to 24 hours of grout emplacement.

E. The annular space tremmie method is required for all subsequent cement stages and screened casing. The bottom of the tremmie pipe shall initially be set within five feet of the top of the previous grout stage as determined by the temperature log and annular grout tag in the well, as approved by the ENGINEER. Tremmie pipe shall be withdrawn before the cement has begun to set or as approved by ENGINEER. The CONTRACTOR shall perform a temperature log within 12 to 24 hours of grout emplacement.

F. Samples of each lift of cement grout installed around each of the casings shall be retained by the CONTRACTOR. These grout samples must be collected a minimum of three times for each cement batch pumped; near the beginning of the batch, in the middle of the batch, and near the end of the batch. Each sample shall be labeled and forwarded to the ENGINEER.

G. The CONTRACTOR shall submit cement reports to the ENGINEER identifying the mixture and quantity of cement grout utilized for each cementing stage completed.

H. The CONTRACTOR shall be solely responsible for any defect in the cementing work and casing deformation due to improper technique, or lack of equipment, technology, personnel or experience, either of CONTRACTOR or of any of Specialty Subcontractors. CONTRACTOR shall pay all costs necessary to correct such defects. Should CONTRACTOR fail to correct defects, the ENGINEER may refuse to accept the well.

3.5 BACKPLUGGING

A. CONTRACTOR shall back plug any boreholes specified and as directed by ENGINEER.

B. Backplug material shall be 100% Neat Cement as specified in this section or as approved by ENGINEER.

C. CONTRACTOR shall submit a detailed backplugging plan to ENGINEER for approval at least two (2) days prior to backplugging operations.

3.6 SETTING TIME

A. No drilling operations shall be permitted until the grout has cured.

B. Minimum setting time between stages shall be 12 hours or a period of time determined by the ENGINEER. Longer time shall be necessary when high-yield cement is used. After cementing is completed on a casing, casing and well must remain undisturbed for at least 12 hours for setting of the cement.

3.7 TEMPERATURE LOG

A. The CONTRACTOR shall perform a static geophysical log for temperature on all cement lifts for the final casing. The temperature log shall be performed after 12 hours for setting of the cement and before 24 hours for setting of the cement or a period of time determined by the ENGINEER.

3.8 TAG DEPTH

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

PART 4. PAYMENT

4.1 CEMENT

A. The cost of cement and cement pumping shall be paid at the unit price per sack of cement used as stated in the CONTRACTOR's Bid Schedule. This shall include all necessary equipment, materials, and subcontracted services required to properly cement the casing as specified herein.

B. Payment for all work, materials, and equipment specified in this section, that are required to tag the top of each grout stage shall be included in the unit price per sack of cement as stated in the CONTRACTOR's Bid Schedule.

C. Temperature logging after each stage of cement shall be included in the corresponding unit price per sack of cement as stated in the CONTRACTOR's Bid Schedule.

D. Waiting on cement to set for each grout stage shall be included in the corresponding unit price per sack of cement as stated in the CONTRACTOR's Bid Schedule.

END OF SECTION

SECTION 02150
VIDEO LOGGING

PART 1. GENERAL

1.1 SCOPE OF WORK

A. The work included in this section covers the work, materials, labor and equipment necessary for video logging the well.

PART 2. PRODUCTS

2.1 PERSONNEL

A. The CONTRACTOR shall furnish the services of a logging company to provide video logs as specified.

2.2 EQUIPMENT

A. The CONTRACTOR shall provide all materials, labor, and equipment including pump(s), flow meter(s), piping, valves and appurtenances necessary for pumping the well during performance of the video survey.

B. The video camera for 2-inch well shall be black and white and have down hole viewing capabilities for inspection of casing and bore hole walls.

C. The video camera for 4-inch to 16-inch wells shall be color and have down hole and horizontal viewing capabilities for inspection of casing and bore hole walls.

PART 3. EXECUTION

3.1 GENERAL

A. The CONTRACTOR shall retain full responsibility for notifying the logging crew, as nominated within his bid submittal, of the need to conduct the video surveying.

B. Prior to each video surveying event, the CONTRACTOR shall prepare the hole to ensure that it is open and can be surveyed with a minimum of delay. During the video logging, clarity of the water shall be such that the video image has good resolution. During each logging phase, the CONTRACTOR shall not charge for this standby time.

3.2 VIDEO LOGGING WELLS

A. Video Logs will be performed on the existing rehabilitated wells after pump testing has been completed.

B. Video Logs will be performed on constructed monitoring well after geophysical logs are completed.

3.4 REPORTING

A. The CONTRACTOR shall provide three (3) field copies and ten (10) Digital Video Disk (DVD) final copies of the video surveys. All copies of logs shall be clearly labeled and sealed. Copies of poor quality will be rejected.

PART 4. PAYMENT

4.1 GENERAL

A. Payment for each of the logging phases specified shall be included in the lump sum price for each well in the CONTRACTOR's bid schedule and described in the Section 01026 MEASUREMENT AND PAYMENT.

END OF SECTION

SECTION 02160
GEOPHYSICAL LOGGING

PART 1. GENERAL

1.1 SCOPE OF WORK

A. The work included in this section covers the work, materials, labor and equipment necessary for geophysical logging of a Sandstone aquifer well.

PART 2. PRODUCTS

2.1 PERSONNEL

A. The CONTRACTOR shall furnish the services of a logging company to provide geophysical logs and/or video log as specified.

2.2 EQUIPMENT

A. The CONTRACTOR shall provide all materials, labor, and equipment including pump(s), flow meter(s), piping, valves and appurtenances necessary for pumping the well during performance of the dynamic geophysical logs and video survey to ensure 100 gpm flow from the well if 4-inch submersible pump is used, or 100 gpm flow if end-suction centrifugal pump is used.

B. A pump will be used during the dynamic geophysical logging and video logging of the Monitoring.

C. The video camera shall be color and have down hole and horizontal viewing capabilities for inspection of casing and bore hole walls of 4-inch wells or larger.

D. The video camera shall be black and white and have down hole viewing capabilities for inspection of casing and bore hole walls of 2-inch wells.

PART 3. EXECUTION

3.1 GENERAL

A. The CONTRACTOR shall retain full responsibility for notifying the logging crew of the need to conduct the geophysical logging and video surveying.

B. Prior to each geophysical logging event, the CONTRACTOR shall prepare the hole to ensure that it is open and can be logged and/or surveyed with a minimum of delay. During the video logging, clarity of the water shall be such that the video image has good resolution. During each logging phase, the CONTRACTOR shall not charge for this standby time.

3.2 LOGGING DRILLED MONITORING WELL

A. The following geophysical logs will be completed under either static and/or dynamic (pumping) conditions in the well:

Static Logs	Dynamic Logs
X-Y Caliper Log	Flow Meter
Gamma Ray	Temperature
Temperature	Fluid Conductivity
Fluid Conductivity	
Flow Meter	

B. Video Log will be performed on the Well after the Static and Dynamic Geophysical Logs.

3.3 LOGGING EXISTING REHABILITATED WELL

A. Video Log will be performed on the Rehabilitated Well after step drawdown test.

3.4 LOGGING EXISTING MONITORING WELL

B. Video Log will be performed on the Monitoring Well as specified.

3.5 REPORTING

A. The CONTRACTOR shall furnish three (3) high quality field copies of the various geophysical logs to the ENGINEER. The CONTRACTOR shall deliver ten (10) final copies and a CD-ROM or thumb drive containing the digital information of all logs prepared by the logging company to the ENGINEER.

B. The CONTRACTOR shall provide three (3) field copies and ten (10) Digital Video Disk (DVD) final copies of the video surveys. All copies of logs shall be clearly labeled and sealed. Videos of poor quality will be rejected.

PART 4. PAYMENT

4.1 GENERAL

A. Payment for each of the logging phases specified including pump setup for the dynamic logs and execution shall be included in the lump sum price for each well in the CONTRACTOR's bid schedule and described in the Section 01026 MEASUREMENT AND PAYMENT.

END OF SECTION

SECTION 02200
PUMPING TEST

PART 1. GENERAL

1.1 SCOPE OF WORK

A. This section covers the work, materials, and equipment necessary for conducting a Step-Drawdown Test and/or Constant Rate Test on all wells.

B. The temporary pump setup for well development shall be used for the pumping tests of the wells.

C. The estimated durations of the pumping tests are the following:

Coastal Ridge Wells – Four hour Step-Drawdown Test

Golden Gate Wells – Four hour Step-Drawdown Test

D. Four different pumping rates shall be utilized during the Step-Drawdown Tests. The ENGINEER shall determine the rates and time steps in the field. The pump shall be left undisturbed and in place during the aquifer recovery period, approximately equal to 50 percent of the total pump test duration. However, the ENGINEER shall be the sole judge as to length of the tests and therefore may increase or decrease the total pumping time of the test. The anticipated flow rates are the following:

Coastal Ridge Wells
Step-Drawdown Test: 150, 300, 450, and 600 gpm

Golden Gate Wells
Step-Drawdown Test: 500, 1,000, 1,500, and 2,000 gpm

PART 2. PRODUCTS

2.1 PERSONNEL

A. The CONTRACTOR shall provide experienced personnel to setup and maintain the pumping test equipment for the duration of the test.

2.2 TEST PUMP

A. The CONTRACTOR shall furnish and install a test pump and driver capable of anticipated pump rates. The CONTRACTOR will not be reimbursed for wear and tear of the pump assembly.

B. The CONTRACTOR shall provide a valve on the discharge side of the pump for adjustment of flow rate if the test pump cannot be sufficiently throttled.

C. The pump, motor, controls, and appurtenances shall be capable of being operated without interruption for the duration of each pumping test.

D. The CONTRACTOR shall furnish engine-driven equipment or shall make his own arrangements for power for the pumping test.

E. The pump, motor, and discharge head shall be installed such that the well can be accessed for water level measurements as required by the ENGINEER.

2.3 FLOW MEASURING DEVICE

A. Both machined orifice plate(s) and flowmeter(s) capable of measuring the pump discharge within ± 5 percent of true flow for the test flow rates.

2.4 DISCHARGE PIPING

A. Furnish, install, maintain, and operate discharge piping for the pump unit of sufficient size to conduct pumped water to an appropriate discharge location, (up to 1,000 feet from the well). The CONTRACTOR shall install a valve and spigot along the discharge pipe within approximately five feet of the wellhead for collecting water samples.

2.5 SAND MEASURING DEVICE

A. Provide a Rossum sand sampler or equivalent as determined by the ENGINEER to measure the sand content of the discharge water during the pumping test.

2.6 ACCESS PIPE

A. Provide and install a 1-inch minimum ID pipe to permit installation of an electric water level measuring device furnished by the

CONTRACTOR for all pumping tests. The pipe shall terminate approximately 2 feet above the pump bowls and be of sufficient strength to remain open for the duration of the test. The down hole end of the pipe shall be capped, and eight small (1/4-inch) diameter holes drilled in the end of the pipe.

2.7 PRESSURE TRANSDUCER AND DATA LOGGER

A. Provide and install an electronic pressure recording device within 3 feet above the pump bowls during the test. The pressure transducer shall be installed in an access pipe of sufficient diameter to facilitate equipment. Transducer and data logger shall be manufactured by Insitu Inc. or approved equivalent and shall be atmospheric pressure compensating (i.e. vented cable) and rated appropriately for accurate measurements.

PART 3. EXECUTION

3.1 INSTALLATION OF PUMPING EQUIPMENT

A. The pump, flow-measuring device(s), flow valve, discharge piping, access pipe/air-line, and other necessary appurtenances shall be installed for the pumping test.

3.2 PRELIMINARY CAPACITY PUMPING TEST

A. Run a preliminary capacity pumping test prior to the pumping tests. The preliminary capacity pumping test shall be conducted to establish rates and evaluate equipment performance, including discharge capacity, and to estimate the production capacity of the well prior to implementation of the step drawdown test. Operate the pumping test equipment continuously at such rates of discharge and for such period of time as determined by the ENGINEER. Operation of such test will be performed during well development.

B. Unless otherwise approved by the ENGINEER, the preliminary capacity pumping test shall be conducted on the second day preceding the pumping test.

C. The static water level in the well shall be allowed to recover for a minimum time equal to the duration of the preliminary test and well development before start of well pumping test or longer as determined by the ENGINEER.

3.3 PUMPING TEST

A. The CONTRACTOR shall operate the pumping test equipment continuously at such rates of discharge and for such period of time prescribed by the ENGINEER.

B. The CONTRACTOR shall provide an operator during the entire time the pump is in operation, as required by the ENGINEER, to operate the pump and motor, and to regulate the discharge by the throttling device during the pumping test period.

C. At the completion of the Pump Test, the pump bowls and column shall not be removed from the well for a time equal to approximately 24 hours or as determined by ENGINEER to allow accurate water level recovery measurements to be taken. No additional standby time or pumping time payment shall be awarded during this period.

3.4 DISPOSAL OF WATER

A. Disposal of water shall be the responsibility of the CONTRACTOR. The CONTRACTOR's method of disposal shall follow an approved route, prevent re-circulation of discharged water into the aquifer being tested, and provide for erosion control and sedimentation along the entire flow route.

B. Water may require settling to reduce turbidity prior to disposal. ENGINEER must approve methods of settling excess turbidity prior to commencing each pumping test. CONTRACTOR is responsible for meeting turbidity requirements prior to discharge water entering receiving waters.

3.5 WATER LEVEL ACCESS

A. Access shall be provided at the wellhead for water level measurements in the well prior to and during the pumping test.

PART 4. PAYMENT

4.1 PUMP SETUP

A. Payment for setup of pumping test, including furnishing, temporarily installing, and removing the pump, driver and associated discharge piping, also described in the Measurement and Payment Section of these documents, shall be made at the CONTRACTOR's lump sum bid prices. Payment shall constitute full compensation for all time, materials, and equipment required to obtain, assemble, and disassemble the equipment.

4.2 HOURLY OPERATION

A. Payment for performance of pumping test shall be made at the unit price per hour as stated in the CONTRACTOR's Bid Submittal and as described in Section 01026 MEASUREMENT AND PAYMENT, to the nearest one-half hour per day during testing operations. The CONTRACTOR will not be paid the hourly rate for pumping during the time the equipment is not actually in use or in the event the pumping test is not performed for the full duration as directed by the ENGINEER.

END OF SECTION

SECTION 02250
WELLHEAD COMPLETION

PART 1. GENERAL

1.0 SCOPE OF WORK

A. This section covers the work, materials, and equipment necessary for completing the wellhead on all of the wells.

PART 2. PRODUCTS

2.1 WELLHEAD

A. 4 inch Flange with one port.

PART 3. EXECUTION

3.1 GENERAL

A. The CONTRACTOR shall furnish and install a 4-inch thick cement well pad around well casing.

B. The CONTRACTOR shall furnish and install a 4 inch flange on monitoring well. The bottom of the wellhead flange shall be 3 feet above cement well pad. All bolts shall be securely tightened.

C. The CONTRACTOR shall survey the horizontal and vertical location of the well. The CONTRACTOR will provide a certified drawing by a Registered Professional Florida Land Surveyor showing the location of the well with coordinates on the Florida State Plane Coordinate System, West Zone, NAD 83, Feet and elevation in Feet – NGVD and Feet- NAVD.

PART 4. PAYMENT

4.1 GENERAL

A. Payment for all work, materials, and equipment specified in this section shall be considered incidental to the well construction.

END OF SECTION

SECTION 02678
WELL DEVELOPMENT

PART 1. GENERAL

1.1 WORK INCLUDED

A. This section covers the work, materials, and equipment necessary for the development of all wells.

B. Development of the wells shall be by direct air circulation, reverse-air circulation, and pumping until all visible particulate has been removed from the fluid to the satisfaction of ENGINEER.

PART 2. PRODUCTS

2.1 AIRLIFT EQUIPMENT

A. The CONTRACTOR shall furnish all necessary compressors, piping, tools, pumps and any other equipment necessary to develop the wells by reverse-air circulation or direct air to facilitate development by over pumping.

2.2 PUMPING EQUIPMENT

A. The CONTRACTOR shall furnish all necessary piping, tools, pumps, power units and any other equipment necessary to develop the wells as specified in SECTION 02200-Pumping Test. The anticipated peak pumping rates are the following:

Coastal Ridge Wells – 600 gpm

Golden Gate Wells – 2,000 gpm

PART 3. EXECUTION

3.1 AIR DEVELOPMENT

A. The purpose of this development is to remove effectively from the well, well walls, and the formation immediately adjacent to the well, material including, mud, clay, cuttings, rock fragments, and any other type of loose or potentially loose materials that may damage test pump.

1. Development shall be done by the utilization of dual pipe air pumping system using an educator pipe (6-inch diameter) and an air line pipe (1.25-inch diameter). The compressors, airlines and equipment shall be of adequate size to pump the well by the airlift principle up to the maximum flow rate specified in Par 2.2 of this specification. The CONTRACTOR shall provide a means by which to measure the flow rate during development.

2. Development of the well shall begin with the bottom of the pipe located just above the bottom of casing.

3. As the pumped water becomes clearer and reduced sand content, the educator system shall be lowered.

4. Air development shall continue at the ENGINEER's discretion or until CONTRACTOR can overdevelop well with test pump.

5. Sand produced from the well shall remain within construction limits. CONTRACTOR shall remove and dispose of sand from the site as needed if sand accumulation is too great to remain within construction limits at no extra cost to the OWNER.

3.2 DEVELOPMENT BY OVER PUMPING

A. The purpose of this development is to remove sufficient sand and fines to ensure that pumped water will be free from sand and fines when the well is pumped at its design pumping rate.

1. Furnish and install pump and equipment as specified in Section 02200 – Pumping Test. The CONTRACTOR will not be reimbursed for wear and tear of the pump assembly.

2. Begin pumping well at a minimum pump rate to minimize sand and fine content in the water. The pumping rate will be determined by the ENGINEER.

3. Progressively increase pumping rate until peak pumping rate of the well is reached. ENGINEER will determine the peak pumping rate of the well and duration to pump the well.

4. CONTRACTOR shall provide a Rossum sand sampler or equivalent as determined by the ENGINEER.

CONTRACTOR shall test sand content of water as determined by ENGINEER.

5. CONTRACTOR shall determine the sand content at a pumping rate as specified in Part 2.2 of this specification for the wells within the first 110 minutes of pumping after the well has been static for a minimum of 12 hours.

6. Sand produced from the well shall remain within construction limits. CONTRACTOR shall remove and dispose of sand from the site at no extra cost to the OWNER.

PART 4. PAYMENT

4.1 GENERAL

A. Payment for all work, materials and equipment specific in this section will be included in the appropriate unit price or lump sum price as stated in the CONTRACTOR's Bid Submittal and as described in Section 01026 Measurement and Payment.

END OF SECTION

SECTION 02682
POST ACIDIZATION DISINFECTION

PART 1. GENERAL

1.1 SCOPE OF WORK

A. This section covers the work necessary to disinfect the well, wellhead, pump and all other appurtenances removed and contaminated during the acidization of a production well and to collect the required water samples for the Florida Department of Environmental Protection (FDEP) to approve the well for public supply.

PART 2. PRODUCTS

2.1 GENERAL

A. The CONTRACTOR shall provide all material and equipment required to accomplish the work as specified.

B. The chlorine solution used for disinfecting the well shall be of such volume and concentration and shall be applied that a concentration of at least 50 ppm of free chlorine shall be obtained in all parts of the well.

PART 3. EXECUTION

3.1 DISINFECTION

A. The items removed from the well shall be thoroughly cleansed of all foreign substances.

B. All permanent equipment and material to be re-installed in the well shall be chlorinated just prior to re-installation by spraying with a solution having a chlorine residual of 200 mg/L.

C. Chlorine solution shall be prepare and applied in accordance with the manufacturer's directions or as approved by the CONSULTANT. The chlorine solution shall be pumped into the well until a concentration of at least 50 ppm of free chlorine shall be obtained in all parts of the well. After four hours, the well shall be pumped or bailed until the chlorine concentration is less than 0.5 ppm.

D. The public supply well shall be disinfected in accordance with these specifications and AWWA Standard C654-03 Disinfection of Wells.

3.2 WATER SAMPLING

A. CONTRACTOR shall collect the required samples for the FDEP to approve the well for public water supply.

B. The CONTRACTOR shall be responsible for laboratory costs.

C. The CONTRACTOR shall provide the CONSULTANT with the results of the biological samples. The CONSULTANT will forward the results of the tests to the appropriate regulatory agency. If the test fails, the CONTRACTOR shall disinfect the well again and repeat the testing until the approval is granted.

3.3 DISPOSAL OF WATER

A. Disposal of water shall be the responsibility of the CONTRACTOR. Dispose of flushing and disinfecting wastewater in accordance with applicable regulations, by means that will protect the public and receiving waters from harmful or toxic concentrations of chlorine or other chemicals. Disposal method shall be approved by the CONSULTANT.

B. Do not allow discharge into a waterway without adequate dilution or other satisfactory method of reducing contaminant concentrations to a safe level.

PART 4. PAYMENT

4.1 GENERAL

Payment for all work, materials and equipment specified in this section will be included in the appropriate lump sum amount as stated in the CONTRACTOR's submitted Bid Schedule and as described in SECTION 01026 MEASUREMENT AND PAYMENT.

END OF SECTION

SECTION 02684
WELL ACIDIZATION – 32%

PART 1. GENERAL

1.1 WORK INCLUDED

A. This section covers the work necessary to acidize wells with a concentrated acid solution.

PART 2. PRODUCTS

2.1 GENERAL

A. CONTRACTOR to provide all the materials and equipment required to accomplish the work as described below. All work is to be completed in the presence of the ENGINEER or City of Naples Utilities representative.

B. Acid shall be 32-percent inhibited Hydrochloric Acid (HCL) from a source and carrier approved by the ENGINEER. The HCL provided shall be approved for use in potable water wells.

C. Acidization Header: Type of temporary acidization wellhead will be at the discretion of the CONTRACTOR but must be rated for a minimum working pressure of 80 psi or higher. The acidization wellhead must include, at a minimum, the following constituents: acid line and water feed line capable of injection at the required rates, one 3-inch blowoff (or equivalent), pressure gage for the acid blowoff valve. The wellhead shall also be equipped with valves on the wellhead to control flows. Gauges shall be suitable for intended use and shall be calibrated from 0-150 psi.

D. It is anticipated that approximately three bore hole volumes or 300 gallons, whichever is more, up to three bore volumes or 2,000 gallons, whichever is less, of HCL will be required to complete the acidization. The actual quantity used will be approved by the ENGINEER in the field. Certification from acid supplier will be required to verify materials and acid quantities on the working day prior to acid delivery to site.

E. CONTRACTOR shall perform all work in accordance with all applicable worker health and safety procedures.

PART 3. EXECUTION

3.1 GENERAL

A. Remove well head and install temporary acidization wellhead with an acid injection pipe to the depth selected by the ENGINEER, not below bottom of casing. If well is equipped with a pump, then remove pump taking care not to damage equipment.

B. Reinforce well casing flange and set up wellhead. The acidization line shall be installed such that no leaks occur.

C. Inject potable water in the well at the rate of approximately 20 gpm for 15 minutes prior to acid injection, 10 gpm during acid injection, and for about 30 minutes after the injection period. The CONTRACTOR is responsible for providing adequate storage capacity or temporary facilities needed for the total flow/volume of water required for the water injection. The CONTRACTOR shall provide and install all piping, fittings, and reduced pressure backflow devices necessary as needed to utilize City of Naples' water wells.

D. The rate of acid injection is expected to be approximately 10 gpm.

E. CONTRACTOR shall provide a tanker or other approved onsite vessel having sufficient volume to capture all acid product from acid blowoff during the acidization.

F. After pumping the acid is complete, continue water injection for approximately 30 minutes as described above. After water injection is complete, close all valves and allow well to remain undisturbed for a minimum 12-hour duration. Monitor the well as required for excess pressure build-up and release as needed.

G. After static period is completed remove the spent acid. The initial volume, equal to the volume of acid injected, of acid by-product shall be trucked off site. Additional acid by-product shall be trucked offsite or diluted with sodium carbonate and freshwater and disposed of when the pH is within 0.5 units of receiving water body background level. Water treatment and discharge shall continue until the raw well water quality is within 5 percent of the background levels of specific conductance and dissolved chloride concentration.

H. The discharge will be the responsibility of the CONTRACTOR. The CONTRACTOR shall coordinate all disposal activities.

I. Conduct specific capacity tests at such rates of discharge and for such a period of time prescribed by the ENGINEER as described in Section 02200 – Pumping Test.

J. Reinstall pump and restore site to pre-acidization condition including disinfection in accordance with Section 02682 – Post Acidization Disinfection.

END OF SECTION

SECTION 02700
WATER QUALITY TESTING

PART 1. GENERAL

1.1 WORK INCLUDED

A. This section covers the work, materials, and equipment necessary for the proper sampling, testing and analysis of water quality.

B. All sampling, testing and analysis shall be performed by a qualified testing company with qualified personnel. CONTRACTOR shall submit for approval of the testing lab and the qualified sampling personnel.

PART 2. PRODUCTS

2.1 SAMPLING EQUIPMENT

A. Furnish all necessary equipment to properly sample the well.

2.2 TESTING EQUIPMENT

A. Furnish all necessary testing equipment for field and lab analysis as required to meet this specification.

2.3 LAB REQUIREMENTS

A. The testing lab shall be certified under National Environmental Laboratory Accreditation Program (NELAP) by the Florida Department of Health.

B. Reporting of results shall be in hard copy format and electronic format. Hard copy format shall meet the requirements of the NELAP system and mailed directly to the ENGINEER and OWNER. An electronic version of the hard copy shall be submitted electronically in a PDF file format. Results shall also be submitted electronically in the Microsoft Excel format.

PART 3. EXECUTION

3.1 SAMPLE PARAMETERS

A. The CONTRACTOR shall collect water quality samples during drilling of monitoring well, or as determined by the ENGINEER. The analysis shall include the following parameters.

	Temperature (Field)
pH	pH (Field and Lab)
	Alkalinity (Field and Lab)
	Conductivity (Field and Lab)
	Turbidity (Field and Lab)
TDS	EvaporativeTDS (at 180°C)
SO4	Sulfate
Cl	Chloride

PART 4. PAYMENT

4.1 GENERAL

A. Payment for all work, materials and equipment specific in this section is incidental to drilling as described in Section 01026 Measurement and Payment.

END OF SECTION