CITY OF NAPLES

WATER RECLAMATION FACILITY

Contract Documents
(Technical Specifications and Drawings)

PROJECT NO. 43201-002

Aquifer Storage and Recovery Test Well
at the
City of Naples Water Reclamation Facility

Bid Set

FEBRUARY 2016

CITY OF NAPLES
AQUIFER STORAGE AND RECOVERY TEST WELL
AT THE CITY OF NAPLES
WATER RECLAMATION FACILITY

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SECTION 01010

SUMMARY OF WORK

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Work to be done under this Contract and in accordance with the Contract Documents consists of furnishing all equipment, superintendence, labor, skill, material and all other items necessary for the construction of the City of Naples Aquifer Storage and Recovery (ASR) System. The ASR system will consist of construction of an ASR Test Well at the approximate location shown on the drawings.

B. Wherever the Contract Documents address a third party, (i.e., subcontractor, manufacturer, etc.), it is to be considered as the Contractor through the third party.

C. Wherever a reference to number of days is noted, it shall be defined as calendar days.

D. The project area is located adjacent to the City of Naples Water Reclamation Facility located at 380 Riverside Circle. The Owner (City of Naples) owns the property within the project area. The Contractor shall confine their construction activities to the Owner's property and general area as shown on the drawings.

E. The Contractor shall be fully responsible for all precautionary measures together with all remediation, cleanup, disinfection, regulatory agency fines and all other labor, materials, and costs associated with any contamination of the water supply caused directly or indirectly by the activities of the Contractor in the performance of the work.

F. Notwithstanding other indemnification requirements of the Contract Documents, the Contractor shall also indemnify, defend, and hold harmless the Owner, the Engineer and the Owner's agents from any and all legal action that may arise from contamination of the water supply caused directly or indirectly by the Contractor in the performance of the work.

1.02 CONTRACT DOCUMENTS

A. The Work to be done is shown on the Drawings. The numbers and titles of all Drawings appear on the index sheet of the Drawings. All Drawings shall be considered an integral part of the Contract Documents as defined herein.

B. Certain Document Sections refer to Divisions of the Contract Specifications. Sections are each individually numbered portions of the Specifications (numerically) such as 08110, 13182, 15206, etc. The term Division is used as a convenience term meaning all Sections within a numerical grouping. For example, Division 16 would thus include Sections 16000 through 16999 and would mean all electrical specifications.

1.03 GENERAL ARRANGEMENT

A. Drawings indicate the extent and general arrangement of the work. If any deviations from the Drawings are deemed necessary by the Contractor to accommodate the

materials and equipment he proposes to furnish, details of such deviations and reasons therefore shall be submitted as soon as practicable to the Engineer for approval. No such deviations shall be made without the prior written approval of the Engineer. Approved changes shall be made without additional cost to the Owner for this work or related work under other Contracts of the Project.

B. The specific equipment proposed for use by the Contractor on the project may require changes in structures, auxiliary equipment, piping, electrical, mechanical, controls or other work to provide a complete satisfactory operating installation. The Contractor shall submit to the Engineer, for approval, all necessary Drawings and details showing such changes. The Bid Price shall include all costs in connection with the preparation of new drawings and details and all changes to construction work to accommodate the proposed equipment, including increases in the costs of other Contracts.

1.04 WORK COVERED BY CONTRACT DOCUMENTS

A. The project consists of construction of Aquifer Storage and Recovery (ASR) Test Well No. 4 (ASR-4), which will be a 24-inch diameter well.

B. The Owner reserves the right to delete any and all parts of the work described in this Section at his own discretion.

C. The Work to be performed under this Contract shall consist of furnishing all tools, equipment, materials, supplies, and manufactured articles and for furnishing all transportation and services, including fuel, power, water, and essential communications, and for the performance of all labor, work, or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The Work shall be complete, and all work, materials, and services not expressly shown or called for in the Contract Documents which may be necessary for the complete and proper construction of the Work in good faith shall be performed, furnished, and installed by the Contractor as though originally so specified or shown, at no increase to the Owner.

1.05 OUTLINE SPECIFICATIONS OF ASR TEST WELL NO. 4 (i.e., Class V Injection Well)

A. ASR Test Well No. 4: The principal features of the Work to be performed under this Contract and described in these Contract Documents are described in this Section.

The following description of the work shall not be construed as a complete description of all work required.

1. Site Preparation: Perform clearing and grubbing for vegetation removal in accordance with the Contract Documents, and as needed to provide a stable base for drilling and testing operations.

2. ASR Test Well Construction and Testing: The anticipated well casing and open-hole depths listed in the following well construction sequence are approximate. Actual depths may vary depending on the specific subsurface conditions encountered during well construction and testing. The sequence of testing and well testing procedures described in this outline may be changed in order of occurrence, or deleted, and additional testing may be added as directed by Engineer.

a. Mobilize on site and prepare location for drilling and testing at location established by Owner.

b. Furnish and install pit casing (minimum 42-inch diameter casing) to a depth selected by the Contractor that will allow the surface casing string to be installed and grouted in place with a minimum annular space of 5 inches around the entire borehole.

c. Drill nominal 12–¼ inch diameter pilot hole to approximately 450 feet below land surface, or to depth as directed by the Engineer, using the mud-rotary method.

d. Clean and condition the borehole. Perform geophysical logging.

e. Ream nominal 42-inch diameter borehole to approximately 450 feet below land surface, or to depth as directed by the Engineer, using the mud-rotary method.

f. Clean and condition the borehole as needed for casing installation. Perform geophysical logging.

g. Furnish and install 34-inch diameter 0.375-inch wall steel surface casing to approximately 450 feet below land surface, or to a depth as directed by the Engineer, and cement in place.

h. Drill nominal 12–¼ inch diameter pilot hole to approximately 750 feet below land surface, or to depth as directed by the Engineer, using the reverse-air method.

i. Clean and condition the borehole as needed for casing installation. Perform geophysical logging.

j. Ream nominal 34-inch diameter borehole to approximately 670 feet below land surface, or to depth as directed by the Engineer, using the reverse air method. Collect representative formation water samples every drill rod (minimum every 30 feet).

k. Clean and condition the borehole as needed for casing installation. Perform geophysical logging.

l. Furnish and install 24-inch casing consisting of 0.500-inch wall seamless steel casing, to approximately 670 feet below land surface, or to a depth as identified by the Engineer, and cement in place. Lower 200 feet of annular space shall be filled with neat cement. Remaining annulus space shall be filled with 6% bentonite cement mix. Perform geophysical logging after each cement stage.

m. Conduct pressure test on 24-inch casing.

n. Drill out nominal 24-inch diameter borehole to an estimated depth of 740 feet below land surface and confirm plumbness.

o. Clean and condition the borehole as needed and perform geophysical logging.

p. Develop well by high rate pumping and surging as directed by the Engineer.

q. Conduct step drawdown tests as directed by the Engineer. Monitor water levels at locations (i.e., monitor wells and other ASR Wells) during testing as directed Engineer.

r. Disinfect well and collect background native water sample. Analyze for primary and secondary drinking water standards.

s. Install wellhead equipment.

t. Demobilize rig and restore site to pre-construction conditions.

1.06 REGULATORY COMPLIANCE

A. It shall be the Contractor's responsibility to secure all permits of every description required to initiate and complete the Work under this contract, except permits obtained by the Owner.

B. Permits being obtained by the Owner or its authorized representative include the following:

1. FDEP Class V Injection Well Construction and Testing Permit

C. The Contractor and Subcontractors must obtain a FDEP Permit for disposal of its drill cuttings and drilling fluid as well as any other permit required by any other regulatory agency. The Contractor or Subcontractors shall also be responsible to call for inspections required in Section 305 of the Florida Building Code.

D. No separate or direct payment will be made to the Contractor for permits and inspection requirements, but all such costs shall be included in the applicable items in the Schedule of Prices. Reference Section entitled "Measurement and Payment" for Contractor acquired permit requirements. The Owner will furnish signed and sealed sets of Contract Documents for permit use as required.

E. The Contractor shall furnish to the Engineer copies of all permits prior to commencement of Work requiring permits.

F. The Contractor shall furnish to the Engineer copies of all permits prior to commencement of Work requiring permits. No payments will be made for work completed without first acquiring and furnishing two (2) copies of each permit to the Engineer.

1.07 WORK BY OTHERS

A. The Contractor's attention is directed to the fact that other contractors may conduct other work at the site(s) during the performance of the work under this Contract. The Contractor shall conduct its operations so as to cause a minimum of interference with

the work of such other contractors, and shall cooperate fully with such contractors to provide continued safe access to their respective portions of the site, as required to perform their respective contracts.

B. When two or more contracts are being executed at one time on the same or adjacent areas in such manner that work on one contract may interfere with that on another, the Owner shall determine the sequence and order of the work. When the territory of one contract is the necessary or convenient means of access for the execution of another contract, such privilege of access or any other reasonable privilege may be granted by the Owner to the Contractor so desiring, to the extent, amount, in the manner, and at the times permitted. No such decision as to the method or time of conducting the work or the use or territory shall be made the basis of any claim of delay or damage.

D. Interference with Work on Utilities: The Contractor shall cooperate fully with all utility forces of the Owner or forces of other public or private agencies engaged in the relocation, altering, or otherwise rearranging of any facilities which interfere with the progress of the work, and shall schedule the work so as to minimize interference with said relocation, altering, or other rearranging of facilities.

1.08 CONTRACTOR USE OF PROJECT SITE

A. The Contractor's use of the project site shall be limited to its construction operations, including on-site storage of materials, on-site fabrication facilities, and field offices, as directed by the Owner and Engineer.

B. Disposal of Debris: All debris, materials, piping, and miscellaneous waste products from the work described in this section shall be removed from the project as soon as possible and not less than twice per week. They shall be disposed of in accordance with applicable federal, state, and local regulations. The Contractor is responsible for determining these regulations and shall bear all costs or retain any profit associated with disposal of these items.

1.09 OWNER USE OF THE PROJECT SITE

A. The Owner may utilize all or part of the facilities during the entire period of construction for the conduct of the Owner’s normal operations. The Contractor shall cooperate with the Owner to minimize interference with the Contractor's operations and to facilitate the Owner's operations.

1.10 ADDITIONAL ENGINEERING SERVICES

A. In the event that the Engineer is required to provide additional engineering services as a result of substitution of materials or equipment which are not "or equal" by the Contractor, or changes by the Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or if the Engineer is required to examine and evaluate any changes proposed by the Contractor for the convenience of the Contractor, then the Engineer's charges in connection with such additional services shall be charged to the Contractor by the Owner.

B. Structural design shown on the Contract Drawings is based upon typical weights for major items of equipment as indicated on the Contract Drawings and specified. If the equipment furnished exceeds the weights of said equipment, the Contractor shall

assume the responsibility for all costs of redesign and for any construction changes required to accommodate the equipment furnished, including the Engineer's expenses in connection therewith.

C. In the event that the Engineer is required to provide additional engineering services as a result of Contractor's errors, omissions, or failure to conform to the requirements of the Contract Documents, or if the Engineer is required to examine and evaluate any changes proposed by the Contractor solely for the convenience of the Contractor, then the Engineer's charges in connection with such additional services shall be charged to the Contractor by the Owner.

1.11 ADDITIONAL OWNER'S EXPENSES

A. In the event the Work of this Contract is not completed within the time set forth in the Contract or within the time to which such completion may have been extended in accordance with the Contract Documents, the additional engineering or inspection charges incurred by the Owner may be charged to the Contractor and deducted from the monies due him. Extra work or supplemental Contract work added to the original Contract, as well as extenuating circumstances beyond the control of the Contractor, will be given due consideration by the Owner before assessing engineering and inspection charges against the Contractor.

B. The normal time of work under this Contract is defined in the Owner's General Conditions. Work beyond these hours will result in additional expense to the Owner. Any expenses and/or damages, including the cost of the Engineer's on site personnel, arising from the Contractor's operations beyond the hours and days specified above shall be borne by the Contractor.

C. Charges assessed to the Contractor for additional engineering and inspection costs will be determined based on actual hours charged to the job by the Engineer. Daily rates will depend on the number and classifications of employees involved, but in no case shall such charges exceed $800 per day for field personnel and $1,200 per day for engineering personnel, based on an eight hour workday.

D. Charges for additional Owner's expenses shall be in addition to any liquidated damages assessed in accordance with the Contract.

1.12 DIMENSIONS OF EXISTING FACILITIES

A. Where the dimensions and locations of existing improvements are of critical importance in the installation or connection of new work, the Contractor shall verify such dimensions and locations in the field prior to the fabrication and/or installation of materials or equipment, which are dependent on the correctness of such information.

1.13 TIME OF WORK

A. The normal time of work for this Contract is limited to 40 hours per week and shall generally be between the hours of 7:00 a.m. and 6:00 p.m., Monday through Friday. The Contractor may elect to work beyond these hours or on holidays or weekends provided that all costs incurred by the Owner for additional engineering shall be borne by

the Contractor. The Owner shall deduct the cost of additional engineering costs and overtime from monies due the Contractor.

B. If it shall become imperative to perform work at night, the Owner and Engineer shall be informed in writing a reasonable time in advance of the beginning of such work (minimum of 48 hours). Temporary lighting and all other necessary facilities for performing and inspecting the work shall be provided and maintained by the Contractor.

C. Unless otherwise specifically permitted, all work that would be subject to damage shall be stopped during inclement, stormy weather. Only such work as will not suffer injury to workmanship or materials will be permitted. Contractor shall carefully protect his work against damage or injury from the weather.

1.14 SITE CONDITIONS

A. The Contractor acknowledges that he has investigated prior to bidding and satisfied himself as to the conditions affecting the Work, including but not restricted to those bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads and uncertainties of weather, tides, water tables or similar physical conditions at the site, the conformation and conditions of the ground, the character of equipment and facilities needed preliminary to and during prosecution of the Work. The Contractor further acknowledges that he has satisfied himself as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, or any contiguous site, as well as from information presented by the Drawings and Specifications made a part of this Contract, or any other information made available to him prior to receipt of Bids. Any failure by the Contractor to acquaint himself with the available information will not relieve him from responsibility for estimating properly the difficulty or cost of successfully performing the Work. The Owner assumes no responsibility for any conclusions or interpretations made by the Contractor on the basis of the information made available to the Owner. The contractor shall not receive any additional compensation for any claims of unforeseen conditions.

1.15 DIMENSIONS OF EXISTING FACILITIES

A. Where the dimensions and locations of existing improvements are of critical importance in the installation or connection of new work, the Contractor shall verify such dimensions and locations in the field prior to the fabrication and/or installation of materials or equipment, which are dependent on the correctness of such information.

1.16 SURVEYS AND LAYOUT

A. All work under this Contract shall be constructed in accordance with the lines and grades shown on the Drawings or as directed by the Engineer. Elevation of existing ground and appurtenances are believed to be reasonably correct but are not guaranteed to be absolute and therefore are presented only as an approximation. Any error or apparent discrepancy in the data shown or omissions of data required for accurately accomplishing the stake out survey shall be referred immediately to the Engineer for interpretation or correction.

B. All survey work for construction control purposes shall be made by the Contractor at his expense. The Contractor shall provide a Licensed Surveyor as Chief of Party, competently qualified men, all necessary instruments, stakes, and other material to perform the work.

C. Contractor shall establish all baselines for the location of the principal component parts of the work together with a suitable number of bench marks and batter boards adjacent to the work. Based upon the information provided by the Contract Drawings, the Contractor shall develop and make all detail surveys necessary for construction, including slope stakes, batter boards, stakes for all working points, lines and elevations.

D. Contractor shall have the responsibility to carefully preserve the bench marks, reference points and stakes, and in the case of destruction thereof by the Contractor or resulting from his negligence, the Contractor shall be charged with the expense and damage resulting there from and shall be responsible for any mistakes that may be caused by the unnecessary loss or disturbance of such bench marks, reference points and stakes.

E. Existing or new control points, property markers and monuments that will be or are destroyed during the normal causes of construction shall be reestablished by the Contractor and all reference ties recorded therefore shall be furnished to the Engineer. All computations necessary to establish the exact position of the work shall be made and preserved by the Contractor.

F. The Engineer may check all or any portion of the work and the Contractor shall afford all necessary assistance to the Engineer in carrying out such checks. Any necessary corrections to the work shall be immediately made by the Contractor. Such checking by the Engineer shall not relieve the Contractor of any responsibilities for the accuracy or completeness of his work.

G. At completion of the work, the Contractor shall furnish Record Drawings indicating the final layout of all structures, roads, all structures, existing bench marks, etc. The Record Drawings shall indicate all critical elevations of piping, structures, finish grades, etc. **Elevations shall be provided in both NGVD (1929) and NAVD (1988).** Contractor shall record survey at courthouse and provide proof of documentation to Engineer.

1.17 FIRE PROTECTION

A. Contractor shall take all necessary precautions to prevent fires at or adjacent to the work, buildings, etc., and shall provide adequate facilities for extinguishing fires which do occur.

B. When fire or explosion hazards are created in the vicinity of the work as a result of the locations of fuel tanks, or similar hazardous utilities or devices, the Contractor shall immediately alert the local Fire Marshal, the Engineer, and the Owner of such tank or device. The Contractor shall exercise all safety precautions and shall comply with all instructions issued by the Fire Marshal and shall cooperate with the Owner of the tank or device to prevent the occurrence of fire or explosion.

1.18 CHEMICALS

A. All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, or reactant of other classification, must show approval of either the EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with all applicable rules and regulations.

1.19 FIRST AID FACILITIES AND ACCIDENTS

A. First Aid Facilities: The Contractor shall provide at the site such equipment and facilities as are necessary to supply first aid to any of his personnel who may be injured in connection with the work.

B. Accidents:

1. The Contractor shall promptly report, in writing, to the Engineer and Owner all accidents whatsoever out of, or in connection with, the performance of the work, whether on or adjacent to the site, which cause death, personal injury or property damage, giving full details and statements of witnesses.

2. If death, serious injuries, or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Owner and the Engineer.

3. If any claim is made by anyone against the Contractor or a Subcontractor on account of any accidents, the Contractor shall promptly report the facts, in writing, to the Engineer and Owner, giving full details of the claim.

1.20 ULTIMATE DISPOSITION OF CLAIMS BY ONE CONTRACTOR ARISING FROM ALLEGED DAMAGE BY ANOTHER CONTRACTOR

A. During the progress of the work, other contractors may be engaged in performing other work or may be awarded other Contracts for additional work on this project. In that event, the Contractor shall coordinate the work to be done hereunder with the work of such other contractors and the Contractor shall fully cooperate with such other contractors and carefully fit its own work to that provided under other Contracts as may be directed by the Engineer. The Contractor shall not commit or permit any act which will interfere with the performance of work by any other Contractor.

B. If the Engineer shall determine that the Contractor is failing to coordinate his work with the work of the other contractors as the Engineer directed, then the Owner shall have the right to withhold any payments otherwise due hereunder until the Contractor completely complies with the Engineer's directions.

C. If the Contractor notifies the Engineer in writing that another Contractor is failing to coordinate his work with the work of this Contract as directed, the Engineer will promptly investigate the charge. If the Engineer finds it to be true, he will promptly issue such directions to the other Contractor with respect thereto as the situation may require. The Owner, the Engineer, nor any of their agents shall not, however, be liable for any damages suffered by the Contractor by reason of the other contractor’s failure to promptly comply with the directions so issued by the Engineer, or by reason of another contractor’s default in performance, it being understood that the Owner does not guarantee the responsibility or continued efficiency of any Contractor.

D. The Contractor shall indemnify and hold the Owner and the Engineer harmless from any and all claims of judgments for damages and from costs and expenses to which the Owner may be subjected or which it may suffer or incur by reason of the Contractor's failure to comply with the Engineer's directions promptly.

E. Should the Contractor sustain any damage through any act or omission of any other Contractor having a Contract with the Owner for the performance of work upon the site or of work which may be necessary to be performed for the proper execution of the work to be performed hereunder, or through any act or omission of a Subcontractor of such Contract, the Contractor shall have no claim against the Owner or the Engineer for such damage, but shall have a right to recover such damage from the other Contractor under the provision similar to the following provisions which have been or will be inserted in the Contracts with such other contractors.

F. Should any other Contractor having or who shall hereafter have a Contract with the Owner for the performance of work upon the site sustain any damage through any act or omission of the Contractor hereunder or through any act or omission of any Subcontractor of the Contractor, the Contractor agrees to reimburse such other Contractor for all such damages and to defend at his own expense any suit based upon such claim and if any judgment or claims against the Owner shall be allowed, the Contractor shall pay or satisfy such judgment or claim and pay all costs and expenses in connection therewith and shall indemnify and hold the Owner harmless from all such claims.

G. The Owner's right to indemnification hereunder shall in no way be diminished, waived or discharged, by its recourse to assessment of liquidated damages as provided in the Contract, or by the exercise of any other remedy provided for by Contract Documents or by law.

1.21 BLASTING AND EXPLOSIVES

A. Blasting shall not be allowed.

1.22 LIMITS OF WORK AREA

A. The Contractor shall confine his construction operations within the Contract limits shown on the Drawings and/or property lines and/or fence lines. Storage of equipment and materials, or erection and use of sheds outside of the Contract limits, if such areas are the property of the Owner, shall be used only with the Owner's approval. Such storage or temporary structures, even within the Contract's limits, shall be confined to the Owner's property and shall not be placed on properties designated as easements or rights-of-way unless specifically permitted elsewhere in the Contract Documents.

1.23 WEATHER CONDITIONS

A. No work shall be done when the weather is unsuitable. The Contractor shall take necessary precautions (in the event of impending storms) to protect all work, materials, or equipment from damage or deterioration due to floods, driving rain, or wind. The Owner reserves the right, through the opinion of the Engineer, to order that additional protection measures over and beyond those proposed by the Contractor, be taken to

safeguard all components of the Project. The Contractor shall not claim any compensation for such precautionary measures so ordered, nor claim any compensation from the Owner for damage to the work from weather elements.

B. The mixing and placing of concrete or pavement courses, the laying of masonry, and installation of sewers and water mains shall be stopped during rainstorms, if ordered by the Engineer; and all freshly placed work shall be protected by canvas or other suitable covering in such manner as to prevent running water from coming in contact with it. Sufficient coverings shall be provided and kept ready at hand for this purpose. The limitations and requirements for mixing and placing concrete or laying of masonry, in cold weather shall be as described elsewhere in these Specifications.

1.24 PERIODIC CLEANUP: BASIC SITE RESTORATION

A. During construction, the Contractor shall regularly remove from the site of the work all accumulated debris and surplus materials of any kind which result from his operations. Unused equipment and tools shall be stored at the Contractor's yard or base of operations for the Project.

B. When the work involves installation of sewers, drains, water mains, manholes, underground structures, or other disturbance of existing features in or across streets, rights-of-way, easements, or private property, the Contractor shall (as the work progresses) promptly backfill, compact, grade, and otherwise restore the disturbed area to the basic condition which will permit resumption of pedestrian or vehicular traffic and any other critical activity or functions consistent with the original use of the land. The requirements for temporary paving of streets, walks, and driveways are specified elsewhere. Unsightly mounds of earth, large stones, boulders, and debris shall be removed so that the site presents a neat appearance.

C. The Contractor shall perform the cleanup work on a regular basis and as frequently as ordered by the Engineer. Basic site restoration in a particular area shall be accomplished immediately following the installation or completion of the required facilities in that area. Furthermore, such work shall also be accomplished, when ordered by the Engineer, if partially completed facilities must remain incomplete for some time period due to unforeseen circumstances.

D. Upon failure of the Contractor to perform periodic cleanup and basic restoration of the site to the Engineer's satisfaction, the Owner may, upon five (5) days prior written notice to the Contractor, without prejudice to any other rights or remedies of the Owner, cause such work for which the Contractor is responsible to be accomplished to the extent deemed necessary by the Engineer, and all costs resulting therefrom shall be charged to the Contractor and deducted from the amounts of money that may be due him.

1.25 USE OF FACILITIES BEFORE COMPLETION

A. The Owner reserves the right to enter and use any portion of the constructed facilities before final completion of the whole work to be done under this Contract. However, only those portions of the facilities which have been completed to the Engineer's satisfaction, as evidenced by his issuing a Certificate of Substantial Completion covering that part of the work, shall be placed in service.

B. It shall be the Owner's responsibility to prevent premature connections to or use of any portion of the installed facilities by private or public parties, persons or groups of persons, before the Engineer issues his Certificate of Substantial Completion covering that portion of the work to be placed in service.

C. Consistent with the approved progress schedule, the Contractor shall cooperate with the Owner, his agents, and the Engineer to accelerate completion of those facilities, or portions thereof, which have been designated for early use by the Owner.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01020

ALLOWANCES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Include in the Total Base Bid Price all allowances stated in the Contract Documents.

B. Include in the Schedule of Payment Values the amount of each Allowance specified herein.

1.02 RELATED REQUIREMENTS

A. Section 01025 – Measurement and Payment

B. Section 01300 – Submittals

1.03 CONTRACT ALLOWANCES

Reimbursement

1. The Contractor is not entitled to the entire allowance amounts as part of the Contract. Reimbursement will be made up to the maximum amount identified for each allowance. If actual reimbursements total less than the amount in the project's contingency, the difference shall be deducted from the Total Base Bid Price by Change Order.

PART 2 -- PRODUCTS (Not Used)

PART 3 -- EXECUTION (Not Used)

- END OF SECTION -

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Payment for the various items in the Schedule of Payment items, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, taxes, materials, commissions, transportation and handling, bonds, permit fees, insurance, overhead and profit, and incidentals appurtenant to the items of Work being described, as necessary to complete the various items of the Work, all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). Such compensation shall also include payment for any loss or damages arising directly or indirectly from the Work.

B. The Contractor's attention is called to the fact that the quotations for the various items of Work are intended to establish a total price for completing the Work in its entirety. Should the Contractor feel that the cost for any item of Work has not been established by the Schedule of Payment items or this Section, it shall include the cost for that Work in some other applicable bid item, so that its proposal for the project does reflect its total price for completing the Work in its entirety.

1.02 SUBMITTALS

A. Informational:

1. Schedule of Values: Submit schedule on Owner's form

2. Application for Payment

3. Final Application for Payment

B. Submittals shall be in accordance with Section 01300 entitled “Submittals”.

1.03 SCHEDULE OF VALUES

A. Prepare a schedule of values for the Work.

B. Unit Price Work: Reflect unit price quantity and price breakdown from conformed Bid Form.

C. Lump Sum Work:

1. Reflect schedule of values format included in conformed Bid Form.

2. List Bonds and insurance premiums, mobilization, demobilization, facility startup, and contract closeout separately.

3. Break down by Divisions 1 through 17 with appropriate subdivision of each Specification.

D. An unbalanced or front-end loaded schedule will not be acceptable.

E. Summation of the complete schedule of values representing all the Work shall equal the Contract Price.

F. The Contractor shall submit a Schedule of Values for review with the return of the executed Agreement to the Owner. The schedule shall contain the installed value of the component parts of Work for the purpose of making progress payments during the construction period.

G. The schedule shall be given in sufficient detail for proper identification of Work accomplished. The Schedule of Values shall directly correlate to each activity outlined in the construction progress schedule (specified in the section entitled “Submittals”) to accurately relate construction progress to the requested payment. Each item shall include its proportional share of all costs including the Contractor's overhead, contingencies and profit. The sum of all scheduled items shall equal the total value of the Contract.

H. If the Contractor anticipates the need for payment for materials stored on the project site or off-site in bonded warehouse, it shall also submit a separate list covering the cost of materials, delivered and unloaded with taxes paid. This list shall also include the installed value of the item with coded reference to the Work items in the Schedule of Values. Payment for stored materials shall comply with requirements of General Conditions.

1.04 APPLICATION FOR PAYMENT

A. Transmittal Summary Form: Attach one Summary Form with each detailed Application for Payment and include Request for Payment of Materials and Equipment on Hand as applicable. Execute certification by authorized officer of Contractor.

B. Use detailed Application for Payment Form provided by Owner.

C. Include accepted schedule of values for each portion of Work and the unit price breakdown for the Work to be paid on unit price basis, and a listing of Owner-selected equipment, if applicable, and allowances, as appropriate.

D. Preparation:

1. Round values to nearest dollar.

2. List each Change Order and Written Amendment executed prior to date of submission as a separate line item. Totals to equal those shown on the Transmittal Summary Form.

3. Submit Application for Payment, including a Transmittal Summary Form and detailed Application for Payment Form, a listing of materials on hand as applicable, and such supporting data as may be requested by Owner.

1.05 MEASUREMENT-GENERAL

A. Weighing, measuring, and metering devices used to measure quantity of materials for Work shall be suitable for purpose intended and conform to tolerances and Specifications as specified in National Institute of Standards and Technology, Handbook 44.

B. Whenever pay quantities of material are determined by weight, material shall be weighed on scales furnished by Contractor and certified accurate by state agency responsible. Weight or load slip shall be obtained from weigher and delivered to Owner's representative at point of delivery of material.

C. If material is shipped by rail, car weights will be accepted provided that actual weight of material only will be paid for and not minimum car weight used for assessing freight tariff, and provided further that car weights will not be acceptable for material to be passed through mixing plants.

D. Vehicles used to haul material being paid for by weight shall be weighed empty daily and at such additional times as required by Engineer. Each vehicle shall bear a plainly legible identification mark.

E. Materials that are specified for measurement by the cubic yard measured in the vehicle shall be hauled in vehicles of such type and size that actual contents may be readily and accurately determined. Unless all vehicles are of uniform capacity, each vehicle must bear a plainly legible identification mark indicating its water level capacity. Vehicles shall be loaded to at least their water level capacity. Loads hauled in vehicles not meeting above requirements or loads of a quantity less than the capacity of the vehicle, measured after being leveled off as above provided, will be subject to rejection, and no compensation will be allowed for such material.

F. Where measurement of quantities depends on elevation of existing ground, elevations obtained during construction will be compared with those shown on Drawings. Variations of 1 foot or less will be ignored, and profiles shown on Drawings will be used for determining quantities.

G. Surface and production casings shall be measured from pad level (Datum Line 0). However, it should be noted that additional casing above the pad level is required to complete the well but is not included in the casing measurement.

H. All work shall be paid on a percent complete basis as determined by Engineer and approved by Owner. Cost for completion of other Bid Items shall include ALL work and materials necessary to complete Item with adjustments as stipulated below. Engineer shall determine value with approval from Owner. Adjustment values are used to establish unit prices and will be used to adjust the total lump sum price for the well with respect to actual quantities used in the field to install the well. Any unused balance of any portions of the Adjustment Values not used shall revert to the Owner upon completion of the job.

I. Adjustment Values are for items included in the bid form and as authorized by the Owner and Engineer. Standby time only applies during periods of active construction activities. Periods during which construction activities are scheduled to be temporarily stopped for evaluation of construction data before proceeding with the next sub-phase or the next phase shall not be considered standby time.

J. Units of measure shown on Bid Form shall be as follows, unless specified otherwise.

Item	Method of Measurement
AC	Acre—Field Measure
CY	Cubic Yard—Field Measure within limits specified or shown, or measured in vehicle by volume, as specified
EA	Each—Field Count
GAL	Gallon—Field Measure
HR	Hour
LB	Pound(s)—Weight Measure by Scale
LF	Linear Foot—Field Measure
LS	Lump Sum—Unit is one; no measurement will be made
SK	Sack—Field Count
SF	Square Foot
SY	Square Yard
TON	Ton—Weight Measure by Scale (2,000 pounds)

1.06 PAYMENT

A. General:

1. Progress payments will be made monthly.

2. The date for Contractor's submission of monthly Application for Payment shall be established at the Preconstruction Conference.

1.07 NONPAYMENT FOR REJECTED OR UNUSED PRODUCTS

A. Payment will not be made for following:

1. Loading, hauling, and disposing of rejected material.

2. Quantities of material wasted or disposed of in manner not called for under Contract Documents.

3. Rejected loads of material, including material rejected after it has been placed by reason of failure of Contractor to conform to provisions of Contract Documents.

4. Material not unloaded from transporting vehicle.

5. Defective Work not accepted by Owner.

6. Material remaining on hand after completion of Work.

1.08 PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

A. Partial Payment: No partial payments will be made for materials and equipment delivered or stored unless Shop Drawings or preliminary operation and maintenance manuals are acceptable to Engineer.

B. Final Payment: Will be made only for products incorporated in Work; remaining products, for which partial payments have been made, shall revert to Contractor unless otherwise agreed, and partial payments made for those items will be deducted from final payment.

1.09 ALLOWANCES

A. The allowances shall be used only at the discretion of and as ordered by the Owner for such items as unforeseen conditions, unforeseeable conflicts between existing elements of work and the proposed work, unit price items exceed estimated quantities, and any associated work requested by the Owner including all labor, materials, and services for modifications or extra work to complete the Project that was anticipated, but not specifically included in this Contract.

B. Any portion of these allowances that remain after all authorized payments have been made will be withheld from contract payments and will remain with the Owner.

1.10 INDEMNIFICATION

A. In recognition of Contractor's indemnification obligations under Paragraph 13 "Indemnification and Insurance" of Exhibit A – "General Terms and Conditions", the Owner will pay to the Contractor the specific consideration of one hundred dollars ($100.00). Payment of said specific consideration shall be made at the time of the payment of the first progress estimate and the Contractor shall acknowledge payment of this consideration by letter to the Owner after receipt of the progress payment.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01040

COORDINATION

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall allow the Owner or their agents, and other project Contractor's or their agents, to enter upon the work for the purpose of constructing, operating, maintaining, removing, repairing, altering, or replacing such pipes, sewers, conduits, manholes, wires, poles, or other structures and appliances which may be required to be installed at or in the work. The Contractor shall cooperate with all aforesaid parties and shall allow reasonable provisions for the prosecution of any other work by the Owner, or others, to be done in connection with his work, or in connection with normal use of the facilities.

B. Each Contractor shall cooperate fully with the Owner, the Engineer, and all other Contractor's employed on the work, to effect proper coordination and progress to complete the project on schedule and in proper sequence. Insofar as possible, decisions of all kinds required from the Engineer shall be anticipated by the Contractor to provide ample time for inspection, or the preparation of instructions.

C. Each Contractor shall assume full responsibility for the correlation of all parts of his work with that of other Contractor's. Each Contractor's superintendent shall correlate all work with other Contractor's in the laying out of work. Each Contractor shall lay out his own work in accordance with the Drawings, Specifications, and instructions of latest issue and with due regard to the work of other Contractor's.

D. Periodic coordinating conferences shall be held in accordance with Section 01200, Project Meetings, of these Contract Documents.

1.02 SUBMITTALS

A. Submit the following informational submittals in accordance with Section 01300 - Submittals:

1. Statement of Qualification (SOQ) for land surveyor or civil engineer

2. Statement of Qualification (SOQ) for professional videographer

3. Key contact information: including name, email, work phone, mobile phone, fax number, 24-hour emergency number, for all key management staff of the primary contractor and all subcontractors. Submit this information within 7 days of receipt of the notice to proceed

4. Construction Photographs: Not Used

5. Video Recordings: Submit one copy within 5 days of being taken

1.03 UTILITY NOTIFICATION AND COORDINATION

A. Coordinate the Work with various utilities within Project limits. Notify applicable utilities prior to commencing Work.

1. Contact the City of Naples Utilities Administration at 239-213-4714 for water and sewer utility locations

2. Contact Sunshine State One Call at 1-800-432-4770 at least 48 hours prior to any excavation

B. If damage occurs, or if conflicts or emergencies arise during Work, contact the appropriate utility.

1. City of Naples Wastewater Treatment Plant

a. Contact Person: Robert Casey / Water Reclamation Facility Superintendent

b. Telephone: 239-537-4058

2. Electricity Company: Florida Power and Light.

a. Contact Person: Brian Ludden

b. Telephone: 239-947-7388

c. Alternate Contact Person: Frank Balogh

d. Telephone: 239-332-9140

1.04 ADJACENT FACILITIES AND PROPERTIES

A. Examination:

1. After Effective Date of the Agreement and before Work at site is started, Contractor, Engineer and affected property owners and utility owners shall make a thorough examination of pre-existing conditions including existing buildings, structures, and other improvements in vicinity of Work, as applicable, which could be damaged by construction operations.

2. Periodic re-examination shall be jointly performed to include, but not limited to, cracks in structures, settlement, leakage, and similar conditions.

B. Documentation:

1. Record and submit documentation of observations made on examination inspections in accordance with paragraphs labeled AUDIO-VIDEO RECORDINGS.

2. Upon receipt of video Engineer will review, sign, and return one record copy of documentation to the Contractor.

3. Such documentation shall be used as indisputable evidence in ascertaining whether and to what extent damage occurred as a result of Contractor's

operations, and is for the protection of adjacent property owners, Contractor, and Owner.

1.05 AUDIO-VIDEO RECORDINGS

A. Video-graph construction site and property adjacent to construction site as follows:

1. Pre-construction Audio Video Recording: Prior to beginning work on the construction site video-graph the following items, at a minimum:

a. Site access

b. Staging area

2. Post Construction Audio Video Recording: Within 10 days following the date of Substantial Completion video-graph the following items, at a minimum:

a. Site access

b. Staging area shown as applicable

B. In the case of pre-construction recording, no work shall begin in the area prior to Engineer's review of content and quality of video for that area.

C. Particular emphasis shall be directed to physical condition of existing vegetation, structures, and pavements within pipeline alignment and areas adjacent to and within the right-of-way or easement, and on Contractor storage and staging areas.

D. Owner and Engineer shall have right to select subject matter and vantage point from which videos are to be taken.

E. Video taping shall be by a professional commercial videographer, experienced in shooting construction videos.

F. Video Format and Quality:

1. DVD format, with sound.

2. Video:

a. Produce bright, sharp, and clear images with accurate colors, free of distortion and other forms of picture imperfections.

b. Electronically, and accurately display the month, day, year, and time of day of the recording.

3. Audio:

a. Audio documentation shall be done clearly, precisely, and at a moderate pace.

b. Indicate date, Project name, and a brief description of the location of taping, including:

1) Facility name;

2) Street names or easements;

3) Addresses of private property; and

4) Direction of coverage, including engineering stationing, if applicable.

G. Documentation:

1. Video Tape Label:

a. Tape number (numbered sequentially, beginning with 001)

b. Project Name

c. Name of street(s) or easement(s) included

d. Applicable location by engineering stationing

e. Date and time of coverage

2. Project Video Log: Maintain an ongoing log that incorporates above noted label information for videotapes on Project.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01070

ABBREVIATIONS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Wherever in these specifications references are made to the standards, specifications, or other published data of the various national, regional, or local organizations, such organizations may be referred to by their acronym or abbreviation only. As a guide to the user of these specifications, the following acronyms or abbreviations which may appear in these specifications shall have the meanings indicated herein.

1.02 ABBREVIATIONS AND ACRONYMS

AAMA	Architectural Aluminum Manufacturer's Association
AASHTO	American Association of the State Highway and Transportation Officials
ACI	American Concrete Institute
ACIFS	American Cast Iron Flange Standards
ACOE	Army Corps of Engineers
ACPA	American Concrete Pipe Association
AFBMA	Anti-Friction Bearing Manufacturer's Association, Inc.
AGMA	American Gear Manufacturer's Association
AHGDA	American Hot Dip Galvanizers Association
AI	The Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute, Inc.
APA	American Plywood Association
API	American Petroleum Institute
APHA	American Public Health Association
APWA	American Public Works Association
ASA	Acoustical Society of America
ASAE	American Society of Agriculture Engineers
ASCE	American Society of Civil Engineers

ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASLE	American Society of Lubricating Engineers
ASME	American Society of Mechanical Engineers
ASMM	Architectural Sheet Metal Manual
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
CEMA	Conveyor Equipment Manufacturer's Association
CMA	Concrete Masonry Association
CRSI	Concrete Reinforcing Steel Institute
DIPRA	Ductile Iron Pipe Research Association
EIA	Electronic Industries Association
EPA	Environmental Protection Agency
ETL	Electrical Test Laboratories
FBC	Florida Building Code
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FS	Federal Specifications
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society
IPCEA	Insulated Power Cable Engineers Association
ISA	Instrument Systems and Automation
ISO	International Organization for Standardization
MBMA	Metal Building Manufacturers Association
MMA	Monorail Manufacturers Association
MTI	Marine Testing Institute
NAAM	National Association of Architectural Metal Manufacturers
NACE	National Association of Corrosion Engineers
NBS	National Bureau of Standards
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association

NFPA	National Fire Protection Association
NIOSH	National Institute of Occupational Safety and Health
NIST	National Institute of Standards and Testing
NRCA	National Roofing Contractors Association
NSF	National Science Foundation
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCM	Program Construction Manager
PMT	Program Management Team
SMACCNA	Sheet Metal and Air Conditioning Contractors National Association
SSPC	Steel Structures Painting Council
SSPWC	Standard Specifications for Public Works Construction
SFWMD	South Florida Water Management District
UL	Underwriters Laboratories, Inc.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01090

REFERENCE STANDARDS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Titles of Sections and Paragraphs: Captions accompanying specification sections and paragraphs are for convenience of reference only, and do not form a part of the Specifications.

B. Applicable Publications: Whenever in these Specifications references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is specified, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date of the opening of bids, shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth herein or shown on the Drawings shall be waived because of any provision of, or omission from, said standards or requirements.

C. Specialists, Assignments: In certain instances, Specification text requires (or implies) that specific work is to be assigned to specialists or expert entities, who must be engaged for the performance of that work. Such assignments shall be recognized as special requirements over which the Contractor has no choice or option. These requirements shall not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the Work; also they are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of contract requirements remains with the Contractor.

D. A partial listing of codes, regulations, specifications, and standards includes the following:

Air Conditioning and Refrigeration Institute (ARI)

Air Diffusion Council (ADC)

Air Moving and Conditioning Association (AMCA)

The Aluminum Association (AA)

American Architectural Manufacturers Association (AAMA)

American Concrete Institute (ACI)

American Gear Manufacturers Association (AGMA)

American Hot Dip Galvanizers Association (AHDGA)

American Institute of Steel Construction, Inc. (AISC)

American Iron and Steel Institute (AISI)

American National Standards Institute (ANSI)

American Society of Civil Engineers (ASCE)

American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE)

American Society of Mechanical Engineers (ASME)

American Society for Testing and Materials (ASTM)

American Standards Association (ASA)

American Water Works Association (AWWA)

American Welding Society (AWS)

American Wood-Preserver's Association (AWPA)

Anti-Friction Bearing Manufacturers Association (AFBMA)

Building Officials and Code Administrators (BOCA)

Consumer Product Safety Commission (CPSC)

Factory Mutual (FM)

Federal Specifications

Florida Building Code

Instrument Society of America (ISA)

Institute of Electrical and Electronics Engineers (IEEE)

National and Local Fire Codes

Lightning Protection Institute (LPI)

National Electrical Code (NEC)

National Electrical Manufacturer's Association (NEMA)

National Electrical Safety Code (NESC)

National Electrical Testing Association (NETA)

National Fire Protection Association (NFiPA)
Regulations and Standards of the Occupational Safety and Health Act (OSHA)

Southern Building Code Congress International, Inc. (SBCCI)

Sheet Metal & Air Conditioning Contractors National Association (SMACCNA)

Standard Building Code

Standard Mechanical Code

Standard Plumbing Code

Uniform Building Code (UBC)

Underwriters Laboratories Inc. (UL)

E. Contractor shall, when required, furnish evidence satisfactory to the Engineer that materials and methods are in accordance with such standards where so specified.

F. In the event any questions arise as to the application of these standards or codes, copies shall be supplied on-site by the Contractor.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of other requirements of the specifications, all work specified herein shall conform to or exceed the requirements of all applicable codes.

B. References herein to "Building Code" shall mean the Florida Building Code (FBC). The latest edition of the code as approved and used by the local agency as of the date of the opening of bids, as adopted by the agency having jurisdiction, shall apply to the Work herein, including all addenda, modifications, amendments, or other lawful changes thereto.

C. In case of conflict between codes, reference standards, Drawings and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarification and directions prior to ordering or providing any materials or labor. The Contractor shall follow the most stringent requirements.

D. Applicable Standard Specifications: The Contractor shall construct the Work specified herein in accordance with the requirements of the Contract Documents and the referenced portions of those referenced codes, standards, and Specifications listed herein.

E. References herein to "OSHA Regulations for Construction" shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

F. References herein to "OSHA Standards" shall mean Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

PART 2 -- PRODUCTS

NOT USED)

PART 3 – EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01110

ENVIRONMENTAL PROTECTION PROCEDURES

PART 1 -- GENERAL

1.01 SCOPE OF WORK

A. The work covered by this Section consists of furnishing labor materials and equipment and performing work required for the prevention of environmental pollution in conformance with applicable laws and regulations, during and as the result of construction operations under this Contract. For the purpose of the Specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environmental for aesthetic and/or recreational purposes.

B. The control of environmental pollution requires consideration of air, water, and land, and involves management of noise and solid waste, as well as other pollutants.

C. Schedule and conduct work in a manner that will minimize the erosion of soils in the area of the work. Provide erosion control measures such as diversion channels, sedimentation or filtration system, berms, staked hay bales, seeding, mulching, or other special surface treatments as are required to prevent silting and muddying of streams, rivers, impoundments, lakes, etc. All erosion control measures shall be in place in an area prior to any construction activity in that area.

D. Erect and maintain the silt fence / hay bales around perimeter of all areas of work and maintain for the duration of the project as indicated on the drawings.

E. These Specifications are intended so that construction is achieved with a minimum of disturbance to the existing ecological balance between a water resource and its surroundings. These are general guidelines.

F. All phases of sedimentation and erosion control shall comply with and be subject to the approval of the Florida Department of Environmental Protection.

G. Schedule and conduct all work in a manner that will minimize the level of noise escaping the site, especially at night and on weekends.

H. Cutting of trees other than those shown on the Drawings is prohibited.

1.02 APPLICABLE REGULATIONS

A. Comply with all applicable Federal, State, and local laws and regulations concerning environmental pollution control and abatement.

1.03 NOTIFICATIONS

A. The Owner will notify the Contractor in wiring of any non-compliance with the foregoing provisions or of any environmentally objectionable acts and corrective action to be taken. State or local agencies responsible for verification of certain aspects of the environmental protection requirements shall notify the Contractor in writing, through the Engineer, of any non-compliance with State or local requirements. The Contractor shall, after receipt of such notice from the Owner or from the regulatory agency through the Engineer, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose.

1.04 IMPLEMENTATION

A. Prior to commencement of the work, meet with the Engineer and Owner to develop mutual understandings relative to compliance with this provision and administration of the environmental pollution control program.

PART 2 – PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

3.01 EROSION CONTROL

A. Provide positive means of erosion control such as shallow ditches around construction to carry off surface water. Erosion control measures such as siltation basins, hay check dams, mulching, jute netting, and other equivalent techniques shall be used as appropriate. Offsite surface water shall be diverted around the site to a downstream channel ahead of siltation barriers. Flow of surface water into excavated areas shall be prevented. Ditches around construction area shall also be used to carry away water resulting from dewatering of excavated areas. At the completion of the work, ditches shall be backfilled and the ground surface restored to original condition.

3.02 PROTECTION OF STREAMS WETLANDS, AND SURFACE WATER

A. Care shall be taken to prevent or reduce to a minimum any damage to any stream, drainage ditch, storm drain of sewer from pollution by debris, sediment, or other material, or from the manipulation of equipment and/or materials in or near such streams. Water that has been used for washing or processing or that contains oils or sediments that will reduce the quality of the water in the stream shall not be directly returned to the stream. Such water will be diverted through a settling basin or filter before being directed into the streams.

B. The Contractor shall not discharge water from dewatering operations directly into any live or intermittent stream, channel, wetlands, surface water, or any storm sewer. Water from dewatering operations shall be treated by filtration, settling basins, or other approved method to reduce the amount of sediment contained in the water to allowable levels.

C. All preventative measures shall be taken to avoid spillage of petroleum products and other pollutants.

D. Water being flushed from structures or pipelines after disinfection, with a chlorine residue of 2 mg/l or greater shall be treated with a de-chlorination solution, in a method approved by the Engineer, prior to discharge.

3.03 PROTECTION OF LAND RESOURCES

A. Land resources within the project and outside the limits of permanent work shall be restored to a condition, after completion of construction, which will appear to be natural and not detract from the appearance of the project. Confine all construction activities to areas shown on the Drawings.

B. Outside of areas requiring earthwork for the construction of the new facilities, the Contractor shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without prior approval. No ropes, cables, or guys shall be fastened to or attached to any exiting nearby trees for anchorage unless specifically authorized by the Engineer. Where such special emergency use is permitted, first wrap the trunk with a sufficient thickness of burlap or rags over which softwood cleats shall be tied before any rope, cable, or wire is placed.

C. Where trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment, dumping or other operations, protect such trees by placing boards, planks, or poles around them. Monuments and markers shall be protected similarly before beginning operations near them.

D. Any trees or other landscape feature scarred or damaged by the subcontractor's equipment or operations shall be restored as nearly as possible to its original condition. The Engineer will decide what method of restoration shall be used and whether damaged trees shall be treated and healed or removed and disposed of.

E. All scars made on trees by equipment, construction operations, or by the removal of limbs larger than 1-inch in diameter shall be coated as soon as possible with an approved tree wound dressing. All trimming or pruning shall be performed in an approved manner by experienced workmen with saws or pruning shears. Tree trimming with axes will not be permitted.

F. The locations of the Contractor's storage, and other construction building, required temporarily in the performance of the work, shall be cleared portions of the job site or areas to be cleared as shown on the Drawings shall not be within wetlands. The preservation of the landscape shall be an imperative consideration in the selection of all sites and in the construction of buildings.

G. Debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner.

3.04 PROTECTION OF AIR QUALITY

A. Burning. The use of burning at the project site for the disposal of refuse and debris will not be permitted.

B. Dust Control. Maintain excavations, embankments, stockpiles, access roads, plant sites, waste areas, borrow areas, and other work areas within or without the project boundaries free from dust which could cause the standards for air pollution to be exceeded, and which would cause a hazard or nuisance to others.

C. An approved method of stabilization consisting of sprinkling or other similar methods will be permitted to control dust. The use of chlorides may be permitted with approval from the Engineer.

3.05 NOISE CONTROL

A. The Contractor shall make every effort to minimize noises caused by his operations. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise in compliance with State and Federal (OSHA) regulations.

3.06 CLEANUP PROCEDURES FOR HURRICANE WARNINGS AND WATCHES

A. In the event that the National Oceanographic and Atmospheric Administration (NOAA) issues a hurricane watch for the Collier County area, the Engineer will contact the Contractor, informing him that the watch has been established. Once notified of a hurricane watch, the Contractor will remove all unnecessary items from the work area and tie down all remaining supplies, barricades, and movable (under 200 pounds) objects. The Engineer will determine “necessary” items. If a warning is issued, the Contractor shall complete the clean-up and evacuate the area the same day. The Owner shall not be liable for any costs or delays caused as a result of demobilization or remobilization due to the above.

- END OF SECTION -

SECTION 01200

PROJECT MEETINGS

PART 1 -- GENERAL

1.01 PROJECT MEETINGS

A. A pre-construction meeting will be held after Award of Contract, but prior to starting work at the site. The Engineer shall prepare and distribute the meeting agenda and shall preside at the meeting. The Engineer shall record and distribute minutes of the proceedings and decisions.

B. Attendance:

1. Owner
2. Engineer
3. Contractor
4. Major subcontractors

C. Minimum Agenda:

1. Tentative construction and submittal schedules
2. Critical work sequencing
3. Designation of responsible personnel
4. Processing of Field Decisions and Change Orders
5. Adequacy of distribution of Contract Documents
6. Submittal of Shop Drawings and samples
7. Procedures for maintaining record documents
8. Use of site and Owner's requirements
9. Major equipment deliveries and priorities
10. Safety and first aid procedures
11. Security procedures
12. Housekeeping procedures
13. Processing of Partial Payment Requests
14. General regard for community relations

1.02 PROGRESS MEETING

A. Progress meetings will be held bi-weekly or at frequencies requested by the Owner and/or Engineer at a location determined by the Engineer during the performance of the work of this Contract. Additional meetings may be called as progress of work dictates.

B. Engineer will prepare and distribute agenda, preside at meetings and record minutes of proceedings and decisions. Engineer will distribute copies of minutes to participants.

C. Attendance:

1. Owner

2. Engineer

3. Contractor

4. Subcontractors, only with Engineer's approval or request, as pertinent to the agenda

D. Minimum Agenda:

1. Review and approve minutes of previous meetings.

2. Review progress of Work since last meeting.

3. Review proposed construction schedule.

4. Note and identify problems which impede planned progress.

5. Develop corrective measures and procedures to regain planned schedule.

6. Revise construction schedule as indicated and plan progress during next work period.

7. Maintaining of quality and work standards.

8. Complete other current business.

9. Schedule next progress meeting.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01300

SUBMITTALS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. This Section specifies the means of all submittals. All submittals, whether their final destination is to the Owner, Engineer, or other representatives of the Owner, shall be directed through the Engineer. A general summary of the types of submittals and the number of copies required is as follows:

Copies to Engineer	Type of Submittal
6	Construction Schedule
6	Management of Traffic Plan
6	Schedule of Payment Items
6	Progress Estimates
8	Shop Drawings
2	Certificates of Compliance
2	Warranties
2	Geophysical logs (PDF and LAS format)
2*	Product Samples

** Unless otherwise required in the specific Section where requested.*

1.02 SUBMITTAL PROCEDURES

A. Direct submittals and all construction related correspondence (i.e., transmittals, Requests for Information, quotations for change orders, etc) to the Engineer at the following address, unless specified otherwise during the preconstruction meeting.

Hazen and Sawyer, P.C.
2101 N.W. Corporate Boulevard, Suite 301
Boca Raton, Florida 33431
Attention: Teresa McNally

B. Transmittal of Submittal:

1. Contractor shall:

a. Review each submittal and check for compliance with Contract Documents and clearly note any deviations and / or exceptions.

b. Stamp each submittal with uniform approval stamp before submitting to Engineer.

1) Stamp to include Project name, submittal number, Specification number, Contractor's reviewer name, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with Contract Documents.

2) Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action

c. Complete, sign, and transmit with each submittal package, one Transmittal of Contractor's Submittal form attached at end of this section.

2. Identify each submittal with the following:

a. Numbering and Tracking System:

1) Sequentially number each submittal.

2) Resubmission of submittal shall have original number with sequential alphabetic suffix.

b. Specification section and paragraph to which submittal applies.

c. Project title and Owner's project number.

d. Date of transmittal.

e. Names of Contractor, Subcontractor or Supplier, and manufacturer as appropriate.

3. Identify and describe each deviation or variation from Contract Documents.

C. Format:

1. Do not base Shop Drawings on reproductions of Contract Documents.

2. Package submittal information by individual specification section. Do not combine different specification sections together in submittal package, unless otherwise directed in Specification.

3. Present in a clear and thorough manner and in sufficient detail to show kind, size, arrangement, and function of components, materials, and devices, and compliance with Contract Documents. All submittals shall be on 8 1/2"x11" or 11"x17" paper unless otherwise approved by Engineer.

4. Index with labeled tab dividers in orderly manner.

D. Timeliness: Schedule and submit in accordance with schedule of Shop Drawing and Sample submittals, and requirements of individual Specification sections.

E. Processing Time:

1. Time for review shall commence on Engineer’s receipt of submittal.

2. Engineer will act upon Contractor's submittal and transmit response to Contractor not later than 21 days after receipt, unless otherwise specified.

3. Re-submittals will be subject to same review time.

4. No adjustment of Contract Times or Price will be allowed due to delays in progress of Work caused by rejection and subsequent re-submittals.

F. Re-submittals: Clearly identify each correction or change made.

G. Incomplete Submittals:

1. Engineer will return entire submittal for Contractor’s revision if preliminary review deems it incomplete.

2. When any of the following are missing, Submittal will be deemed incomplete:

a. Contractor’s review stamp, completed and signed

b. Transmittal of Contractor’s Submittal, completed and signed

c. Insufficient number of copies

H. Submittals not required by Contract Documents:

1. Will not be reviewed and will be returned stamped “Not Subject to Review”.

2. Engineer will keep one copy and return all remaining copies to Contractor.

1.03 CONSTRUCTION SCHEDULES

A. The scheduling of the work under the Contract shall be performed by the Contractor in accordance with the requirements of this section. The development of the schedule, the cost loading of the schedule, monthly payment requisitions and project status reporting requirements of the Contract shall employ computerized Critical Path Method (CPM) scheduling. The CPM schedule shall be cost loaded and resource (manpower) loaded based on the schedule of values approved by the Engineer in accordance with the requirements of this Section. The CPM schedule and all reports shall be prepared with computer software, specifically Microsoft Project. No substitutions will be allowed. Method employed shall be precedence diagramming method (PDM). Where submittals are required hereunder, the Contractor shall submit eight (8) copies of each submittal item.

B. The Contractor shall have the capability of preparing and utilizing the specified progress scheduling techniques. A statement of capability shall be submitted in writing to the Engineer with the return of the executed Agreement to the Owner and will verify that either the Contractor's organization has in-house capability qualified to use the technique or that the Contractor employs a consultant who is so qualified. Capability shall be verified by description of the construction projects to which the Contractor or his

consultant has successfully applied the scheduling technique and which were controlled throughout the duration of the project by means of systematic use and updating of the construction progress schedule, the network analysis and associated reports. The statement shall also provide the contact persons for the referenced projects with current telephone and address information. The submittal shall include the name of the individual on the Contractor's staff or qualified scheduling Consultant who will be responsible for the construction progress schedule, and associated reports and for providing the required updating information of same.

C. Activity durations shall be in whole working days. The workday calendar date correlation shall be based on an 8-hour day and 40-hour week with allowance for standard holidays, normal weather, and other special requirements.

D. If the Contractor desires to make changes in his method of operating which affect the construction progress schedule and related items, he shall notify the Engineer in writing stating what changes are proposed and the reason for the change. If the Engineer accepts these changes, in writing, the Contractor shall revise and submit, without additional cost to the Owner, all of the affected portions of the construction progress schedule, and associated reports. The construction progress schedule and related items shall be adjusted by the Contractor only after prior acceptance, in writing by the Engineer. Adjustments may consist of changing portions of the activity sequence, activity durations, division of activities, or other adjustments as may be required. The addition of extraneous, nonworking activities and activities which add restraints to the construction progress schedule shall not be accepted.

E. Except where earlier completions are specified, schedule dates which show completion of all work prior to the contract completion date shall, in no event, be the basis for claim for delay against the Owner by the Contractor.

F. Construction progress schedules and related items which contain activities showing negative float or which extend beyond the contract completion date will not be accepted by the Engineer.

G. Whenever it becomes apparent from the current construction progress schedule and associated reports that delays to the critical path have resulted and the contract completion date will not be met, or when so directed by the Engineer, the Contractor shall take some or all of the following actions at no additional cost to the Owner. They shall submit to the Engineer for approval, a written statement of the steps they intend to take to remove or arrest the delay to the critical path in the current construction progress schedule.

1. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of work.

2. Increase the number of working hours per shift, shifts per day, working days per week, the amount of construction equipment, or any combination of the foregoing, sufficiently to substantially eliminate the backlog of work.

3. Reschedule activities to achieve maximum practical concurrency of accomplishment of activities, and comply with the revised schedule.

H. If, when so requested by the Engineer, the Contractor should fail to submit a written statement of the steps they intend to take or should fail to take such steps as reviewed and accepted in writing by the Engineer, the Engineer may direct the Contractor to increase the level of effort in manpower (trades), equipment and work schedule (overtime, weekend and holiday work, etc.) to be employed by the Contractor in order to remove or arrest the delay to the critical path in the current construction progress schedule, and the Contractor shall promptly provide such level of effort at no additional cost to the Owner.

I. If the completion of any activity, whether or not critical, falls more than 100 percent behind its previously scheduled and accepted duration, the Contractor shall submit for approval a schedule adjustment showing each such activity divided into two activities reflecting completed versus uncompleted work.

J. Shop drawings which are not approved on the first submittal or within the time scheduled, and equipment which does not pass the specified tests and certifications shall be immediately rescheduled.

K. The contract time will be adjusted only in accordance with the General Conditions and other portions of the Contract Documents as may be applicable. If the Engineer finds that the Contractor is entitled to any extension of the contract completion date, the Engineer's determination as to the total number of days extension shall be based upon the current construction progress schedule and on all data relevant to the extension. Such data shall be included in the next updating of the schedule and related items. Actual delays in activities which, according to the construction progress schedule, do not affect any contract completion date will not be the basis for a change therein.

L. From time to time it may be necessary for the contract schedule of completion time to be adjusted by the Owner in accordance with the General Conditions and other portions of the Contract Documents as may be applicable. Under such conditions, the Engineer will direct the Contractor to reschedule the work or contract completion time to reflect the changed conditions, and the Contractor shall revise the construction progress schedule and related items accordingly, at no additional cost to the Owner.

M. Available float time may be used by the Owner through the Owner's Engineer.

N. Float or slack time within the construction schedule is not for the exclusive use or benefit of either the Owner or the Contractor, but is jointly owned, as an expiring project resource available to both parties as needed to meet contract milestones and completion dates. The Owner controls the float time and, therefore, without obligation to extend either the overall completion date or any intermediate completion dates the Owner may initiate changes that absorb float time only. Owner initiated changes that affect the critical path on the network diagram shall be the sole grounds for extending the completion dates. Each change request shall include a change impact schedule indicating the effect of this change on the detailed construction schedule. This schedule shall include a narrative description of the schedule change and a computer generated schedule comparison of the current schedule and the schedule revised to indicate the additional work required by the change and its impact on the critical path. Contractor initiated changes that encroach on the float time may be accomplished only with the Owner's concurrence. Such changes, however, shall give way to Owner initiated changes competing for the same float time.

O. To the extent that the construction project schedule, or associated report or any revision thereof shows anything not jointly agreed upon or fails to shown anything jointly agreed upon, it shall not be deemed to have been accepted by the Engineer. Failure to include on a schedule any element of work required for the performance of this Contract shall not excuse the Contractor from completing all work required within any applicable completion date, notwithstanding the review of the schedule by the Engineer.

P. Review and acceptance of the construction progress schedule, and related reports, by the Engineer is advisory only and shall not relieve the Contractor of the responsibility for accomplishing the work within the contract completion date. Omissions and errors in the construction progress schedule, and related reports shall not excuse performance less than that required by the Contract and in no way make the Engineer an insurer of the Contractor's success or liable for time or cost overruns flowing from any shortcomings in the construction progress schedule, and related reports.

Q. Monthly progress payment amounts shall be determined from the monthly progress updates of the CPM schedule activities as correlated to the Schedule of Values.

R. Contractor is responsible for determining the sequence of activities, the time estimates of the detailed construction activities and the means, methods, techniques and procedures to be employed.

S. Detailed network activities shall include: construction activities, the submittal and approval of samples of materials and shop drawings, the procurement of materials and equipment, fabrication of materials and equipment and their delivery, installation, and testing, start-up and training. Schedule, logic, and operating constraints and sequences shall be as listed in Section 01010 entitled "Summary of Work". Milestones shall be selected by Contractor and Engineer.

T. Contractor shall consult with his Subcontractors (and suppliers) relating to the preparation of his construction plan and Construction Schedule. Subcontractors shall receive copies of the Contractor's Construction Schedule and shall be continually advised of any updates or revisions to the Construction Schedule as the work progresses. When Contractor submits his Construction Schedule to the Engineer or makes any proposed updates or revisions to such Schedule, it will be assumed by the Owner and Engineer that Contractor has consulted with and has the concurrence of his Subcontractors. Contractor shall be solely responsible for ensuring that all Subcontractors comply with the requirements of the Construction Schedule for their portions of the work.

U. Responsibility codes shall be established for the Contractor, Engineer, Owner, subcontractors, suppliers, etc.

1.04 CPM SCHEDULE SUBMITTALS

A. All schedule submittals including revisions and updates shall include two (2) copies of the schedule data on diskette(s) with label(s) identifying the file name and revision number. These diskette(s) shall be 3.5-inch size with double-sided high-density nominal capacity of 1.4 megabytes. The diskette(s) shall be properly packaged and shipped so as to prevent damage or loss of the data.

B. Preliminary CPM Schedule Submittals: The Contractor shall submit three short term schedule documents at the Pre-construction Conference which shall serve as the Contractor's Plan of Operation for the initial 60 day period of the contract time and to identify the manner in which the Contractor intends to complete all work within the Contract Time. The Contractor shall submit (1) a 60 Day Plan of Operation Bar Chart, (2) a Project Overview Bar Chart, and (3) a Preliminary Schedule of Values.

1. 60 Day Plan of Operation: During the initial 60 days of the Contract Time, the Contractor shall conduct Contract operations in accordance with the 60 day bar chart Plan of Operations. The bar chart so prepared and submitted shall show the accomplishment of the Contractor's early activities (mobilization, permits, and submittals necessary for early material and equipment procurement, submittals necessary for long-lead equipment procurement, initial site work and other submittals and activities required for the first 60 days.

2. Project Overview Bar Chart: The overview bar chart shall indicate the major components of the project work and the sequence relations between major components and subdivisions of major components. The overview bar chart shall indicate the relationships and time frames in which the various components of the work will be made substantially complete in order to meet the project milestones and contract completion date.

3. The schedule of values shall be developed with the development of the CPM schedule activities to minimize changes when cost loading the CPM schedule. At the Pre-construction Conference, the Contractor shall submit a preliminary Schedule of Values for the major components of the work correlated to the activities listed on the project overview bar chart (2). The total sum of the schedule of values shall equal the project contract total amount.

C. Preliminary CPM Schedule and Revised Original CPM Schedule Submittals: The Preliminary CPM Schedule shall be submitted within thirty (30) days from the Pre-construction Conference. Owner and Engineer shall review the Preliminary CPM Schedule within ten (10) days and will schedule the Preliminary CPM Schedule Review Meeting. The Preliminary CPM Schedule Review Meeting shall be attended by the Contractor's project manager, scheduling staff (in-house or consultant), superintendent, and major subcontractors. The Revised Original CPM Schedule shall be submitted within thirty (30) days from the return of the Preliminary CPM Schedule. Both the Preliminary CPM Schedule and Revised Original CPM Schedule submittals shall have identical format, and shall consist of tabular and graphic reports, eight (8) copies, spiral bound, and ordered with table of contents. The following required reports must be included:

1. Four (4) tabular schedule listings: sorted by Activity number, by Early Start, by Total Float, and by Responsibility code; with the following data elements:

   a. Activity number/ID

   b. Activity description

   c. Duration

   d. Early start date

e. Early finish date

f. Late start date

g. Late finish date

h. Free float

i. Total float

j. Criticality

k. Budget amount of activity

l. Responsibility

2. A successor-predecessor report which shall identify the successor and predecessor activities for each activity and ties between schedule activities.

3. A critical path report which shall identify all activities with zero (0) duration.

4. A project bar chart sorted by Activity number.

5. A project bar chart sorted by Early start.

6. A milestone bar chart.

7. A network diagram showing critical path clearly highlighted.

D. Upon acceptance of the Original CPM Schedule, the Early Start and Early Finish dates for all activities shall be fixed as Planned Start and Planned Finish dates, except where Late Start and Late Finish dates are specifically agreed to by Owner and Engineer, for future variance calculations.

E. Following acceptance of the Original CPM Schedule, the Contractor shall monitor the progress of the work and adjust the schedule each month to reflect actual progress and any changes in planned future activities. Progress shall be evaluated monthly by the Contractor (Subcontractor) and the Engineer. Not less than seven (7) days prior to submittal of each monthly progress payment estimate, they shall meet at the jobsite and jointly evaluate the status of each activity on which work has started or is due to start, based on the preceding construction schedule; to show actual progress, to identify those activities started and those completed during the previous period; to show the estimated time required to complete or the percent complete of each activity started but not yet completed; and to reflect any necessary changes to the schedule, network analysis or report to accurately reflect progress. Activities shall not be considered to be complete until they are, in fact, 100 percent complete. Each schedule update must be complete including all information requested in the Original CPM Schedule submittal shown in paragraph B.

1. In addition, each update shall include the following tabular report formats:

a. Completed Tasks (a Current Activities Report)

b. Should have Started Tasks (a Current Activities Report)

c. Tasks in progress (a Current Activities Report)

d. Slipping Tasks (a Current Activities Report)

e. Resource Usage (a Workload Report). This report shall identify any over-allocation of manpower and/or equipment resources, and identify measures to correct/alleviate the over-allocation.

f. Itemized list of all changes to the network logic, activity durations, responsibility, or any data elements since the previous submission.

g. Variance report comparing Planned start and finish dates to Actual start and finish dates.

2. Neither the submission nor the updating of the Contractors Revised Original CPM Schedule submittal, nor the submission, updating, change or revision of any other report, curve, schedule or narrative, shall have the effect of amending or modifying or limiting in any way the Contractor's obligations under this Contract. Only a signed, fully executed Change Order can modify these contractual obligations.

3. Upon approval of a Change Order, or upon receipt by the Contractor of authorization to proceed with additional work, the change shall be reflected in the next submittal of the CPM Schedule by the Contractor. The Contractor shall utilize a sub-network in the schedule depicting the changed work and its effect on other activities. The sub-network shall be tied to the main network with the appropriate logic so that a true analysis of the critical Path can be made.

4. Monthly schedule updates shall be submitted with the Application for Progress Payment.

F. A three (3) week rolling schedule shall be provided for each weekly meeting showing the items worked the previous week and those scheduled to be in progress during the next two (2) weeks. The three-week rolling schedule shall use a bar chart format and be accompanied by a tabular report of the activities included. The previous week's schedule shall be indicated as a "target" schedule for comparison.

G. A shop drawing submittal schedule shall be provided.

1.05 SCHEDULE OF PAYMENT VALUES

A. The Contractor shall prepare a preliminary Schedule of Values to correspond with the Project Overview Barchart as required under Paragraph 1.04 B.2 for submission at the Pre-construction Conference and a Detailed Schedule of Values to correspond with the Revised Original CPM Schedule as required under Section 1.04C in conjunction with the Revised Original CPM Schedule submission.

1. Because the ultimate requirement is to develop a detailed schedule of values sufficient to determine appropriate monthly progress payment amounts through cost loading of the CPM Schedule activities, sufficient detailed breakdown shall

be provided to meet this requirement. The Engineer shall be the sole judge of acceptable numbers, details and description of values established. If, in the opinion of the Engineer, a greater number of Schedule of Value items than proposed by the Contractor is necessary the Contractor shall add the additional items so identified by the Engineer.

2. A cross-reference list shall be developed in two parts:

   a. List each schedule activity with the respective valued items making up the total cost of the activity.

   b. List each valued item with the respective schedule activity or activities that make up the total cost indicated. In the case where a number of schedule items make up the total cost for a valued item (shown in the schedule of values) the total cost for each scheduled item should be indicated.

B. The schedule shall be given in sufficient detail for the proper identification of Work accomplished. Each item shall include its proportional share of all costs including the Contractor's overhead, contingencies and profit. The sum of all scheduled items shall equal the total value of the Contract.

C. If the Contractor anticipates the need for payment for materials stored on the project site, he shall also submit a list covering the cost of materials, delivered and unloaded with taxes paid.

D. The Contractor shall expand or modify the above schedule and materials listing as required by the Engineer's initial or subsequent reviews.

E. The Contractor's schedule of payment items shall be, at a minimum, categorized by structures (and appurtenances) as follows:

   1. Mobilization

   2. Individual drilling activities

   3. Individual testing activities

   4. Site Clearing/Demolition

   5. Demobilization/Project Closeout

1.06 SHOP DRAWINGS

A. The Contractor shall submit a detailed Schedule of Shop Drawing Submittals at the Pre-Construction Conference, organized by Specification Section Number.

B. The Contractor shall submit for review shop drawings for concrete reinforcement, structural details, piping layout and appurtenances, wiring, color selection charts, Contractor Furnished Equipment, materials and equipment fabricated especially for this

Contract, and materials and equipment for which such Drawings are specified or specifically requested by the Engineer.

C. Shop drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, installation/erection drawings, etc., depending on the subject of the Drawings.

D. When so specified, or if considered by the Engineer to be acceptable, the manufacturer's specifications, catalog data, descriptive matter, illustrations, etc. may be submitted for review in place of shop drawings. In such case, the requirements shall be as specified for shop drawings, insofar as applicable.

E. The Contractor shall be responsible for the prompt submittal of all shop drawings so that there shall be no delay to the Work due to the absence of such Drawings. The Engineer will review the shop drawings within 21 calendar days of receipt of such Drawings. Reviewed shop drawings will be returned to the Contractor by regular mail, posted no later than 21 days after receipt.

F. Time delays caused by rejection of submittals are not cause for extra charges to the Owner or time extensions.

G. Requirements: All shop drawings shall be submitted to the Engineer through the Contractor. The Contractor is responsible for obtaining shop drawings from his subcontractors and returning reviewed Drawings to them. All Drawings shall be clearly marked with the name of the project, Owner, Contractor, and building, equipment, or structure to which the drawing applies. Drawings shall be suitably numbered and stamped by the Contractor. Each shipment of Drawings shall be accompanied by a letter of transmittal giving a list of the drawing numbers and the names mentioned above.

H. Product Data: Where manufacturer's publications in the form of catalogs, brochures, illustrations, or other data sheets are submitted in lieu of prepared shop drawings, such submission shall specifically indicate the particular item offered. Identification of such items and relative pertinent information shall be made with indelible ink. Submissions showing only general information will not be accepted. Non-applicable information shall be crossed out.

I. Product data shall include materials of construction, dimensions, performance characteristics, capacities, wiring diagrams, piping and controls, etc.

J. Warranties: When warranties are called for, a sample of the warranty shall be submitted with the shop drawings. The sample warranty shall be the same form that will be used for the actual warranty. Actual warranties shall be originals and notarized.

K. Work Prior to Review: No material or equipment shall be purchased, fabricated especially for this Contract, or delivered to the project site until the required shop drawings have been submitted, processed and marked either "FURNISH AS SUBMITTED" or "FURNISH AS CORRECTED". All materials and Work involved in the construction shall be as represented by said Drawings.

L. The Contractor shall not proceed with any portion of the Work (such as the construction of foundations) for which the design and details are dependent upon the design and details of equipment for which submittal review has not been completed.

M. Contractor's Review: Only submittals which have been checked and corrected should be submitted to the Contractor by its subcontractors and vendors. Prior to submitting shop drawings to the Engineer, the Contractor shall check thoroughly all such Drawings to satisfy itself that the subject matter thereof conforms to the Drawings and Specifications in all respects. Drawings which are correct shall be marked with the date, checker's name and indications of the Contractor's approval, and then shall be submitted to the Engineer. Other Drawings submitted to the Engineer will be returned to the Contractor unreviewed.

N. Contractor's Responsibility: The Engineers review of shop drawings will be general and shall not relieve the Contractor of the responsibility for details of design, dimensions, etc., necessary for proper fitting and construction of the Work required by the Contract and for achieving the specified performance.

O. Contractor's Modifications: For submissions containing departures from the Contract Documents, the Contractor shall include proper explanation in his letter of transmittal. Should the Contractor submit for review equipment that requires modifications to the structures, piping, layout, etc. detailed on the Drawings, he shall also submit for review details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the Owner, shall do all Work necessary to make such modifications.

P. "Or Equal" Items: Whenever a particular brand or make of material, equipment, or other item is specified, or is indicated on the Drawings, it is for the purpose of establishing a standard of quality, design, and type desired and to supplement the detailed specifications and unless it is followed by the words "NO SUBSTITUTION", or “SUBSTITUTIONS ARE NOT ALLOWED” any other brand or make which is equivalent to that specified or indicated may be offered as an "or equal" item subject to the following provisions:

1. Contractor shall submit for each proposed "or equal" item sufficient details, complete descriptive literature, and performance data together with samples of the materials, where feasible, to enable the Engineer to determine if the proposed "or equal" item is equal, in all respects including, but not limited to, quality, performance, ease of maintenance, availability of spare parts, and experience record.

2. Contractor shall submit certified tests, where applicable, by an independent laboratory attesting that the proposed "or equal" item is equal.

3. A list of installations where the proposed "or equal" item is equal. Such listing shall cover a minimum of the previous five years and will furnish project names and contact phone numbers.

4. Where the acceptance of a "or equal" item requires excessive review by the Engineer, revision or redesign of any part of the Work, all such additional review

costs, revisions and redesign, and all new Drawings and details required therefore, shall be at the Contractor's expense.

5. In all cases the Engineer shall be the sole judge as to whether a proposed "or equal" item is to be accepted. The Contractor shall abide by the Engineer's decision when proposed "or equal" items are judged to be unacceptable and shall in such instances furnish the item as specified. No "or equal" items shall be used in the Work without written acceptance of the Engineer.

6. Acceptance of any proposed "or equal" item shall in no way release the Contractor from any of the provisions of the Contract Documents.

7. Owner may require, at Contractor's expense, a special performance guarantee or other surety with respect to any substitute.

P. Complete Submittals: Each submittal shall be complete in all aspects incorporating all information and data required to evaluate the products' compliance with the Contract Documents. Partial or incomplete submissions shall be returned to the Contractor without review.

Q. Shop Drawing Distribution: The Contractor shall submit a minimum of 8 copies of all shop drawings to the Engineer for review. Where full size drawings are required, the Contractor shall submit one reproducible vellum and two bluelines or blacklines. Shop drawings will be reviewed, stamped and distributed with the appropriate box checked either "FURNISH AS SUBMITTED", "FURNISH AS CORRECTED" or "REVISE AND RESUBMIT". The distribution of processed shop drawings will be as follows:

1. Drawings Marked "FURNISH AS SUBMITTED" or "FURNISH AS CORRECTED"

   3 copies returned to the Contractor
   1 copy transmitted to the Owner
   2 copies remain at the Engineer's office
   1 copy remains with the shop drawing reviewer
   1 copy for the Engineer's field personnel

2. Drawings Marked "REVISE AND RESUBMIT"

   2 copies returned to the Contractor
   2 copies remain at the Engineer's office
   1 copy remains with the shop drawing reviewer
   3 copies will be discarded

R. If the Contractor requires additional copies of returned shop drawings, it shall include extra Drawings in its original submittal. The Engineer will process the Drawings and return them to the Contractor.

S. The distribution of processed shop drawings will be as shown at the end of this section in "Flow Diagram for Shop Drawing Submittals".

T. Structural Shop Drawings

1. General: Following are additional requirements for structural shop drawings.

2. Fabricated items: Submit only one (1) reproducible vellum, and two (2) blue/black line prints of all structural shop drawings of fabricated items such as reinforcing, structural steel, aluminum, gratings, floor plates, handrails, stairs, etc. The reproducible copy will be returned to the Contractor for duplication and required further distribution. All proposed changes shall be clearly clouded and flagged for Engineer's review and acceptance.

3. Coordination and Verification: Prior to submission, the Contractor shall coordinate the shop drawings with related trades and verify that the required dimensions or information necessary for construction has been made.

4. Facility shop drawings: For each facility reinforcing or structural steel shop drawings such as rebars for footings, base slab, columns, beams, stairs, etc., shall all be submitted at one time.

5. Concrete Products & Accessories: Submittals of all concrete related products and accessories shall be made all at one time, each properly labeled and its use identified by Facility/Structure name.

U. Architectural Shop Drawings: Following additional requirements shall apply. Architectural work requiring design or certification by an Engineer shall accompany signed and sealed design calculations for review. Shop drawings of architectural work related to each other shall be submitted for review all at one time.

1.07 WARRANTIES

A. Warranties called for in the Contract Documents shall be originals and submitted to the Owner through the Engineer. When warranties are required they shall be submitted prior to request for payment.

B. When advance copies of warranties are requested, they shall be submitted with, and considered as shop drawings.

1.08 CERTIFICATES

A. Four copies of certificates of compliance and test reports shall be submitted for requested items to the Engineer prior to request for payment.

1.09 PRODUCT SAMPLES

A. Contractor shall furnish for review all product samples as required by the Contract Documents or requested by the Engineer to determine compliance with the specifications.

B. Samples shall be of sufficient size or quantity to clearly illustrate the quality, type, range of color, finish or texture and shall be properly labeled to show complete project

identification, the nature of the material, trade name of manufacturer and location of the Work where the material represented by the sample will be used.

C. Samples shall be checked by the Contractor for conformance to the Contract Documents before being submitted to the Engineer and shall bear the Contractor's stamp certifying that they have been so checked. Transportation charges on samples submitted to the Engineer shall be prepaid by the Contractor.

D. Engineer's review will be for compliance with the Contract Documents, and its comments will be transmitted to the Contractor with reasonable promptness.

E. Acceptable samples will establish the standards by which the completed Work will be judged.

1.10 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall submit two (2) complete preliminary Operations and Maintenance (O&M) Manuals for each item of equipment at the same time the initial Shop Drawing for that item is submitted for review.

B. The Contractor shall furnish and deliver to the Engineer six (6) complete and final Operation and Maintenance (O&M) Manuals for the substantial, complete systems including instructions, technical bulletins, and any other printed matter such as diagrams, prints or drawings, containing full information required for the proper operations, maintenance, and repair of all Contractor furnished equipment. The final manuals shall incorporate all Engineer's review comments associated with the preliminary O&M Manual. Also included shall be a spare parts diagram and complete spare parts list. These requirements are a prerequisite to the operation and acceptance of equipment. Each O&M Manual shall be bound together in appropriate three-ring hard cover binders. A detailed table of contents shall be provided for each Manual. Provide an appropriate label on the binder edge. Provide tabs and separate sections for operation, maintenance, spare parts, etc. Front covers and binder edge covers shall reference the facility and project name as directed by the Engineer. Each front and binder edge cover shall include, as a minimum, the Collier County logo (electronic file of logo to be provided to Contractor by Owner/Engineer), Project Name, Date (Month/Year), Equipment Name, and the corresponding Specification Section Number.

C. Written operations and maintenance instructions are required for all equipment items supplied for this project. The amount of detail shall be commensurate with the complexity of the equipment item. Extensive pictorial cuts of equipment are required for operator reference in servicing.

D. Information not applicable to the specific piece of equipment installed on this project shall be struck from the Manual by the Contractor. Information provided shall include a source of replacement parts and names of service representatives, including addresses and telephone numbers.

E. When written instructions include shop drawings and other information previously reviewed by the Engineer, only those editions which were accepted by the Engineer, and which accurately depict the equipment installed, shall be incorporated in the O&M Manual.

F. Maintenance and Lubrication Schedules: The Contractor shall include in the O&M Manual, for all Contractor furnished mechanical and electrical equipment including switchgear and MCC's, instrumentation, valves, gates, etc., complete maintenance and lubrication schedules. Separate forms will be submitted for each piece of equipment. Sample forms are included at the end of this section.

1.12 STORM/HURRICANE PREPAREDNESS PLAN

1.13 SAFETY/RISK MANAGEMENT PLAN

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

EXAMPLE - EQUIPMENT LUBRICATION SCHEDULE

EQUIPMENT NO. _____ DATE _____

LOCATION _____ REV. _____

NAME _____

EQUIPMENT MANUFACTURER _____

ADDRESS _____

_____

PHONE ( ) _____

SERVICE REPRESENTATIVE _____

ADDRESS _____

_____

PHONE ( ) _____

Assembly	Maintenance Interval: Running Time	Maintenance Interval: Calendar	Description/Type/ Special Tools

NOTE: Use additional sheets as required

EXAMPLE - EQUIPMENT MAINTENANCE SCHEDULE

EQUIPMENT NO. _____ DATE _____

LOCATION _____ REV. _____

NAME _____

EQUIPMENT MANUFACTURER _____

ADDRESS _____

_____

PHONE ( ) _____

SERVICE REPRESENTATIVE _____

ADDRESS _____

_____

PHONE ( ) _____

Assembly	Maintenance Interval: Running Time	Maintenance Interval: Calendar	Description/Type/ Special Tools

NOTE: Use additional sheets as required

TRANSMITTAL

CITY OF NAPLES
AQUIFER STORAGE AND RECOVERY SYSTEM
CONSTRUCTION OF ASR TEST WELL NO. 4

TO:
Hazen and Sawyer, P.C.
2101 N.W. Corporate Blvd., Suite 301
Boca Raton, Florida 33431
Attn: Teresa McNally

Submittal No.:

☐ New Submittal ☐ Re-submittal

Project:

Project No.:

Specification Section No.:
(Cover only one section with each transmittal)

Schedule Date of Submittal:

FROM:
Contractor

SUBMITTAL TYPE: ☐ Shop Drawing ☐ Sample ☐ Informational

The following items are hereby submitted:

Number of Copies	Description of Item Submitted (Type, Size, Model Number, Etc.)	Spec. and Para. No.	Drawing or Brochure Number	Contains Variation to Contract	
				No	Yes

Contractor hereby certifies that (i) Contractor has complied with the requirements of Contract Documents in preparation, review, and submission of designated Submittal and (ii) the Submittal is complete and in accordance with the Contract Documents and requirements of laws and regulations and governing agencies.

By:

Contractor (Authorized Signature)

- END OF SECTION -

SECTION 01400

QUALITY CONTROL

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Testing Laboratory Services

1. Laboratory testing and checking required by the Specifications, including the cost of transporting all samples and test specimens, shall be provided and paid for by the Owner unless otherwise indicated in the Specifications.

2. Materials to be tested include, but are not necessarily limited to the following: cement, concrete aggregate, concrete, bituminous paving materials, structural and reinforcing steel, waterproofing, select backfill, crushed stone or gravel and sand.

3. Tests required by the Owner shall not relieve the Contractor from the responsibility of supplying test results and certificates from manufacturers or suppliers to demonstrate conformance with the Specifications.

4. Procedure

a. The Contractor shall plan and conduct his operations to permit taking of field samples and test specimens, as required, and to allow adequate time for laboratory tests.

b. The collection, field preparation and storage of field samples and test specimens shall be as directed by the Engineer with the cooperation of the Contractor.

5. Significance of Tests

a. Test results shall be binding on both the Contractor and the Owner, and shall be considered irrefutable evidence of compliance or noncompliance with the Specification requirements, unless supplementary testing shall prove, to the satisfaction of the Owner, that the initial samples were not representative of actual conditions.

6. Supplementary and Other Testing

a. Nothing shall restrict the Contractor from conducting tests he may require. Should the Contractor at any time request the Owner to consider such test results, the test reports shall be certified by an independent testing laboratory acceptable to the Owner. Testing of this nature shall be conducted at the Contractor's expense.

1.02 IMPERFECT WORK OR MATERIALS

A. Any defective or imperfect work or materials furnished by the Contractor which is discovered before the final acceptance of the work, as established by the Certificate of Substantial Completion, or during the subsequent guarantee period, shall be removed immediately even though it may have been overlooked by the Engineer and estimated for payment. Any equipment or materials condemned or rejected by the Engineer shall be tagged as such and shall be immediately removed from the site. Satisfactory work or materials shall be substituted for that rejected.

B. The Engineer may order tests of imperfect or damaged work or materials to determine the required functional capability for possible acceptance, if there is no other reason for rejection. The cost of such tests shall be borne by the Contractor; and the nature, tester, extent and supervision of the tests will be as determined by the Engineer. If the results of the tests indicate that the required functional capability of the work, equipment, or material was not impaired, consistent with the final general appearance of same, the work or materials may be deemed acceptable. If the results of such tests reveal that the required functional capability of the questionable work or materials has been impaired, then such work, equipment, or materials shall be deemed imperfect and shall be replaced. The Contractor may elect to replace the imperfect work, equipment, or material in lieu of performing the tests.

1.04 INSPECTION AND TESTS

A. The Contractor shall allow the Engineer ample time and opportunity for testing materials to be used in the work and the new wells. The Contractor shall advise the Engineer promptly upon placing orders for material and equipment so that arrangements may be made, if desired, for inspection before shipment from the place of manufacture. The Contractor shall at all times furnish the Engineer and his representatives, facilities including labor, and allow proper time for inspecting and testing materials, equipment, and workmanship. The Contractor must anticipate possible delays that may be caused in the execution of his work due to the necessity of materials and equipment being inspected and accepted for use. The Contractor shall furnish, at his own expense, all samples of materials required by the Engineer for testing, and shall make his own arrangements for providing water, electric power, or fuel for the various inspections and tests of structures and equipment.

B. Where other tests or analyses are specifically required in other Sections of these Specifications, the cost thereof shall be borne by the party (Owner or Contractor) so designated in such Sections. The Owner will bear the cost of all tests, inspections, or investigations undertaken by the order of the Engineer for the purpose of determining conformance with the Contract Documents if such tests, inspection, or investigations are not specifically required by the Contract Documents, and if conformance is ascertained thereby. Whenever nonconformance is determined by the Engineer as a result of such tests, inspections, or investigations, the Contractor shall bear the full cost thereof or shall reimburse the Owner for said cost. In this connection, the cost of any additional tests and investigations, which are ordered by the Engineer to ascertain subsequent conformance with the Contract Documents, shall be borne by the Contractor.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01510

TEMPORARY UTILITIES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide temporary power, water service and sanitary facilities for their operations at the site. The temporary services shall be provided for use throughout the construction period.

B. The Contractor shall coordinate and install all temporary services in accordance with the requirements of the utility companies having jurisdiction and as required by applicable codes and regulations.

C. At the completion of the work, or when the temporary services are no longer required, the facilities shall be restored to their original conditions.

D. All costs in connection with the temporary services including, but not limited to, installation, utility company service charges, maintenance, relocation and removal shall be borne by the Contractor at no additional cost to the Owner.

E. The Drawings do not show any temporary facilities.

F. Temporary Power: The Contractor shall make all necessary arrangements, and pay for all permits, inspections, and power company charges for all temporary service installations. All temporary systems shall comply with and meet the approval of the local authorities having jurisdiction. All temporary electrical systems shall consist of wiring, switches, necessary insulated supports, poles, fixtures, sockets, receptacles, lamps, guards, cutouts, and fuses as required to complete such installations.

G. Temporary Sanitary Service: Sanitary conveniences, in sufficient numbers, for the use of all persons employed on the work and properly screened from public observation, shall be provided and maintained at suitable locations by the Contractor, all as prescribed by State Labor Regulations and local ordinances. The contents of same shall be removed and disposed of in a manner consistent with local and state regulations, as the occasion requires. Each Contractor shall rigorously prohibit the committing of nuisances within, on, or about the work. Sanitary facilities shall be removed from the site when no longer required.

H. Temporary Water

1. The General Contractor shall provide temporary potable water service for construction purposes, sanitary facilities, fire protection, field offices and for cleaning. The Contractor shall make all arrangements for connections to the potable water at the plant site. The Contractor shall obtain a potable water flowmeter from the Owner.

2. The Contractor shall pay all charges associated with the potable water connection. The Owner shall pay all charges for potable water used under this Contract.

3. Each Contractor shall supply potable water for his employees either by portable containers or drinking fountains.

4. An adequate number of hose bibbs, hoses, and watertight barrels shall be provided for the distribution of water.

5. Water service shall be extended and relocated as necessary to meet temporary water requirements.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01520

MAINTENANCE OF UTILITY OPERATIONS DURING CONSTRUCTION

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The existing plant will be maintained in continuous operation by the Owner during the entire construction period of the Contract as hereinafter specified. The intent of this Section is to outline the minimum requirements necessary to provide continuous treatment, chlorination and disposal of the full effluent flow throughout the construction period.

B. Work shall be scheduled and conducted by the Contractor so as not to impede any treatment process, reduce the quality of the plant effluent or cause odor or other nuisance except as explicitly permitted hereinafter. In performing the work shown and specified, the Contractor shall plan and schedule his work to meet the plant and collection system operating requirements, and the constraints and construction requirements as outlined in this Section. No discharge of raw or inadequately treated wastewater shall be allowed. The Contractor shall pay all civil penalties, costs, assessments, etc., associated with any discharge of raw or inadequately treated wastewater associated with the Contractor's work.

C. The General Contractor shall be responsible for coordinating the general construction and the schedules of electrical, HVAC, plumbing and related trades and for ensuring that permanent or temporary power and controls are available for all existing, proposed, and temporary facilities that are required to be on line at any given time.

D. The Contractor has the option of providing additional temporary facilities that can eliminate a constraint, provided it is done without cost to the Owner and provided that all requirements of these Specifications are fulfilled. Work not specifically covered in the following paragraphs may, in general, be done at any time during the contract period, subject to the operating requirements and constraints and construction requirements outlined hereinafter. All references to days in this Section shall be consecutive calendar days.

1.02 RELATED WORK DESCRIBED ELSEWHERE

A. Section 01010 – Summary of Work

B. Section 01020 – Construction Sequencing/Constraints

1.03 GENERAL CONSTRAINTS

A. The Contractor shall schedule the Work so that the plant is maintained in continuous operation. All treatment processes shall be maintained in continuous operation during the construction period. Several items of work require connections of new piping and/or utilities to existing piping, utilities, or modifications to existing piping, utilities or facilities. The Contractor shall be responsible for, and include in its contract bid amount, all costs

associated with necessary work to isolate the existing piping, utilities or facilities to complete the required connections and/or modifications. Necessary work required by the Contractor shall include, but shall not be limited to, temporary bypass pumping and piping, wet taps, line stops, line plugs, and temporary bulkheads.

B. The Contractor shall review all bidding documents and shall be responsible to determine all such connections or modifications, and the scope and cost of all temporary measures required to isolate the work area without the need for a shutdown of the affected facility, process area, piping or utility. The following is a listing of connections and modifications required under this contract. This list is not necessarily all-inclusive, and is provided for the Contractor's convenience only.

C. Any temporary work, facilities, roads, walks, protection of existing structures, piping, blind flanges, valves, equipment, etc. that may be required within the Contractor's work limits to maintain continuous and dependable plant operation shall be furnished by the Contractor at the direction of the Engineer at no extra cost to the Owner.

D. The Owner shall have the authority to order Work postponed, stopped or prohibited that would, in his opinion, unreasonably result in interrupting the necessary functions of the plant operations.

E. If the Contractor impairs performance or operation of the plant as a result of not complying with specified provisions for maintaining plant operations, then the Contractor shall immediately make all repairs or replacements and do all work necessary to restore the plant to operation to the satisfaction of the Owner and the Engineer. Such work shall progress continuously to completion on a 24-hours per day, seven work days per week basis.

F. The Contractor shall provide the services of emergency repair crews on call 24-hours per day.

1.04 GENERAL OPERATING REQUIREMENTS, CONSTRAINTS, AND CONSTRUCTION REQUIREMENTS

A. Access to Plant Site, Roadways, and Parking Areas

1. An unobstructed traffic route through the Main Gate shall be maintained at all times for the Owner's operations personnel and maintenance equipment. The General Contractor shall be responsible for providing access to and for preparing and maintaining/approved parking areas.

2. An unobstructed traffic route around the plant site shall be maintained at all times for the Owner's operations personnel and maintenance equipment. Vehicular access to the treatment units and buildings for Owner personnel shall be maintained at all times by the Contractor.

3. The Contractor shall provide temporary measures to protect the existing pavement by filling over with earthen material or supplying other measures acceptable to the Engineer, and he shall repair any damage to existing paved surfaces that occurs during the construction period. Any areas disturbed along the shoulders of the access road and interior roads and elsewhere inside and

outside of the plant shall be repaired, graded, seeded, etc. as necessary to match pre-existing conditions.

4. The General Contractor shall not undertake the restoration/construction of new roadway (paved, gravel, or asphalt overlay) shown on the Contract Drawings, until all other work on the plant improvements has been completed.

5. It shall be the responsibility of the General Contractor to obtain any permits required from the Florida Department of Transportation and pay all associated fees.

B. Personnel Access

1. Treatment plant personnel shall have access to all areas which remain in operation throughout the construction period. The Contractor shall locate stored material, dispose of construction debris and trash, provide temporary walkways, provide temporary lighting, and other such work as directed by the Engineer to maintain personnel access to areas in operation. Access and adequate parking areas for plant personnel must be maintained throughout construction.

C. Plumbing Facilities

1. Unless otherwise allowed by the Engineer, sanitary facilities in the existing structures shall be operational at all times for plant operating personnel. All other building plumbing systems such as roof and floor drains, pumping, etc., shall be maintained for all structures.

D. Building Heating and Ventilating

1. Building heating and ventilating for the existing plant structures shall be in service for the entire construction period. Additional temporary heating and ventilation shall be provided as required to maintain facilities under construction adequately heated and vented. The temperatures to be maintained in any areas occupied by plant operating personnel such as offices, lunchrooms, locker rooms, bathrooms, etc., shall be at least 65 degrees Fahrenheit. The temperatures to be maintained in all other interior plant areas, whether new, existing or temporary, shall be maintained at a minimum of 55 degrees Fahrenheit.

E. Power, Light and Communications Systems (General)

1. Electric power, lighting service and communications systems shall be maintained in uninterrupted operation in all areas which remain in operation. Individual units may be disconnected as required for replacement, but service shall be available at all times including periods when plant elements are out of service. Shutdown of electrical facilities shall be limited to not more than five (5) hours. The Owner may allow longer outages under conditions determined by the Owner by making use of the existing and/or the proposed engine-generator at the plant. All costs associated with operation of the engine-generators shall be paid by the Contractor. The Electrical Contractor shall coordinate shutdowns required with the General Contractor to minimize the total number of shutdowns required to

complete construction. Owner's phone service to the plant shall be maintained in continuous operation during construction.

F. Draining Process Pipes and Conduits (General)

1. The contents of all pipes and conduits to be removed, replaced or relocated (or dewatered for a specific purpose) shall be transferred to a suitable facility in a manner approved by the Owner through hoses or piping, or by using pumps if hydraulic conditions so require them. The Contractor shall provide the pumps, piping and hoses at no additional cost to the Owner. No uncontrolled spillage of a pipe or conduit shall be permitted. Any spillage, other than potable water, shall be immediately washed down and flushed into the appropriate process flow train.

G. Potable Water System

1. Potable water service shall be maintained in continuous service at all times during construction except for short term interruptions required for tie-ins. Shutdown of the potable water system shall be fully planned and coordinated with the Plant Superintendent and shall be limited to not more than two (2) hours. Existing fire hydrants within the plant site shall be operational at all times, unless otherwise approved by the Owner.

H. Sump Pumps and Sumps

1. All existing sumps shall be maintained in an operable condition with either existing pumps or temporary pumps. Interim piping, power and controls shall be provided as required by the staged construction sequence.

I. Seal Water and Service Water Piping

1. A supply of service and seal water and the necessary connections to existing equipment shall be maintained during construction. Interim piping shall be provided as required.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01530

PROTECTION OF EXISTING FACILITIES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Contractor shall be responsible for the preservation and protection of property adjacent to the work site against damage or injury as a result of his operations under this Contract. Any damage or injury occurring on account of any act, omission or neglect on the part of the Contractor shall be restored in a proper and satisfactory manner or replaced by and at the expense of the Contractor to an equal or superior condition than previously existed.

B. Contractor shall comply promptly with such safety regulations as may be prescribed by the Owner or the local authorities having jurisdiction and shall, when so directed, properly correct any unsafe conditions created by, or unsafe practices on the part of, his employees. In the event of the Contractor's failure to comply, the Owner may take the necessary measures to correct the conditions or practices complained of, and all costs thereof will be deducted from any monies due the Contractor. Failure of the Engineer to direct the correction of unsafe conditions or practices shall not relieve the Contractor of his responsibility hereunder.

C. In the event of any claims for damage or alleged damage to property as a result of work under this Contract, the Contractor shall be responsible for all costs in connection with the settlement of or defense against such claims. Prior to commencement of work in the vicinity of property adjacent to the work site, the Contractor, at his own expense, shall take such surveys as may be necessary to establish the existing condition of the property. Before final payment can be made, the Contractor shall furnish satisfactory evidence that all claims for damage have been legally settled or sufficient funds to cover such claims have been placed in escrow, or that an adequate bond to cover such claims has been obtained.

1.02 PROTECTION OF WORK AND MATERIAL

A. During the progress of the work and up to the date of final payment, the Contractor shall be solely responsible for the care and protection of all work and materials covered by the Contract.

B. All work and materials shall be protected against damage, injury or loss from any cause whatsoever, and the Contractor shall make good any such damage or loss at his own expense. Protection measures shall be subject to the approval of the Engineer.

1.03 BARRICADES, WARNING SIGNS AND LIGHTS

A. The Contractor shall provide, erect and maintain as necessary, strong and suitable barricades, danger signs and warning lights along all roads accessible to the public, as required by the authority having jurisdiction, to insure safety to the public. All barricades

and obstructions along public roads shall be illuminated at night and all lights for this purpose shall be kept burning from sunset to sunrise.

B. Each Contractor shall provide and maintain such other warning signs and barricades in areas of and around their respective work as may be required for the safety of all those employed in the work, the Owner's operating personnel, or those visiting the site.

1.04 EXISTING UTILITIES AND STRUCTURES

A. The term existing utilities shall be deemed to refer to both publicly owned and privately owned utilities such as electric power and lighting, telephone, water, gas, storm drains, process lines, sanitary sewers and all appurtenant structures.

B. Where existing utilities and structures are indicated on the Drawings, it shall be understood that all of the existing utilities and structures affecting the work may not be shown and that the locations of those shown are approximate only. It shall be the responsibility of the Contractor to ascertain the actual extent and exact location of existing utilities and structures. In every instance, the Contractor shall notify the proper authority having jurisdiction and obtain all necessary directions and approvals before performing any work in the vicinity of existing utilities.

C. Prior to beginning any excavation work, the Contractor shall, through field investigations, determine any conflicts or interferences between existing utilities and new utilities to be constructed under this project. This determination shall be based on the actual locations, elevations, slopes, etc., of existing utilities as determined in the field investigations, and locations, elevation, slope, etc. of new utilities as shown on the Drawings. If any interference exists, the Contractor shall bring it to the attention of the Engineer as soon as possible. If the Engineer agrees that any interference exists, he shall modify the design as required. Additional costs to the Contractor for this change shall be processed through a Change Order as detailed elsewhere in these Contract Documents. In the event the Contractor fails to bring a potential conflict or interference to the attention of the Engineer prior to beginning excavation work, any actual conflict or interference which does arise during the Project shall be corrected by the Contractor, as directed by the Engineer, at no additional expense to the Owner.

D. The work shall be carried out in a manner to prevent disruption of existing services and to avoid damage to the existing utilities. Temporary connections shall be provided, as required, to insure uninterruption of existing services. Any damage resulting from the work of this Contract shall be promptly repaired by the Contractor at his own expense in a manner approved by the Engineer and further subject to the requirements of any authority having jurisdiction. Where it is required by the authority having jurisdiction that they perform their own repairs or have them done by others, the Contractor shall be responsible for all costs thereof.

E. Where excavations by the Contractor require any utility lines or appurtenant structures to be temporarily supported and otherwise protected during the construction work, such support and protection shall be provided by the Contractor. All such work shall be performed in a manner satisfactory to the Engineer and the respective authority having jurisdiction over such work. In the event the Contractor fails to provide proper support or protection to any existing utility, the Engineer may, at his discretion, have the respective

authority to provide such support or protection as may be necessary to insure the safety of such utility, and the costs of such measures shall be paid by the Contractor.

1.05 TREES WITHIN PROJECT LIMITS

A. General: The Contractor shall exercise all necessary precautions so as not to damage or destroy any trees on the project site, and shall not trim or remove any trees unless such trees have been approved for trimming or removal by the jurisdictional agency or Owner. All existing trees which are damaged during construction shall be replaced by the Contractor or a certified tree company to the satisfaction of the Owner.

B. Replacement: The Contractor shall immediately notify the Owner if any tree is damaged by the Contractor's operations. If, in the opinion of the Owner, the damage is such that replacement is necessary, the Contractor shall replace the tree at its own expense. The tree shall be of a like size and variety as the tree damaged, or, if of a smaller size, the Contractor shall pay to the Owner compensatory payment acceptable to the Owner.

1.06 NOTIFICATION BY THE CONTRACTOR

A. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way the Contractor shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than three days nor more than seven days prior to excavation so that a representative

1.07 DETOURS

A. Where authority having jurisdiction requires that traffic be maintained over construction work in a public street, road, or highway, and traffic cannot be maintained on original roadbed or pavement, construct and maintain detour around the Work. Coordinate traffic routing with that of others working in same or adjacent areas.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01550

SITE ACCESS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Access Roads:

1. The Contractor shall construct and maintain site access roads as shown on the Drawings.

2. Access roads shall be located within the easements of the Owner unless the Contractor independently secures easements for his use and convenience. Contractor shall submit written documentation to the Engineer for any Contractor secured easements across privately held property. Easement agreement shall specify terms and conditions of use and provisions for site restoration. A written release from the property Owner certifying that all terms of the easement agreement has been complied with the Contractor shall be furnished to the Engineer prior to final payment.

4. Existing access roads used by the Contractor shall be suitably maintained by the Contractor at his expense during construction. Contractor shall not be permitted to restrict Owner access to existing facilities. Engineer may direct Contractor to perform maintenance of existing access roads when Engineer determines that such work is required to insure all weather access by the Owner.

5. The Contractor shall obtain and pay all cost associated with any bonds required by the Florida Department of Transportation for the use of State maintained roads.

B. Parking Areas: The Contractor shall construct and maintain suitable parking areas for his construction personnel on the project site where approved by the Engineer and the Owner.

C. Restoration: At the completion of the work, the surfaces of land used for parking areas shall be restored by the Contractor to its original condition and to the satisfaction of the Engineer. At a minimum, such as restoration shall include establishment of a permanent ground cover adequate to restrain erosion for all disturbed areas.

D. Traffic Regulations: Contractor shall obey all traffic laws and comply with all the requirements, rules and regulations of the Florida Department of Transportation and other local authorities having jurisdiction to maintain adequate warning signs, lights, barriers, etc., for the protection of traffic on public roadways.

E. Storage of Equipment and Materials

1. Contractor shall store his equipment and materials at the job site in accordance with the requirements of the General Conditions, the Supplemental Conditions, and as hereinafter specified. All equipment and materials shall be stored in

accordance with manufacturer's recommendations and as directed by the Owner or Engineer, and in conformity to applicable statutes, ordinances, regulations and rulings of the public authority having jurisdiction. Where space or strip heaters are provided within the enclosure for motors, valve operators, motor starters, panels, instruments, or other electrical equipment, the Contractor shall make connections to these heaters from an appropriate power source and operate the heaters with temperature control as necessary until the equipment is installed and being operated according to its intended use.

2. Contractor shall enforce the instructions of Owner and Engineer regarding the posting of regulatory signs for loadings on structures, fire safety, and smoking areas.

3. Contractor shall not store materials or encroach upon private property without the written consent of the owners of such private property.

4. Contractor shall not store unnecessary materials or equipment on the job site, and shall take care to prevent any structure from being loaded with a weight which will endanger its security or the safety of persons.

5. Materials shall not be placed within ten (10) feet of fire hydrants. Gutters, drainage channels and inlets shall be kept unobstructed at all times.

6. Contractor shall provide adequate temporary storage buildings/facilities, if required, to protect materials or equipment on the job site.

7. Owner and Engineer shall not be responsible for the unloading or receipt of materials delivered to the project site. Contractor shall retain full responsibility to coordinate and schedule the delivery, unloading and placement of equipment in storage during the normal time of work.

F. Owner's Facilities

1. The Contractor shall not enter any of the Owner's existing facilities without the expressed written authorization from the Owner or Owner's project representative.

2. Except for the Contractor's superintendent, no Contractor's personnel shall enter the Operations Building.

3. Where the Contractor is required to perform work in an existing Owner's facility, the Contractor's superintendent shall notify the Owner and Engineer in writing, and request a meeting to discuss the limits of work.

4. The Contractor, subcontractors, suppliers, and others shall park only in the Contractor's project staging area.

1.02 CONTRACTOR IDENTIFICATION BADGE

A. All employees shall have an Owner provided temporary photo identification badge to be worn at all times while at the project site.

B. The Contractor shall coordinate with the Owner, their employees and subcontract employees as soon as practicable after the notice of award to obtain the Owner provided temporary photo identification badges. Submit the following information for all employees that will work on the project:

1. A list of all employees that will work on the project, including the following information shall be submitted:

   a. Employee Name

   b. Employee title

   c. Name of Company

   d. Name of Project

   e. Time period that badge will remain valid (assume a minimum of 4 months from notice to proceed date)

PART 2 – PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

3.01 SITE SECURITY

A. General – Code Yellow or Less:

1. All Sites: Provide and maintain temporary security fences as necessary to protect the Work and Contractor furnished products not yet installed.

2. Secure sites include, but are not limited to, water treatment plants, wastewater treatment plants, wellfields, water booster pump stations, storage facilities, and master lift stations.

3. All employees shall have a photo identification badge to be worn at all times while on the project site.

4. Visitors shall be required to obtain daily visitor badges and vehicle access.

5. Obtain approval in writing from the Owner for work on the project site outside of normal working hours. Approval must be available for inspection while working on the site after hours.

- END OF SECTION -

SECTION 01560

TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 -- GENERAL

1.01 TEMPORARY CONTROLS

A. Dust Control

1. Contractor shall take all necessary measures to control dust from his operations, and to prevent spillage of excavated materials on public roads.

2. Contractor shall remove all spillage of excavated materials, debris or dust from public roads by methods approved by the Engineer.

3. Contractor shall sprinkle water at locations and in such quantities and at such frequencies as may be required by the Engineer to control dust and prevent it from becoming a nuisance to the surrounding area.

4. Dust control and cleaning measures shall be provided at no additional cost to the Owner.

B. Air Pollution Control

1. Minimize air pollution from construction operations.

2. Burning of waste materials, rubbish, or other debris will not be permitted on or adjacent to site.

3. Conduct operations of dumping rock and of carrying rock away in trucks to cause a minimum of dust. Give unpaved streets, roads, detours, or haul roads used in construction area a dust-preventive treatment or periodically water to prevent dust as needed up to daily, as directed by the Owner. Strictly adhere to applicable environmental regulations for dust prevention.

C. Noise Control

1. The Contractor shall be responsible for curtailing noise resulting from his operation. Special precautions must be taken at all wells to minimize the noise generated during the well drilling operations. The following steps shall be taken by the Contractor:

a. Mufflers are required on all equipment motors. Drill rigs shall be equipped with hospital grade mufflers.

b. If required by the Owner and Engineer, install sound attenuation barriers surrounding the motorized machinery. The barrier shall absorb or reflect noise generated from the drilling rig, air compressor, electrical generator and other machinery which contribute to the noise levels. In general, the barrier shall be approximately 30 feet tall, consisting of tarpaulin supported by poles. The location of the perimeter sound barrier wall is shown on the drawings. The Contractor shall provide other barriers

around specific stationary equipment such as compressors. Alternative barrier configurations which provide equivalent or better performance will be considered upon submittal to the Engineer. The cost for all noise control equipment and procedures shall be included in the lump sum bid price for each injection and monitor well.

D. Water Pollution Control

1. Divert sanitary sewage and non-storm waste flow interfering with construction and requiring diversion to sanitary sewers. Do not cause or permit action to occur which would cause an overflow to existing waterway.

2. Prior to commencing excavation and construction, obtain ENGINEER's agreement with detailed plans showing procedures intended to handle and dispose of sewage, groundwater, and stormwater flow, including dewatering pump discharges.

3. Comply with procedures outlined in U.S. Environmental Protection Agency manuals entitled, "Guidelines for Erosion and Sedimentation Control Planning," and "Implementation, Processes, Procedures, and Methods to Control Pollution Resulting from All Construction Activity," and "Erosion and Sediment Control-Surface Mining in Eastern United States."

4. Do not dispose of volatile wastes such as mineral spirits, oil, chemicals, or paint thinner in storm or sanitary drains. Disposal of wastes into streams or waterways is prohibited. Provide acceptable containers for collection and disposal of waste materials, debris, and rubbish.

E. Erosion, Sediment, and Flood Control: Provide, maintain, and operate temporary facilities to control erosion and sediment releases, and to protect the Work and existing facilities from flooding during construction period. Meet all local, state, and Federal requirements and obtain necessary permits and approvals as required.

1.02 CLEANUP PROCEDURES FOR HURRICANE WARNINGS AND WATCHES

A. In the event that the National Oceanographic and Atmospheric Administration (NOAA) issues a hurricane watch for the Fort Lauderdale area, the ENGINEER will contact the Contractor, informing him that the watch has been established. Once notified of a hurricane watch, the Contractor will remove all unnecessary items from the work area and tie down all remaining supplies, barricades, and movable (under 200 pounds) objects. If a warning is issued, the Contractor shall complete the clean-up and evacuate the area the same day. The Owner shall not be liable for any costs or delays caused as a result of demobilization or remobilization due to the above.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

- END OF SECTION -

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish, install, test, and place in acceptable operation all material and equipment and all necessary accessories as specified herein, as shown on the Drawings, and as required for a complete and operable system.

B. The equipment shall be provided complete with all accessories, special tools, spare parts, mountings, and other appurtenances as specified, and as may be required for a complete and operating installation.

C. It is the intent of these Specifications that the Contractor shall provide the Owner complete and operational equipment/systems. To this end, it is the responsibility of the Contractor to provide necessary ancillary items such as controls, wiring, etc., to make each piece of equipment operational as intended by the Specifications.

D. Furnish and Install

1. Where the words "furnish", "provide", "supply", "replace", or "install" are used, whether singularly or in combination, they shall mean to furnish and install, unless specifically stated otherwise.

2. In the interest of brevity, the explicit direction "to furnish and install" has sometimes been omitted in specifying materials and/or equipment herein. Unless specifically noted otherwise, it shall be understood that all equipment and/or materials specified or shown on the Drawings shall be furnished and installed under the Contract as designated on the Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01430 – Operations and Maintenance Data

B. Section 01660 – Equipment Testing and Startup

C. Section 03600 – Grout

D. Section 05050 – Metal Fastening

1.03 JOB SITE DELIVERY TIMING

A. Equipment and materials to be incorporated into the work shall be delivered sufficiently in advance of their installation and use to prevent delay in the execution of the work, and they shall be delivered as nearly as feasible in the order required for executing the work.

B. The Contractor shall not deliver to the job site equipment and materials that are not scheduled to be incorporated into the work within the following 120 calendar days.

1.04 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. All equipment, materials, and installations shall conform to the requirements of the most recent editions with latest revisions, supplements, and amendments of the specifications, codes, and standards listed in Section 01090, Reference Standards.

1.05 PERFORMANCE AFFIDAVITS

A. When required in the appropriate equipment Specifications, the Contractor shall submit manufacturer's Performance Affidavits for equipment to be furnished.

B. By these affidavits, each manufacturer must certify to the Contractor and the Owner, jointly, that he has examined the Contract Documents and that the equipment, apparatus, or process he offers to furnish will meet in every way the performance requirements set forth or implied in the Contract Documents.

C. The Contractor must transmit to the Engineer three (3) copies of the affidavit given him by the manufacturer or supplier along with the initial Shop Drawing submittals.

D. The Performance Affidavit must be signed by an officer of the corporation, partnership, or company manufacturing the equipment and witnessed by a notary public.

E. Shop Drawings, if required, will not be reviewed prior to receipt of an acceptable Performance Affidavit.

F. The Performance Affidavit shall have the following format:

Addressed to: City of Naples
Reclaimed Water ASR
380 Riverside Circle
Naples, Florida 34102
Attention: Robert Middleton, Utilities Director

Reference: City of Naples
Project No. (TBA)
Reclaimed Water ASR
Performance Affidavit

Text: (Manufacturer's Name) has examined the Contract Documents and hereby state that the (Product) meets in every way the performance requirements set forth or implied in Section _____ of the Contract Documents.

Signature: Corporate Officers shall be Vice President, or higher. (Unless statement authorizing signature is attached)

1.06 SHOP DRAWINGS

A. Shop Drawings, descriptive data, dimensions, parts, performance characteristics, material Specifications, construction details, piping and wiring diagrams, and associated items, as appropriate, showing conformance of all equipment to the Contract Documents, shall be submitted to the Engineer for review in accordance with Section 01300, Submittals. Additional required information shall include: the horsepower, voltage, and rotative speed of the motor along with other pertinent motor data, and the total weight of the equipment plus the approximate weight of the shipped materials. Shop Drawings shall also include complete erection, installation, and adjustment instructions, and recommendations.

B. SHOP DRAWINGS ON ITEMS REQUIRING PERFORMANCE AFFIDAVITS WILL NOT BE REVIEWED UNTIL ACCEPTABLE PERFORMANCE AFFIDAVITS ARE RECEIVED.

1.07 COORDINATION

A. The Contractor shall coordinate all details, locations, field measurements and other conditions with various equipment suppliers, so that the equipment supplied functions as part of a complete system.

1.08 SERVICES OF THE MANUFACTURER'S REPRESENTATIVE

A. The Contractor shall provide the services of a qualified manufacturer's representative who shall adequately supervise the installation and testing of all equipment furnished under this Contract and instruct the Owner's operating personnel in its maintenance and operation as outlined in Section 01660 entitled "Equipment Testing and Plant Startup". The Contract prices for equipment shall include the cost of furnishing the manufacturer's representative for the number of days specified in the individual equipment specifications. Any additional time required to achieve successful installation and operation shall be at the expense of the Contractor.

A. The manufacturer's representative shall sign in and out at the office of the Engineer's Resident Project Representative on each day he is at the project.

C. The times specified for services by the manufacturer's technical representative herein or in the equipment specifications are exclusive of travel time to and from the facility and shall not be construed as to relieve the manufacturer of any additional visits to provide sufficient service to place the equipment in satisfactory operation.

D. The Contractor shall notify manufacturers or suppliers that they will be required to state and guarantee a firm delivery date for all equipment that they offer to furnish. Delivery dates shall be as required by the Contractor to meet the approved progress schedule.

E. Unless otherwise referenced in the individual equipment specification section, the services of the manufacturer's representative shall be provided for a period as stated in the following schedule:

Item	Duration (days)
1. Proper Installation Check and Functional Test	1
2. Performance Test	1
3. Operation and Maintenance Training	1

1.09 SUBSTITUTIONS

A. Requests for substitutions of equipment or materials shall conform to the requirements of the General Conditions, Supplemental Conditions, and as hereinafter specified.

1. Contractor shall submit for each proposed substitution sufficient details, complete descriptive literature and performance data together with samples of the materials, where feasible, to enable the Owner and Engineer to determine if the proposed substitution is equal.

2. Contractor shall submit certified tests, where applicable, by an independent laboratory attesting that the proposed substitution is equal.

3. A list of installations where the proposed substitution is equal.

4. Requests for substitutions shall include full information concerning differences in cost, and any savings in cost resulting from such substitutions shall be passed on to the Owner.

B. Where the approval of a substitution requires revision or redesign of any part of the work, including that of other Contracts, all such revision and redesign, and all new drawings and details therefore, shall be provided by the Contractor at his own cost and expense, and shall be subject to the approval of the Owner and Engineer.

C. In the event that the Engineer is required to provide additional engineering services, then the Engineer's charges for such additional services shall be charged to the Contractor by the Owner in accordance with the requirements of the General Conditions, and the Supplemental Conditions.

D. In all cases the Owner and Engineer shall be the judge as to whether a proposed substitution is to be approved. The Contractor shall abide by their decision when proposed substitute items are judged to be unacceptable and shall in such instances furnish the item specified or indicated. No substitute items shall be used in the work without written approval of the Owner and Engineer.

E. Contractor shall have and make no claim for an extension of time or for damages by reason of the time taken by the Engineer in considering a substitution proposed by the Contractor or by reason of the failure of the Engineer to approve a substitution proposed by the Contractor.

F. Acceptance of any proposed substitution shall in no way release the Contractor from any of the provisions of the Contract Documents.

PART 2 -- PRODUCTS

2.01 GENERAL

A. All parts of the equipment furnished shall be amply designed and constructed for the maximum stresses occurring during fabrication, erection, and continuous operation.

B. All materials shall be new and both workmanship and materials shall be of the very best quality, entirely suitable for the service to which the unit is to be subjected and shall conform to all applicable sections of these Specifications.

C. All parts of duplicate equipment shall be interchangeable without modification. Manufacturer's design shall accommodate all the requirements of these Specifications.

D. All bearings and moving parts shall be adequately protected by bushings or other approved means against wear, and provision shall be made for adequate lubrication by readily accessible devices.

E. All equipment greater than 100 pounds shall have lifting lugs, eyebolts, etc., for ease of lifting, without damage or undue stress exerted on its components.

F. Provide manufacturer's standard materials suitable for service conditions, unless otherwise specified in the individual Specifications.

G. Where product specifications include a named manufacturer, with or without model number, and also include performance requirements, named manufacturer's products must meet the performance specifications.

H. Like items of products furnished and installed in the Work shall be end products of one manufacturer and of the same series or family of models to achieve standardization for appearance, operation and maintenance, spare parts and replacement, manufacturer's services, and implement same or similar process instrumentation and control functions in same or similar manner.

I. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.

J. Provide interchangeable components of the same manufacturer, for similar components, unless otherwise specified.

K. Equipment, Components, Systems, Subsystems: Design and manufacture with due regard for health and safety of operation, maintenance, and accessibility, durability of parts, and shall comply with applicable OSHA, state, and local health and safety regulations.

L. Regulatory Requirement: Coating materials shall meet federal, state, and local requirements limiting the emission of volatile organic compounds and for worker exposure.

M. Safety Guards: All rotating shafts, couplings, or other moving pieces of equipment shall be provided with suitable protective guards of sheet metal or wire mesh, neatly and rigidly supported. Guards shall be removable as required to provide access for repairs.

N. Provide materials and equipment listed by UL wherever standards have been established by that agency.

2.02 EQUIPMENT FOUNDATIONS, SUPPORTS AND ANCHORS

A. The Contractor shall provide concrete foundations/bases for all equipment items including mechanical equipment, tanks, control cabinets, etc. Concrete foundations shall be provided whether shown on the drawings or not.

B. Concrete foundations shall be a minimum of 4-inches thick unless otherwise shown or detailed on the Drawings. Equipment bases shall be tied into floor slabs by means of reinforcing bars or dowels. Foundation drawings shall be submitted to the Engineer for review in accordance with the requirements of the Section entitled "Submittals".

C. All equipment supports, anchors, and restrainers shall be adequately designed for static, dynamic, and seismic loads. A seismic force of 0.25 of gravity shall be assumed for this purpose, unless otherwise required by local conditions.

D. Anchor bolts and fasteners shall be of number, size, strength, and material required for the purpose intended and shall be in accordance with section entitled “Metal Fastening”, and with the detailed equipment Specifications. Anchor bolts and templates for equipment foundations shall be furnished by the Contractor.

E. Pipe sleeves or other means of adjusting anchor bolts shall be provided where indicated or required. Equipment shall be leveled by first using sitting nuts on the anchor bolts, and then filling the space between the equipment base and concrete pedestal with non-shrink grout, unless alternate methods are recommended by the manufacturer and are acceptable to the Engineer (such as shim leveling pumps). Non-shrink grout shall be as specified in section entitled “Grout”.

2.03 STANDARDIZATION OF GREASE FITTINGS

A. The grease fittings on all mechanical equipment shall be such that they can be serviced with a single type of grease gun. Fittings shall be hydraulic type, Alemite or equal.

2.04 ACCESSORIES, LUBRICANTS, SPARE PARTS, AND SPECIAL TOOLS

A. Spare parts for equipment shall be furnished where indicated in the equipment Specifications or where recommended by the equipment manufacturer.

B. Spare parts shall be identical and interchangeable with original parts.

C. Parts shall be supplied in clearly identified containers, except that large or bulky items may be wrapped in polyethylene.

D. Painting requirements for spare parts shall be identical to those for original, installed parts.

E. Spare parts shall be stored separately in a locked area, maintained by the Contractor, and shall be turned over to the Owner in a group prior to substantial completion. All of these materials shall be properly packed, labeled, and stored where directed by the Owner and Engineer.

F. Contractor shall submit, for approval by the Engineer, a complete list of the special tools and appliances to be furnished. Such tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with good grade cylinder locks and duplicate keys.

G. The Contractor shall furnish all special tools and appliances necessary to operate, disassemble, service, repair, and adjust the equipment and shall furnish a one year supply of all recommended lubricating oils and greases. The manufacturer shall submit a list of at least four manufacturer's standard lubricants that may be used interchangeably for each type of lubricant required. All of these materials shall be properly packed, labeled and stored where directed by the Engineer.

PART 3 -- EXECUTION

3.01 SHOP TESTING

A. All equipment so noted in the technical specifications, shall be tested in the shop of the manufacturer in a manner that shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents and that it will operate in the manner specified or implied.

B. Where multiple units of an identical design are specified to be tested, unless otherwise noted, only one of each group shall require testing.

C. Equipment specified to be shop tested shall not be shipped from the manufacturer until the Engineer has been furnished a certified copy of test results and has notified the Contractor, in writing, that the results of such tests are acceptable.

D. When called for in the technical specifications, arrangements shall be made for the Engineer and Owner to witness performance tests in the manufacturer's shop. The Engineer shall be notified ten working days before shop testing commences. Expenses are to be paid by the Contractor.

E. Five (5) certified copies of the manufacturer's actual test data and interpreted results thereof, shall be forwarded to the Engineer for review.

3.02 DELIVERY, UNLOADING AND INSPECTION

A. The Contractor shall not deliver to the job site equipment and materials that are not scheduled to be incorporated into the work within the following 120 calendar days.

B. Deliver products in accordance with accepted current progress schedule and coordinate to avoid conflict with the Work and conditions at site. Deliver anchor bolts and templates sufficiently early to permit setting prior to placement of structural concrete.

C. Deliver products in undamaged condition, in manufacturer's original container or packaging, with identifying labels intact and legible. Include on label, date of manufacture and shelf life, where applicable. Include UL labels on products so specified.

D. Unload products in accordance with manufacturer's instructions for unloading or as specified. Record receipt of products at project site. Inspect for completeness and evidence of damage during shipment.

E. Remove damaged products from site and expedite delivery of identical new undamaged products, and remedy incomplete or lost products to provide that specified, so as not to delay progress of the Work. Delays to the Work resulting from material or equipment damage that necessitates procurement of new products will be considered delays within Contractor's control.

F. The Contractor shall notify Engineer upon arrival of major equipment and materials.

3.03 HANDLING, STORAGE AND PROTECTION

A. Contractor shall store his equipment and materials at the job site in accordance with the requirements of the General Conditions, the Supplemental Conditions, and as hereinafter specified.

B. All equipment and materials shall be stored in accordance with manufacturer's recommendations and as directed by the Owner or Engineer, and in conformity to applicable statutes, ordinances, regulations and rulings of the public authority having jurisdiction and in manner to prevent damage.

C. Equipment and materials stored in the job site, or offsite in a bonded warehouse, is stored at the Contractor’s risk. Any equipment or materials of whatever kind, which may have become damaged or deteriorated from any cause, shall be removed and replaced by items that are satisfactory to the Engineer at no expense to the Owner.

D. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration. Keep running account of products in storage to facilitate inspection and to estimate progress payments for products delivered, but not installed in the Work.

E. Store electrical, instrumentation, and control products, and equipment with bearings in weather-tight structures maintained above 60 degrees F. Protect electrical, instrumentation, and control products, and insulation against moisture, water, and dust damage.

F. Where space or strip heaters are provided within the enclosure for motors, valve operators, motor starters, panels, instruments, or other electrical equipment, the Contractor shall make connections to these heaters from an appropriate power source and operate the heaters continuously with temperature control as necessary until the equipment is installed and being operated according to its intended use.

G. Store fabricated products above ground on blocking or skids, and prevent soiling or staining. Store loose granular materials in well-drained area on solid surface to prevent

mixing with foreign matter. Cover products that are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.

H. Contractor shall not store equipment and materials or encroach upon private property without the written consent of the owners of such private property.

I. Contractor shall not store unnecessary materials or equipment on the job site.

J. Contractor shall take care to prevent any structure from being loaded with a weight which will endanger its security or the safety of persons.

K. Materials shall not be placed within ten (10) feet of fire hydrants. Gutters, drainage channels and inlets shall be kept unobstructed at all times.

L. Contractor shall provide adequate temporary storage buildings/facilities, if required, to protect materials or equipment on the job site.

3.04 INSTALLATION

A. The Contractor shall obtain written installation manuals from the equipment manufacturer prior to installation. Equipment shall be installed strictly in accordance with recommendations of the manufacturer. The Contractor shall retain a copy of the manufacturer's installation manuals on site, stored in the Contractor's field office and available for review at all times.

B. The Contractor shall have on hand sufficient personnel, proper construction equipment, and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character. To minimize field erection problems, mechanical units shall be factory-assembled insofar as practical.

C. Equipment shall be erected in a neat and workmanlike manner on the foundations at the locations and elevations shown on the Drawings.

D. All blocking and wedging required for the proper support and leveling of equipment during installation shall be furnished by the Contractor. All temporary supports shall be removed, except steel wedges and shims, which may be left in place with the approval of the Engineer.

E. When motors are shipped separately from driven equipment, the motors shall be received, stored, meggered once a month, and the reports submitted to the Engineer. After driven equipment is set, the motors shall be set, mounted, shimmed, millrighted, coupled and connected complete.

3.05 CONNECTIONS TO EQUIPMENT

A. Connections to equipment shall follow manufacturer's recommendations as to size and arrangement of connections and/or as shown in detail on the Drawings or approved Shop Drawings. Piping connections shall be made to permit ready disconnection of equipment with minimum disturbance of adjoining piping and equipment.

B. The Electrical Contractor or Contractor if no electrical contract exists shall be responsible for bringing proper electrical service to each item of equipment requiring electrical service as shown on the Drawings or approved Shop Drawings. The Electrical Contractor shall make electrical connections to equipment requiring electrical service, unless otherwise indicated on the Drawings or in the Technical Specifications.

B. The HVAC Contractor or Contractor if no HVAC Contract exists shall bring and connect HVAC service to all equipment items requiring same as shown on the Drawings. The Electrical Contractor shall make electrical connections to equipment requiring electrical service, unless otherwise indicated on the Drawings or in the Technical Specifications.

D. The Plumbing Contractor or Contractor if no plumbing contract exists shall bring and connect plumbing service to all equipment items requiring same as shown on the Drawings.

3.06 FAILURE OF EQUIPMENT TO PERFORM

A. Any defects in the equipment, or failure to meet the guarantees or performance requirements of the Specifications shall be promptly corrected by the Contractor by replacements or otherwise.

B. If the Contractor fails to make these corrections, or if the improved equipment shall fail again to meet the guarantees or specified requirements, the Owner, notwithstanding his having made partial payment for work and materials which have entered into the manufacture of said equipment, may reject said equipment and order the Contractor to remove it from the premises at the Contractor's expense.

C. The Contractor shall then obtain specified equipment to meet the contract requirements or upon mutual agreement with the Owner, adjust the contract price to reflect not supplying the specific equipment item.

D. In case the Owner rejects said equipment, then the Contractor hereby agrees to repay to the Owner all sums of money paid to him for said rejected equipment on progress certificates or otherwise on account of the lump sum prices herein specified.

E. Upon receipt of said sums of money, the Owner will execute and deliver to the Contractor a bill of sale of all his rights, title, and interest in and to said rejected equipment; provided, however, that said equipment shall not be removed from the premises until the Owner obtains from other sources other equipment to take the place of that rejected.

F. Said bill of sale shall not abrogate Owner's right to recover damages for delays, losses, or other conditions arising out of the basic contract.

3.07 PAINTING

A. All surface preparation, shop painting, field repairs, finish painting, and other pertinent detailed painting specifications shall conform to applicable sections of Section 09850 entitled “Painting”.

B. All inaccessible surfaces of the equipment, which normally require painting, shall be finished painted by the manufacturer. The equipment and motor shall be painted with a high quality epoxy polyamide semi-gloss coating specifically resistant to chemical, solvent, moisture, and acid environmental conditions, unless otherwise specified.

C. Gears, bearing surfaces, and other unpainted surfaces shall be protected prior to shipment by a heavy covering of rust-preventive compound sprayed or hand applied which shall be maintained until the equipment is placed in operation. This coating shall be easily removable by a solvent.

3.08 WELDING

A. The equipment manufacturer's shop welding procedures, welders, and welding operators shall be qualified and certified in accordance with the requirement of AWS D1.1 "Structural Welding Code - Steel" or AWS D1.2 "Structural Welding Code - Aluminum" of the American Welding Society, as applicable.

B. The equipment manufacturer's shop drawings shall clearly show complete information regarding location, type, size, and length of all welds in accordance with "Standard Welding Symbols" AWS A2.0 of the American Welding Society. Special conditions shall be fully explained by notes and details.

C. The Contractor's welding procedures, welders, and welding operators shall be qualified and certified in accordance with the requirements of AWS D1.1 "Structural Welding Code - Steel" or AWS D1.2 "Structural Welding Code - Aluminum" of the American Welding Society, as applicable.

D. The Contractor shall perform all field welding in conformance with the information shown on the Equipment Manufacturer's drawings regarding location, type, size, and length of all welds in accordance with "Standard Welding Symbols" AWS A2.0 of the American Welding Society, and special conditions, as shown by notes and details.

3.09 EQUIPMENT IDENTIFICATION

A. All mechanical equipment shall be provided with a stainless steel nameplate, securely fastened in a conspicuous place, and clearly inscribed with the manufacturer's name, year of manufacture, serial number, and principal rating data.

B. Each pump and other piece of mechanical equipment shall also be identified as to name and number by a suitable stainless steel nameplate attached to the unit; for example, "High Service Pump No. 1". Coordinate name and number with same on remotely located controls, control panel, etc.

C. Nameplates shall not be painted over.

- END OF SECTION -

SECTION 01700

PROJECT CLOSEOUT

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Final Cleaning

1. At the completion of the work, the Contractor shall remove all rubbish from and about the site of the work, and all temporary structures, construction signs, tools, scaffolding, materials, supplies and equipment which he or any of his Subcontractors may have used in the performance of the work. Contractor shall broom clean paved surfaces and rake clean other surfaces of grounds.

2. Contractor shall thoroughly clean all materials, equipment and structures; all marred surfaces shall be touched up to match adjacent surfaces; dirty filters and burned out lights replaced as required; all glass surfaces cleaned and floors cleaned and polished so as to leave work in a clean and new appearing condition.

3. Contractor shall maintain cleaning until project, or portion thereof, is accepted and occupied by the Owner.

B. Lubrication Survey

1. A lubrication survey, made by a lubricant supply firm, subject to the approval of the Owner shall be provided and paid for by the Contractor.

2. The lubrication survey shall list all equipment, the equipment manufacturer's lubrication recommendations, and an interchangeable lubricants tabulation standardizing and consolidating lubricants whenever possible.

3. The Contractor shall supply all lubricants, applicators and labor for lubricating the equipment, in accordance with manufacturer's recommendations, for field testing and prior to final acceptance. A supply of required lubricants sufficient for start-up and one year of operation shall also be supplied by the Contractor.

4. Ten (10) copies of the approved lubrication survey shall be furnished to the Engineer prior to final acceptance.

C. Spare Parts and Special Tools

1. As soon as practicable after approval of the list of equipment, the Contractor shall furnish spare parts data for each different item of equipment listed. The data shall include a complete list of parts and supplies, with current unit prices and source or sources of supply.

2. Contractor shall also furnish a list of parts, and supplies that are either normally furnished at no extra cost with the purchase of the equipment or specified to be furnished as part of the Contract and a list of additional items recommended by the manufacturer to assure efficient operation for a period of one-hundred and twenty (120) days for the particular installation.

3. All parts shall be securely boxed and tagged, and clearly marked on the box and individually for identification as to the name of manufacturer or supplier, applicable equipment, part number, description and location in the equipment. All parts shall be protected and packaged for a shelf life of at least ten (10) years.

4. Contractor shall furnish at no additional cost to the Owner with each piece of equipment as a minimum, one (1) complete set, or the number of sets called for in the Technical Specifications, of suitably marked special tools and appliances which may be needed to adjust, operate, maintain, or repair the equipment.

5. Contractor shall submit, for approval by the Engineer, a complete list of the special tools and appliances to be furnished. Such tools and appliances shall be furnished in approved painted steel cases properly labeled and equipped with good grade cylinder locks and duplicate keys.

D. Equipment Startup Services

1. Equipment startup period, for the training of plant personnel, shall begin after satisfactory completion and acceptance of the field tests and coincidentally with the certified date of substantial completion for the part of the work for which the equipment is included. If the equipment is not covered by a certificate of substantial completion for a part of the work, the period shall begin upon substantial completion of the project.

2. During the equipment start-up period the Contractor shall furnish, at no additional cost to the Owner the services of factory trained representatives of the equipment manufacturers for the equipment designated in the Specifications to:

   a. Assist in the start-up and operations of the equipment.

   b. Assist in the training of plant personnel, designated by the Owner in the proper operation and maintenance of the equipment.

3 The Owner shall:

   a. Provide the necessary plant personnel to be instructed in the operation and maintenance of the equipment. The Owner's personnel shall operate all equipment.

   b. Pay for all fuel, power and chemicals consumed beyond quantities specified in the Contract Documents. The Contractor shall pay for fuel, power, and chemicals consumed up to the date of "certified substantial completion" except as otherwise specified herein.

4. Contractor shall be available to promptly repair all work during the start-up period so as to cause minimum disruption to the total plant operation.

5. Upon completion of a minimum of ten (10) consecutive and continuous days of satisfactory operation, or the number of days called for in the Technical Specifications, the Owner will assume operation and operating cost of the equipment. If the equipment malfunctions during this start-up period, the start-up period will be repeated until satisfactory operation is achieved.

6. In the event a system, equipment or component proves defective or is unable to meet specified performance criteria, the Contractor shall replace the defective item and the minimum one (1) year guarantee period, or the guarantee period called for in the Technical Specifications for the item shall start after satisfactory replacement and testing of the item.

E. Final Cleanup; Site Rehabilitation

1. Before finally leaving the site, the Contractor shall wash and clean all exposed surfaces which have become soiled or marked, and shall remove from the site of work all accumulated debris and surplus materials of any kind which result from his operation, including construction equipment, tools, sheds, sanitary enclosures, etc. The Contractor shall leave all equipment, fixtures, and work, which he has installed, in a clean condition. The completed project shall be turned over to the Owner in a neat and orderly condition.

2. The site of the work shall be rehabilitated or developed in accordance with other sections of the Specifications and the Drawings. In the absence of any portion of these requirements, the Contractor shall completely rehabilitate the site to a condition and appearance equal or superior to that which existed just prior to construction, except for those items whose permanent removal or relocation was required in the Contract Documents or ordered by the Owner.

F. Final Inspection

1. Final cleaning and repairing shall be so arranged as to be finished upon completion of the construction work. The Contractor will make his final cleaning and repairing, and any portion of the work finally inspected and accepted by the Engineer shall be kept clean by the Contractor, until the final acceptance of the entire work.

2. When the Contractor has finally cleaned and repaired the whole or any portion of the work, he shall notify the Engineer that he is ready for final inspection of the whole or a portion of the work, and the Engineer will thereupon inspect the work. If the work is not found satisfactory, the Engineer will order further cleaning, repairs, or replacement.

3. When such further cleaning or repairing is completed, the Engineer, upon further notice, will again inspect the work. The "Final Payment" will not be processed until the Contractor has complied with the requirements set forth, and the Engineer has made his final inspection of the entire work and is satisfied that the

entire work is properly and satisfactorily constructed in accordance with the requirements of the Contract Documents.

G. Project Closeout

1. As construction of the project enters the final stages of completion, the Contractor shall, in concert with accomplishing the requirements set forth in the Contract Documents, attend to or have already completed the following items as they apply to his contract:

   a. Scheduling equipment manufacturers' visits to site.

   b. Required testing of project components.

   c. Scheduling start-up and initial operation.

   d. Scheduling and furnishing skilled personnel during initial operation.

   e. Correcting or replacing defective work, including completion of items previously overlooked or work which remains incomplete, all as evidenced by the Engineer's "Punch" Lists.

   f. Attend to any other items listed herein or brought to the Contractor's attention by the Engineer.

2. Just before the Engineer's Certificate of Substantial Completion is issued, the Contractor shall accomplish the cleaning and final adjustment of the various building components as specified in the Specifications and as follows:

   a. Clean all glass and adjust all windows and doors for proper operation.

   b. Clean all finish hardware after adjustment for proper operation.

   c. Touch up marks or defects in painted surfaces and touch up any similar defects in factory finished surfaces.

   d. Wax all resilient flooring materials.

   e. Remove bitumen from gravel stops, fascias, and other exposed surfaces.

   f. Remove all stains, marks, fingerprints, soil, spots, and blemishes from all finished surfaces, tile, stone, brick, and similar surfaces.

3. In addition, and before the Certificate of Substantial Completion is issued, the Contractor shall submit to the Engineer (or to the Owner if indicated) certain records, certifications, etc., which are specified elsewhere in the Contract Documents. A partial list of such items appears below, but it shall be the Contractor's responsibility to submit any other items which are required in the Contract Documents:

   a. Test results of project components.

b. Performance Affidavits for equipment.

c. Certification of equipment or materials in compliance with Contract Documents.

d. Operation and maintenance instructions or manuals for equipment.

e. One set of neatly marked-up record drawings showing as-built changes and additions to the work under his Contract.

f. Any special guarantees or bonds (Submit to Owner).

g. Original signed copy of survey with coordinates and elevations in NAVD with a conversion to NGVD.

4. The Contractor's attention is directed to the fact that required certifications and information under Item 3, above, must actually be submitted earlier in accordance with other Sections of the Specifications.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01720

PROJECT RECORD DRAWINGS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall keep and maintain, at the job site, one record copy of all drawings, specifications, addenda, change orders, and other modifications to the Contract, approved shop drawings, and field test records.

B. The Contractor shall mark the record drawings to indicate all project conditions, locations, configurations, and any other changes or deviations which may vary from the details represented on the original Contract Drawings, including buried or concealed construction and utility features which are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated, or which were not indicated on the Contract Drawings. Said record drawings shall be supplemented by any detailed sketches as necessary or directed to indicate, fully, the Work as actually constructed. These master record drawings of the Contractor's representation of as-built conditions, including all revisions made necessary by addenda and change orders shall be maintained up-to-date during the progress of the Work.

C. Project record drawings shall be maintained and updated by the Contractor on a month-to-month basis.

D. Record drawings shall be accessible to the Engineer at all times during the construction period.

E. Periodic payments shall not be processed prior to Engineer's review and acceptance of record drawing development for the pay period submitted.

F. Final payment will not be acted upon until the Contractor has prepared and delivered record as-built drawings to the Engineer. Said up-to-date record drawings shall be in the form of a set of prints 24 x 36 inch in size with carefully plotted information overlaid in red ink.

G. Upon substantial completion of the Work and prior to final acceptance, the Contractor shall finalize and deliver a complete set of record drawings to the Engineer for transmittal to the Owner, conforming to the construction records of the Contractor. This set of drawings shall consist of corrected drawings showing the reported location of the Work. The information submitted by the Contractor and incorporated by the Engineer into the Record Drawings will be assumed to be correct, and the Contractor shall be responsible for the accuracy of such information, and shall bear the costs resulting from the correction of incorrect data furnished to the Engineer and the Owner.

1.02 RELATED REQUIREMENTS

A. Section 01300: Contractor Submittals

B. Section 01700: Project Closeout.

1.03 RECORDING

A. Label each document "PROJECT RECORD" in neat large printed letters.

B. Record information concurrently with the progress of construction.

C. Legibly mark drawings to record actual construction

1. Incorporate changes made by Field Order, Change Order, or Construction Change Directive.

2. Incorporate details generated during the construction phase not shown on the original Contract Drawings.

1.04 SUBMITTAL

A. Prior to Substantial Completion, submit Record Documents to the Engineer for delivery to the Owner.

B. Accompany submittal with a transmittal letter in duplicate, containing:

1. Date.

2. Project title and number.

3. Contractor's name and address.

4. Title and number of each record document.

5. Signature of Contractor or its authorized representative.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 02100

CLEARING AND GRUBBING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide all labor, material, equipment and appliances required for the complete execution of any additions, modifications, or alterations to existing facilities and new construction work as shown on the Drawings and specified herein.

B. Principal items of work include:

1. Notifying all authorities owning utility lines running to or on the property. Protecting and maintaining all utility lines to remain and capping those that are not required in accordance with instructions of the Utility Companies, and all other authorities having jurisdiction.

2. Clearing the site within the Contract Limit Lines as shown on drawings, including removal of grass, brush, shrubs, trees, loose debris and other encumbrances except for trees marked to remain.

3. Boxing and protecting all trees, shrubs, lawns and the like within areas to be preserved. Relocating trees and shrubs, so indicated on the Drawings, to designated areas.

4. Repairing all injuries to trees, shrubs, and other plants caused by site preparation operations shall be repaired immediately. Work shall be done by qualified personnel in accordance with standard horticultural practice and as acceptable to the Engineer and Owner.

5. Removing topsoil to its full depth from designated areas and stockpiling on site for future use.

6. Disposing from the site all debris resulting from work under this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02210 - Site Grading

1.03 STREET AND ROAD BLOCKAGE

A. Closing of streets and roads during progress of the work shall be in compliance with the requirements of the Owner and other authorities having jurisdiction. Access shall be provided to all facilities remaining in operation.

1.04 PROTECTION OF PERSONS AND PROPERTY

A. All work shall be performed in such a manner to protect all personnel, workmen, pedestrians and adjacent property and structures from possible injury and damage.

B. All conduits, wires, cables and appurtenances above or below ground shall be protected from damage.

C. Provide warning and barrier fence where shown on the Drawings and as specified herein.

PART 2 – PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

3.01 CLEARING OF SITE

A. Before removal of topsoil, and start of excavation and grading operations, the areas within the vegetation removal limits shown on the Drawings shall be cleared and grubbed.

B. Clearing shall consist of cutting, removal, and satisfactory disposal of all trees, fallen timber, brush, bushes, rubbish, sanitary landfill material, fencing, and other perishable and objectionable material within the areas to be excavated or other designated areas. Prior to the start of construction, the Contractor shall survey the entire Contract site and shall prepare a plan which defines the areas to be cleared and grubbed, trees to be pruned, extent of tree pruning, and/or areas which are to be cleared but not grubbed. This plan shall be submitted to the Engineer for approval. Should it become necessary to remove a tree, bush, brush or other plants adjacent to the area to be excavated, the Contractor shall do so only after permission has been granted by the Engineer.

C. Excavation resulting from the removal of trees, roots and the like shall be filled with suitable material, as approved by the Engineer, and thoroughly compacted per the requirements contained in Section 02210 entitled "Site Grading".

3.02 GRUBBING

A. Grubbing shall consist of the removal and disposal of all stumps, roots, logs, sticks and other perishable materials to a depth of at least 6-inches below ground surfaces.

B. Stumps located the areas within the vegetation removal limits shown on the Drawings shall be removed.

3.03 STRIPPING OF EXISTING TOPSOIL

A. Where called for on the Drawing strip existing topsoil within areas designated to whatever depth it may occur.

B. Stripped topsoil shall be become the property of the Contractor and shall be removed from the site.

3.04 REMOVAL OF UNSUITABLE SOILS AND REPLACEMENT WITH FILL

A. When encountered, unsuitable soils (i.e., organic materials) shall be excavated, removed and disposed of by the Contractor.

B. Excavation resulting from the removal of unsuitable soils shall be filled with “fill” and thoroughly compacted per the requirements contained in Section 02210 entitled "Site Grading".

3.05 DISPOSAL OF MATERIAL

A. All debris resulting from the clearing and grubbing work shall be disposed of by the Contractor as part of the work of this Contract. Material designated by the Engineer to be salvaged shall be stored on the construction site as directed by the Engineer for reuse in this Project or removal by others.

B. Burning of any debris resulting from the clearing and grubbing work will not be permitted at the site.

3.06 WARNING AND BARRIER FENCE

A. The fence shall be made of a visible, lightweight, flexible, high strength polyethylene material. The fence shall be MIRASAFE as manufactured by Mirafi, Inc., or equal. Warning and Barrier Fence shall be utilized as may be required for safety during construction.

B. Physical Properties

Fence:

Color:	International Orange
Roll Size:	4 feet x 164 feet
Roll weight:	34 lbs.
Mesh opening:	1-1/2 inches x 3 inches

Posts:

ASTM Designation:	ASTM 702
Length:	5 feet long (T-Type)
Weight:	1.25 lbs./Foot (min)
Area of Anchor Plate:	14 square inches

C. Drive posts 12 to 18 inches into ground every 10 feet to 12 feet. Wrap fence material around first terminal post allowing overlap of one material opening. Use metal tie wire or plastic tie wrap to fasten material to itself at top, middle and bottom. At final post, cut

with utility knife or scissors at a point halfway across an opening. Wrap around and tie at final post in the same way as the first post.

D. Use tie wire or tie wrap at intermediate posts and splices as well. Thread ties around a vertical member of the fence material and the post, and bind tightly against the post. For the most secure fastening, tie at top, middle and bottom. Overlap splices a minimum of four fence openings, tie as above, fastening both edges of the fence material splice overlap.

- END OF SECTION -

SECTION 02101

SILT FENCE

PART 1 -- GENERAL

1.01 DESCRIPTION

A. Provide all work and take all measures necessary to control soil erosion resulting from construction operations, prevent flow of sediment from construction site, and contain construction materials (including excavation and backfill) within protected working area as to prevent damage to any stream or wetlands.

B. The Contractor shall construct the silt fence prior to initiating any other major construction activities on the site. The silt fence shall be constructed along the outside perimeter of the easements provided for the work area as shown on the Drawings. Maintain this filter barrier in continuous operation in accordance with the requirements of this section for the duration of this contract.

1.02 REFERENCE

A. "Guidelines for Erosion and Sediment Control, Planning and Implementation" published by the United States Environmental Protection Agency.

B. "Processes, Procedures and Methods to Control Pollution Resulting from all Construction Activity", published by the United States Environmental Protection Agency.

C. "The Florida Stormwater, Erosion, and Sedimentation Control Inspector's Manual" published by the Florida Department of Environmental Protection.

1.03 SUBMITTALS

A. Two weeks prior to the start of the work, submit to Engineer, for review, a plan with detailed sketches showing the proposed methods to be used for controlling erosion during construction.

1.04 QUALITY ASSURANCE

A. Operations restricted to areas of work indicated on drawings and area which must be entered for construction of temporary or permanent facilities.

B. Engineer has authority to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and fill operations and to direct immediate permanent or temporary pollution control measures to prevent contamination of any stream or wetlands, including construction of temporary berms, dikes, dams, sediment basins, sediment traps, slope drains, and use of temporary mulches, mats, or other control devices or methods as necessary to control erosion.

PART 2 -- PRODUCTS

2.01 SILT FENCE

A. A temporary sediment barrier consisting of a filter fabric stretched across and attached to supporting posts and entrenched. The silt fence shall be constructed of wooden stakes and synthetic filter fabric.

B. Filter fabric shall be in conformance with Section 985 FDOT Specification.

C. Stakes for silt fence shall be 2-1/2" diameter softwood, 2"x4" softwood, 1-1/2" x 1-1/2" hardwood or steel 1.33 lbs/ft.

D. The height of a silt fence shall be a minimum of 15 inches and shall not exceed 18 inches.

E. Standard strength synthetic filter fabric shall be purchased in a continuous roll and cut to the length of the barrier to avoid the use of joints (and thus improve the strength and efficiency of the barrier).

PART 3 -- EXECUTION

3.01 GENERAL

A. Prior to the start of work, provide and install the site sedimentation and erosion control storm as indicated on the drawings and as required by applicable regulations. Maintain such system for the duration of the project.

B. Install baled hay or straw erosion/silt fence checks in all locations as directed, surrounding base of all deposits of stored excavated material outside of disturbed area, and where directed by the Engineer.

C. Install checks immediately after site is cleared and before trench excavation. Remove locate checks, surrounding stored material, approximately 6 ft. from material.

D. Hold bales in place with two 2-inch by 2-inch by 3 feet stakes so that each bale is butted tightly against adjoining bale thereby precluding short-circuiting of erosion check.

E. Construct earth berms or diversions to intercept and divert runoff water from critical areas.

F. Discharge silt-laden water from excavations onto filter fabric mat and/or baled hay or straw sediment traps to ensure that only sediment-free water is returned to watercourses.

G. Do not place excavated soil material adjacent to watercourse in manner that will cause it to wash away by high water or runoff.

H. Prevent damage to vegetation by excessive watering or silt accumulation in the discharge area.

I. Do not dump soiled material into any streams, wetlands, surface waters, or unspecified locations.

J. Do not pump silt-laden water from trenches or excavations into surface waters, streams, wetlands, or natural or man-made channels leading thereto.

K. Prevent damage to vegetation adjacent to or outside of construction area limits.

L. Do not dispose of trees, brush, debris, paints, chemicals, asphalt products, concrete curing compounds, fuels, lubricants, insecticides, washwater from concrete trucks or hydro-seeders, or any other pollutant in streams, wetlands, surface waters, or natural or man-made channels leading thereto, or unspecified locations.

M. Do not alter flow line of any stream unless indicated or specified.

3.02 SILT FENCE INSTALLATION

A. The stakes shall be spaced a maximum of 3 feet apart at the fence location and driven securely into the ground a minimum of 8 inches.

B. A trench shall be excavated approximately 4 inches wide and 4 inches deep along the line of stakes and upslope from the fence.

C. The filter material shall be stapled to the wooden stakes, and 8 inches of the fabric shall be extended into the trench. Heavy duty wire staples at least 1/2 inch long, hog rings, or tie wire shall be used. Filter material shall not be stapled to existing trees.

D. The trench shall be backfilled and the soil compacted over the filter material.

3.03 SILT FENCE MAINTENANCE

A. Silt fence shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately.

B. Should the fabric on the silt fence decompose or become ineffective before the end of the expected usable life and the fence still be necessary, the fabric shall be replaced promptly.

C. Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately one-half the height of the fence.

D. Any sediment deposits remaining in place after the silt fence is no longer required shall be dressed to conform with the existing grade, prepared, and seeded.

3.04 SILT FENCE REMOVAL

A. Upon completion of the project remove and dispose of the silt fence.

- END OF SECTION -

SECTION 02210

SITE GRADING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall perform grading Work within the limits, elevations and grades indicated on the Drawings, as specified herein, and in accordance with all City of Naples and South Florida Water Management District regulations.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02100 – Clearing and Grubbing

1.03 SUBMITTALS

A. The Contractor shall notify the Engineer, in writing, of the sources of the fill material at least 10 calendar days prior to the anticipated use of the material.

1.04 QUALITY CONTROL

A. The Contractor shall notify the Engineer in writing of the off-site sources of fill material.

B. Borrow areas or other sources for this material shall be reviewed by the Engineer prior to acceptance for use.

PART 2 -- PRODUCTS

2.01 FILL

A. Suitable fill material shall be non-cohesive, non-plastic, granular mixture of local sand and limerock, shall be free from vegetation, organic material or muck and shall contain not more than 8 percent material by weight which passes the No. 200 sieve. Broken concrete shall not be used in the fill. Fill material containing limerock shall have sufficient sand to fill the voids in the limerock, and no individual rocks or pieces of hard material that will not pass a 6-inch diameter ring shall be used in the fill; except that the upper 4 inches of all backfill or fills shall not contain any rock or hard material that will not pass a 3-inch diameter ring.

B. The Contractor must determine the volume of material required for the site.

PART 3 -- EXECUTION

3.01 GRADING AND COMPACTION

A. Fill material shall be placed in lifts not to exceed 8-inches and compacted to a density of not less than 95 percent of maximum density at optimum moisture as determined by ASTM D 1557. Fill material shall be within plus or minus 2 percentage points of optimum moisture content. The costs of all density testing shall be borne by the Contractor. At least one test per lift/layer shall be taken for every 200 feet of roadway. If roadway is less than 600 feet, at least one test per lift/layer shall be taken. For areas other than roadways, take at least one test per lift/layer for every 1,000 square feet of area.

B. The site shall be graded to the required elevations. Final grades shown on the Drawings are based on dimensions from existing grade. Finished surfaces shall be uniformly sloped between final grades. Minor adjustments to line and grade may be required as the work progresses in order to satisfy field conditions.

C. The Contractor shall confirm construction by performing soil testing (standard proctor tests).

- END OF SECTION -

SECTION 02260

FINISH GRADING

PART 1 -- GENERAL

1.01 WORK INCLUDED

A. The Contractor shall, under this Section, supply, place, compact and roll finish grade materials prior to landscaping work.

B. Finish grade sub-soil.

C. Cut out areas to receive stabilizing base course materials for paving and sidewalks.

D. Place finish grade and compact topsoil.

1.02 RELATED WORK

A. Section 02210 – Site Grading

1.03 PROTECTION

A. The Contractor shall prevent damage to existing structures, fencing, trees, landscaping, natural features, bench marks, pavement, utility lines, and sprinkler system. In addition the Contractor shall correct all damaged areas at no cost to the Owner.

PART 2 -- PRODUCTS

2.01 MATERIALS

A. Topsoil shall be friable loam free from subsoil, roots, grass, excessive amount of weeds, stones and foreign matter; acidity range (pH) of 5.5 to 7.5; containing a minimum of 4% and a maximum of 25% organic matter.

2.02 CRUSHED STONE

A. Crushed stone for general grading purposes shall be as specified in Section 02224 entitled “Excavation and Backfill for Structures”.

PART 3 -- EXECUTION

3.01 SUB-SOIL PREPARATION

A. Rough grade sub-soil systematically to allow for a maximum amount of natural settlement and compaction. Eliminate uneven areas and low spots. Remove debris, roots, branches, stones, etc., in excess of 2 inches in size. Remove sub-soil which has been contaminated with petroleum products or other materials.

B. Cut out areas, to sub-grade elevation, which are to receive stabilizing base for paving

and sidewalks.

C. Bring sub-soil to required levels, profiles and contours. Make changes in grade gradual. Blend slopes in to level areas.

D. Slope grade away from building minimum 4 inches in 10 feet (unless indicated otherwise on Drawings).

3.02 PLACING TOPSOIL

A. Place topsoil in area where seeding, sodding and planting is to be performed. Place to the following minimum depths, up to finished grade elevations:

1. 6-inches for seeded areas

2. 4 1/2-inches for sodded areas

3. 24-inches for shrub beds

4. 18-inches for flower beds

B. Use topsoil in relatively dry state. Place during dry weather.

C. Fine grade topsoil eliminating rough and low areas to ensure positive drainage. Maintain levels, profiles and contours of sub-grades.

D. Remove stones, roots, grass, weeds, debris and other foreign material while spreading.

E. Manually spread topsoil around trees, plants, buildings and other structures to prevent damage which may be caused by grading equipment.

F. Lightly compact placed topsoil.

3.03 SURPLUS MATERIAL

A. Remove surplus sub-soil and topsoil from site.

B. Leave stockpile areas and entire job site clean and raked, ready to receive landscaping.

- END OF SECTION -

SECTION 02500

SURFACE RESTORATION

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Items specified in this Section include repairs to landscaped and grassed areas that may be damaged or disturbed by Contractor activities.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02210 - Site Grading

1.03 SUBMITTALS

A. The Contractor shall submit submittals for review in accordance with the section entitled “Submittals.”

1.04 DEFINITIONS

A. The phrase “DOT Specifications” shall refer to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction. The DOT Specifications are referred to herein and are hereby made a part of this Contract to the extent of such references, and shall be as binding upon the Contract as though reproduced herein in their entirety.

1.05 PROTECTION OF EXISTING IMPROVEMENTS

A. The Contractor shall be responsible for the protection of all pavements and other improvements within the work area. All damage to such improvements, as a result of the Contractor's operations, beyond the limits of the work of pavement replacement shall be repaired by the Contractor at its expense.

1.06 GUARANTEE

A. The Contractor shall guarantee the ground cover (sod) for a period of one year beyond acceptance of the project. The Contractor shall be responsible for replacement in kind in the event that that the sod dies within the guarantee period.

PART 2 -- PRODUCTS

2.01 REPLACEMENT OF SOD

A. Replacement of sod shall be of the same type and size and sound, healthy and vigorous. They shall have healthy, well developed root systems and shall be free of disease and insect pests, eggs or larvae.

2.02 GRAVEL BEDS

A. Filter Fabric: Filter fabric shall be nonwoven polyester material Trevia Type 1120 as manufactured by Hoechst Fibers Industries, or equal. Fabric weight shall be 6 ounces per square yard, puncture strength maximum 40 pounds, minimum Flux 240 gallons per minute per square foot. Fabric shall be installed in accordance with the manufacturer's recommendations, with precautions taken to avoid tearing the fabric. Fabric shall be laid in strips with a minimum overlap of one foot.

B. Crushed Stone: Crushed stone shall consist of hard, durable, subangular particles of proper size and gradation, and shall be free from organic material, wood, trash, sand, loam, clay, excess fines, and other deleterious materials. Crushed stone shall conform to the requirements of ASTM C 33, Size Number 57, graded within the following limits:

Sieve Size	Percent Finer by Weight
1 ½ inch	100
1 inch	95 to 100
½ inch	25 to 80
No. 4	0 to 10
No. 8	0 to 5

Crushed stone shall be carefully placed and spread to a minimum depth of 6 inches. Final grades and locations shall be as indicated on the Drawings.

PART 3 -- EXECUTION

3.01 GRADING AND SODDING

A. General: Sod shall be placed at the locations shown on the Drawings that have been disturbed by construction activities. Sodding shall be in accordance with Sections 575 and 981 of the DOT Specifications. Prior to sodding, the area to be sodded shall be re-graded to the existing grade prior to commencement of construction. Sprinkler systems damaged in the area to be sodded shall be restored.

B. Maintenance: Sufficient watering shall be done by the Contractor to maintain adequate moisture for optimum development of the sodded areas. Sodded areas shall receive no less than 1.5 inches of water per week.

- END OF SECTION -

SECTION 02850

WELL MOBILIZATION AND CLEANUP

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. This Section covers the work necessary to move in and move out personnel and equipment, set up and remove drill rigs and temporary facilities, and cleanup site, complete.

PART 2 – PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

3.01 GENERAL

A. Set up well drilling equipment within the area designated by the Engineer. Accomplish all required work in accordance with applicable portions of these Specifications.

B. Some obstructions may not be shown. The removal and replacement of minor obstructions such as electrical conduits, water, waste piping, and similar items shall be anticipated and accomplished, even though not shown or specifically mentioned.

C. The Contractor shall be responsible for grading within the actual well construction and staging areas to facilitate operations.

D. The Contractor shall fill and grade land surfaces at each drilling location such that runoff is directed away from the well sites.

E. The Contractor is responsible for grading an access road leading to the well sites and shall be responsible for maintaining all-weather temporary access to the wells and construction staging areas from the graded access road. The Contractor shall include the cost for this maintenance in the lump-sum pay item for Site Preparation listed on the Cost Proposal Form.

3.02 CONTAMINATION PRECAUTIONS

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

3.03 WELL DRILLER LOG

A. The Contractor shall maintain a detailed daily log of his operations on each rig during the construction and testing of the wells. The logs shall be on IADC Forms and shall give a

complete description of equipment used, fluid and water-level changes and the depths at which they occurred, details of gravel and cementing operations including flush volumes cement weight, any additives and chase volumes, repair time and other such pertinent data as required by the Engineer. One copy of each daily log shall be submitted to the Engineer on a daily basis.

3.04 CLEANUP OF CONSTRUCTION AREAS

A. Upon completion and acceptance of each well, remove from the site the drill rig and equipment, complete, and all debris, unused materials, and other miscellaneous items resulting from or used in the operations. All drilling fluids and drill cuttings shall be removed from the work sites. Replace or repair any facility which has been damaged during the construction work. Restore the site as nearly as possible to its original condition as approved by Owner and its representative.

B All improved areas disturbed by well construction shall be restored to a condition at least equal to the pre-construction conditions including, but not limited to, all driveways, roads, fences and other improvements. The Contractor shall maintain a photographic record of pre and post-construction conditions at the work sites to substantiate any claims for pre-existing damage.

- END OF SECTION -

SECTION 02851

DRILLING

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide the work, materials, and equipment necessary for drilling of the wells, complete.

B. Wells shall be drilled into aquifers containing saline water under pressure. The shallow aquifer contains potable water at the well site; it is required that the saltier water from the deep aquifers be handled so that there will be no spills upon the ground. Requirements will be set forth in these specifications regarding the handling of salty water, drilling fluids, and cuttings. Contractor shall comply with all regulations applicable to handling and disposal of all fluids and materials. Requirements also are set forth or controlling the flow of the well during construction and providing a closed, steel lined circulation system for all drilling operations. Drilling pads will be required and shall be constructed to retain spillage of water from drilling and related operations. Water table monitor wells shall be installed around each pad. Due precautions should be taken to prevent spills; any spillage of fluids shall be returned to the closed circulation systems

C. The anticipated well casing and open-hole depths listed in the following specifications are approximate. Actual depths may vary depending on specific conditions encountered during well construction. Additionally, the well testing procedures may be changed in order of occurrence, added to, or deleted at the discretion of the Engineer.

D. At the completion of drilling, the Contractor shall remove the closed circulation system and its appurtenances that are not part of each completed well and leave each site in good condition acceptable to the Engineer.

1.02 CONTRACTOR'S RESPONSIBILITY

A. All work shall be performed by a certified water well driller, licensed by the State of Florida.

B. CONTRACTOR shall be responsible for obtaining all necessary local, state and agency permits and completion of summary reports.

1.03 LOCAL GEOLOGIC CONDITIONS

A. It is anticipated that the boreholes will encounter beds of limestone, sandstone clay and varying amounts of unconsolidated shell and sand. Permeable zones containing water under pressure and flowing conditions will be present.

B. Information regarding subsurface conditions is intended to assist the Contractor in establishing a price for the Work. The Owner does not guarantee its accuracy or that it is necessarily indicative of conditions to be encountered in drilling the wells. The Contractor shall satisfy himself regarding all local conditions affecting his work by personal investigation and neither the information on local geology, nor that derived from maps or plans nor from the Owner or his agents or employees shall act to relieve the

Contractor of any responsibility hereunder or from fulfilling any and all of the terms and requirements of the Contract Documents.

1.04 REMEDIAL WORK

A. If remedial work proves to be necessary to make a well acceptable and come within the governing regulations and/or Contract Documents because of accident, loss of tools, defective material of for any other cause, the Contractor shall propose a method of correcting the problem, in writing. Suggested methods shall be reviewed and accepted by the Engineer before work proceeds. Such work shall be performed at no additional cost to the Owner and it shall not extend the length of the Contract. The Contractor is notified that all requirements of the Contract Documents shall be met, including hole straightness and setting of casings to the points designated by the Engineer.

1.05 ABANDONMENT OF WELL BY CONTRACTOR

A. Any hole in which the Contractor voluntarily stops work and/or fails to complete in a satisfactory manner, in accordance with the governing regulations and/or Contract Documents shall be considered as abandoned by him. If the Owner declares the hole abandoned by the Contractor, then no payment will be made for the abandoned hole. All abandoned holes shall be properly plugged and sealed by the Contractor at his own cost in accordance with federal, state and local regulations. All salvageable material furnished by the Contractor may be removed and remain his property. The Contractor shall submit, in writing, his plan of action of abandonment and plugging. Casings may be removed only with the permission and acceptance of the Engineer.

1.06 GUARANTEE

A. The Contractor guarantees that the work and service to be performed, under the Contract and all workmanship, materials and equipment performed, furnished, used or installed in the work shall be free from defects and flaws, and shall be performed and furnished in strict accordance with the Contract Documents; that the strength of all parts of all manufactured equipment shall be adequate and as specified; and that performance test requirements of the Contract Documents shall be fulfilled. The Contractor shall repair, correct, or replace all damage to the work resulting from failures covered by the guarantee. The guarantee shall remain in effect for one year from the date of final acceptance by the Owner.

1.07 STANDBY TIME

A. The Engineer may order the Contractor to stop his operations so that extra work not included in the Contract Documents such as testing and additional data collection can be performed. The Engineer will advise the Contractor when he proposes to do this and will schedule his request so it causes a minimum of delay. All extra work must be accepted by the Owner in writing, in advance.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

3.01 EQUIPMENT

A. The Contractor shall provide all necessary equipment to perform specified work. The Contractor and/or his subcontractor's equipment shall be in first class working order and shall be suitable for completing work described herein. No unnecessary delays or work stoppages will be tolerated because of equipment failure. They will not be considered a valid reason for extending the length of the Contract. The Contractor shall be held responsible and payment may be withheld for damages to a well due to any cause of negligence, faulty operation, or equipment failure.

B. The Contractor shall provide and operate equipment capable of handling the largest load that will be placed upon the rigs drilling and supporting equipment. If conditions develop in the field that prove the rigs and supporting equipment that had been supplied by the Contractor are incapable of completing a well, the Contractor shall provide a larger rig with the necessary capacity at his own cost.

C. The Contractor and/or his subcontractor's equipment shall be operated and maintained in conformance with manufacturer's recommendations.

D. The Contractor shall provide all drilling fluids, water, and additives required for drilling. All fluids and additives shall comply with Federal, State and Local regulations. The Contractor shall review fluids and additives with the Engineer prior to drilling.

E. The Contractor shall use only potable water for makeup of drilling fluids and grout preparation, unless an alternative water source is approved in advance by the Engineer. It shall be the Contractors responsibility to coordinate water use arrangements with the Owner, provide a means of delivering the water to the work sites, and if requested by the Owner, to meter all water used.

F. The Contractor shall provide equipment for measuring weight and viscosity of drilling fluid.

G. The Contractor shall provide sampling bags or containers as acceptable to the Engineer.

H. The Contractor shall provide water sampling containers as acceptable to the Engineer.

3.02 DRILLING

A. Pilot hole drilling and reaming shall be conducted by either the mud-rotary or the reverse-air circulation method. The reverse-air method shall be used for all open hole drilling, except in limited cases where formation yields are inadequate and an external source of potable water is required to properly clean the borehole. Potable water shall not be used for open-hole drilling without prior acceptance by the Engineer.

B. Fluid for mud-rotary circulation shall be a mixture of potable water and high-grade bentonite unless other types of drilling fluid of fluid additives have been approved in advance by the Engineer. All drilling additives must be approved for use in public supply wells by NSF. Drilling mud shall be conditioned using a shale shaker and de-sanders, or other equipment acceptable to the Engineer prior to being recirculated into the borehole.

C. Drill cuttings and fluids from mud-rotary drilling shall be removed from each drilling site and disposed of at a suitable location. The Contractor shall furnish the Engineer and Owner prior to beginning construction, the name and location of his disposal site along with documentation that the site has been approved by the appropriate regulatory agencies. The fluid displaced from the borehole during cementing operations shall be considered excess drilling fluid and shall be disposed of in the accepted manner.

D Flowing conditions in the well shall be kept under control at all times. Drilling mud may be used as weight material to keep the drilling fluid at a density necessary to control the flow during mud-rotary drilling. Salt or naturally occurring brines such as those produced from oil wells shall not be used as drilling fluid or weight material during drilling. As flowing conditions are anticipated during reverse-air drilling of the well the Contractor shall furnish and install a suitable blowout preventer for the well. The blowout preventer to be provided will be a commercially available, hydraulically operated, singular annular preventer, or acceptable equivalent. When no work is being done on a well, a preventer shall be put in place and the well shall be secured. Contractor shall provide letter to Engineer noting that the blowout preventer is installed and will be available and functional throughout all drilling and testing.

E. The use of brine solution to suppress well flow may be required to install test pumping equipment or permanent wellhead equipment. The Engineer shall be notified in advance of any plan by the Contractor to introduce brine solution to the well. Following use, brine must be removed completely from the well. This shall be performed by purging the well until specific conductance levels in the discharge water are consistently maintained at background levels as determined by the Engineer. Such a demonstration shall be required before any borehole geophysical logging is conducted. All costs associated with brine use shall be included in the price of the well. The brine slug must be contained by the Contractor for off-site disposal. The Contractor shall be solely responsible for disposal of all drilling fluids including brine solutions.

F. Formation fluids from reverse-air drilling, well development and well testing shall be treated to remove suspended solids and then discharged onto the ground within 250 feet of each well site. The Contractor shall ensure that his own and other work sites and associated access roads are maintained in a reasonably dry condition so that work activities are not impaired. It is anticipated that earthen berms will be required to keep other work sites and associated access roads in a reasonably dry condition, the Contractor shall provide and maintain the earthen berms at his own cost.

G. Lost circulation conditions may be encountered while drilling with mud. The use of lost circulation materials shall be restricted to those materials approved by FDEP and NSF.

H. At all times during the progress of the work the Contractor shall use reasonable precautions to prevent either tampering with the well or the entrance of foreign material into it. When flowing conditions may be encountered, the well shall be sealed at the end of the work day.

I. At the completion of drilling, the Contractor shall remove the closed circulation system and its appurtenances that are not part of each completed well and leave each site in good condition acceptable to the Engineer.

J. When all casings are being set and cemented in place, it is the Contractor's responsibility to insure that these operations are conducted in such a manner that the

casing collapse and burst strengths (with safety factor) are not exceeded and the casings are not caused to fail.

K. The Contractor shall notify the Engineer in writing at least five days (Saturdays, Sundays and holidays excepted) prior to the commencement of drilling. The Contractor shall bear the all costs associated with special inspections by the Owner or Engineer should he choose to perform work outside regular working hours. Regular working hours are to be defined at the preconstruction meeting and are subject to prior acceptance by the Engineer. Said work shall be coordinated with the Engineer at least five days prior to commencement of work. The Contractor shall maintain appropriate lighting for the different parts of the project as required for compliance with applicable Federal and State regulations, and all requirements of the Owner.

L. The Contractor shall provide a thoroughly experienced, competent, and licensed driller which shall be present onsite during all operations.

M. Wells are to be of the general type and characteristics described in the Contract Documents. The exact depth of well and length of casings will be determined in the field.

N. The Contractor shall drill the wells at the approximate location shown on the Drawing. The exact location will be determined in the field by the Owner or the Engineer.

O. During reaming operations the Contractor shall incorporate the use of a lead bit and a staged drilling assembly to facilitate pilot-hole tracking.

P. The Contractor shall drill all boreholes straight and plumb to permit the installation of the casing.

3.03 ALIGNMENT

A. The Contractor is responsible for plumbness of the borehole. Requirements for testing plumbness are specified in the Section entitled “CASING”.

B. All pilot holes and boreholes shall be drilled round, plumb, and straight throughout.

3.04 DATA COLLECTION

A. The Contractor shall be responsible for collection of formation samples. Each sample shall be approximately one pint in volume, and placed in a container labeled using indelible ink with the date, well identification, and depth from which the sample was taken. Sampling and labeling procedures shall be in accordance with Bulletin No. 638-S, Instructions for Taking Formation Samples, published by UOP-Johnson Division, and as approved by the Engineer.

B. The Contractor shall collect two sets of formation samples from the well at intervals of 5 feet and at every formation change and drilling break. The samples shall be preserved in cloth sample bags to be furnished by the Contractor. The sample containers shall be plainly marked with the well identification and shall show the depth below the ground surface from which they were taken. The Contractor shall collect the samples, provide suitable facilities for storage while they remain onsite and deliver them to the Engineer.

3.05 REVERSE-AIR CIRCULATION WATER SAMPLES

A. Prior to every drill pipe connection during all reverse-air drilling operations (maximum interval of 30 feet) the Contractor shall assist the Engineer in collecting a clear water sample from the drill stem discharge after cuttings have been flushed from the well. Water samples will be analyzed in the field by the Engineer for conductance and chloride concentrations. The Contractor shall provide a calibrated instrument acceptable to the Engineer for conducting field measurements. Samples for laboratory analysis of conductivity, TDS and chloride shall be collected every 90 feet.

3.06 RECORD KEEPING

A. The Contractor shall submit to the Engineer a daily drilling report describing the activities performed during the referenced period. Original daily logs shall be submitted with 48 hours of occurrence. The log shall accurately describe the geologic materials and depths encountered, the presence or absence of water, depths of lost circulation zones and methods of regaining circulation, drilling rates, time and description of any unusual occurrences or problems during drilling, diameters and lengths of casing installed, details of cementing operations including flush volumes, cement weight any additives and chase volumes, repair time and other such pertinent drilling and testing data as may be required by the Engineer. The Contractor shall also provide a tabulation of all quantities for pay items and a description of all decisions made by the Contractor.

B. The Contractor shall maintain a detailed daily log of his operations on each rig during the construction of each well. The logs shall be on IADC Forms or equivalent as approved by the Engineer and shall give a complete description of all formations encountered, footage and size of hole drilled, depth and sizes of all casings installed in the well, fluid losses, complete record of drilling fluids added, water level changes and the depths at which they occurred, repair time and other such pertinent data as may be required by the Engineer. One copy of each daily log shall be submitted to the Engineer on a daily basis.

C. The Contractor shall keep a copy of the daily log at the drill site for inspection at all times. Failure to keep this record up-to-date (maximum 48 hours from occurrence) shall be grounds for the Engineer to stop drilling operations.

D. The Contractor shall prepare and submit to the Engineer a final well log which shall include geologic log, borehole diameters, depth to the bottom of casing and/or the bottom of the borehole, casing diameters and wall thickness, cemented zones, perforated or screened interval(s) type, size and quantity of gravel pack installed, amount of sand removed during development and other information from the daily logs pertinent to the well construction. In addition the Contractor shall file all records and reports with the proper agencies required by Federal, State and local codes or regulations.

3.07 REGULATORY COMPLIANCE

A. The Contractor shall construct the wells in conformance with all laws, rules, regulations and standards related to the construction of wells in the United States, State of Florida, Collier County, South Florida Water Management District, City of Naples and any other applicable regulations.

B. The Contractor shall take all necessary precautions to prevent contaminated water, gasoline, or other deleterious substances from entering the well, either through the

opening or by seepage through the ground surface. Maintain precautions during and after construction of the well until accepted by the Owner.

C. The Contractor shall be responsible for disposal of cuttings and water, and shall make arrangements to remove all drilling fluids and cuttings from the site in accordance with Federal, State, county and local regulations. The Contractor shall provide the Engineer with an original letter showing acceptance of above materials by the landfill or other disposal location prior to construction. The letter shall include the name and location of the disposal site along with documentation that the site has been approved by the appropriate regulatory agencies. The fluids displaced from the borehole during cementing operations shall be considered excess drilling fluids and shall be disposed of in an acceptable manner. The Contractor shall submit a plan to contain and remove all cuttings and drilling mud for the Owner's acceptance at the preconstruction meeting.

D. The Contractor shall be responsible for disposal of all fluids produced during drilling, pumping tests and well development. The Contractor shall submit a written plan for disposal at the preconstruction meeting for review by the Engineer. Discharge of fluids to local water bodies is forbidden.

E. The Contractor shall be responsible for obtaining all necessary well construction permits.

3.08 DRILLING PAD

A. The Contractor shall fill and grade the drilling locations such that runoff is directed away from the well sites.

3.09 PUMPING TEST

A. Acidization Procedures

1. Kill well if necessary. Suppress head to approximately 30 feet below land surface (BLS).

2. Remove existing wellhead (if necessary).

3. Count label and strap all pipe on site, record information.

4. Install high pressure well header. Header must have ports for acid line, water line, pressure relief and pressure gauge.

5. Run two tremie lines. One tremie line to the acid injection zone and a second shallower tremie line for water. Use black steel pipe for tremie. GALVANIZED PIPE IS NOT ACCEPTABLE.

6. Install stainless steel check valves on acid line and stainless steel ball valves on acid line and water line. ALUMINUM FITTINGS ARE NOT ACCEPTABLE.

7. Install backflow preventer on water line

8. Run pressure relief line to tank or other approved location.

9. Install 300 psi gauge on wellhead.

10. Check flow through all lines with water.

11. Organize equipment and clear site of all unnecessary equipment and trash. Establish a clear path to a vehicle for emergency exit.

12. Confirm location and directions to nearest Emergency Medical Facility

13. Have potable water on hand for emergency rinse down.

14. Pump 1,250 gallons of 10% to 15% HCl acid at 25 gpm and 2,500 gallons of potable water at a rate of 50 gpm.

15. Continuously monitor pressure. If pressure increases above 150 psi or as determined by Engineer discontinue pumping acid and pump only water until pressure is reduced.

16. Relieve gas pressure at wellhead if necessary. NOTE: Gas vented from well may be colorless, odorless and harmful.

17. After pumping acid, pump 20,000 gallons or as determined by Engineer of potable chase water.

18. Close in well, monitor pressure, disconnect lines after pressure has equalized.

19. Allow 24 hours for acid reaction time.

20. Remove tremie after specified reaction time has elapsed.

21. Develop well and dispose of spent acid in approved manner. NOTE: Begin development at a low rate as large quantities of gas may be present.

22. Record pressure readings over time.

23. Continue well development as directed by Engineer.

24. After development, allow a minimum of 12 hours for well to fully recover to static level.

25. Conduct step-drawdown test.

26. Reassemble wellhead.

27. Demobilize equipment, clean and restore location to original conditions.

3.10 CONDITIONS AND HAZARDS

A. The Contractor should be advised and be aware of difficult drilling conditions and problems he may encounter during the drilling, construction, and testing of the wells. Typical examples he may have to cope with include, but are not limited to, lost circulation, cavities and fractured zones; squeezing zones and potential sand intervals, with attendant caving problems. A priority requirement of these Technical Specifications is the drilling of straight holes and setting all casing to specified depths. Hole straightness, which will permit casings to be set at specified depths and facilitate

achievement of proper cement seals, shall not be sacrificed for drilling speed. These and other pertinent factors shall be taken into consideration by the Contractor in planning and executing the work.

B. The goal of this program is the successful completion of the wells described in these Contract Documents. In the event of any problems or difficulty which, in the Engineer's opinion, may jeopardize the successful completion of a well in accordance with the governing regulations, Contract Documents and approved changes, it is the Contractor's responsibility to perform work required to successfully remedy any problem and perform such surveys and testing as necessary to demonstrate the problem has been solved and that the wells are in compliance with the Contract Documents. The Contractor shall bear all costs of testing, surveys and work deemed necessary by the Engineer to confirm that the problem has been resolved or corrected and that the construction is in compliance with the Technical Specifications and appropriate governing regulations. In the event that a problem occurs, the Contractor will be notified in writing by the Engineer. The Contractor shall submit to the Engineer his plan of action to identify and/or solve the problem and the Engineer will review the plan of action. In the event the problem is considered serious enough to jeopardize successful completion of the well in accordance with the Contract Documents, the Engineer may request technical concurrence from the regulatory and scientific agencies in accordance with the construction permits. No monies will be paid for the time spent by the Contractor during the entire period of review for the particular problem.

C. The Engineer will notify the Contractor that:

1. Plan of action is acceptable;

2. Plan of action is acceptable with Engineer's suggested modifications;

3. Plan of action is not acceptable.

D. Under (1.), the Contractor shall proceed with the plan of action. The Contractor shall bear all costs of surveys associated with detecting the problem, implementing his plan of action, and tests to confirm the plan of action was carried to successful completion and to obtain acceptance of the Engineer.

E. Under (2.), the Contractor shall resubmit his plan of action with necessary backup and justification of revised plan of action. The Engineer shall notify the Contractor that the revised plan of action is (1.) acceptable or (3.) not acceptable.

F. If the plan of action is not acceptable to the Engineer and the Contractor elects to pursue the unacceptable plan of action, then two options exist for the Engineer.

G. OPTION A: If the unacceptable plan of action jeopardized the well construction, completion, or operation in the Engineer's opinion and the Contractor elects to implement the unacceptable plan of action, the Engineer may declare the well abandoned by the Contractor. A determination shall be made by the Engineer whether to abandon the well or attempt to correct the existing well. The Contractor shall bear all costs of rig time, etc., from original verbal notification and all cost of either abandoning the well or taking steps to complete a successful well.

H. OPTION B: If the unacceptable plan of action does not jeopardize the well construction, completion, or operation in the Engineer's opinion, the Contractor may, at his own risk proceed with his plan of action. The Contractor shall bear all cost associated with his plan of action including testing, remedies, surveys, and programs to solve the problem. When completed, the Contractor shall notify the Engineer that the problem has been resolved. The Contractor shall bear all costs of testing, surveys, and work deemed necessary by the Engineer to confirm that the problem has been resolved. If the Engineer is satisfied that the problem has been resolved by the Contractor, then the Contractor shall proceed with the construction of the well, bearing all costs of the plan of action and the Engineer's program to confirm successful completion.

- END OF SECTION -

SECTION 02852

CASING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide all the work, materials, and equipment necessary for furnishing, installing, and testing the straightness and plumbness of the well casing, complete.

B. The Contractor shall provide all materials and equipment necessary for joining and installing the casing as specified.

C. All well casing and tubing shall be new. The Contractor may propose to the Engineer the use of well casing of a higher grade. The casing shall have minimum standards in the following Specifications. Before casings are installed in the wells, the Contractor shall submit mill certificates as specified in Section 01300 entitled "Submittals" to the Engineer. No payment for pipe casing shall be made without submission of mill certificates containing all pertinent information as determined by the Engineer. The Contractor shall provide the Engineer proof of welders' certifications before any welding may be started.

PART 2 -- PRODUCTS

2.01 PIT CASING

A. The material, length and method of pit casing installation shall be determined by the Contractor, subject to acceptance by the Engineer. For the purpose of determining minimum pipe clearances, it is assumed that the pit casing will be constructed minimum of 0.375-inch wall steel. Regardless of the material used, the inside diameter of the pit casing shall be sufficient to accommodate a drill bit that will provide an annulus of eight inches between the production casing collars and the reamed borehole. Pit casing specifications and installation methods shall be provided in the Shop Drawing submittals.

B. Pit casings, or pit pipe, may be used to hold the upper portion of the borehole open during construction of the injection or, monitor wells.

C. Pit casings shall be of sufficient strength to hold the borehole open and to withstand pulling. In addition, the pit casing shall be of sufficient size so to not restrict the drilling of next specified borehole size. If used, the pit casing shall be left in place.

D. Pit casing shall be used at the Contractor’s option. The nominal diameter shall be as identified in the Drawings and shall extend to an appropriate depth to prevent subsidence. If necessary, all pit casings shall be grouted from bottom up to land surface.

2.02 SURFACE CASING

A. All casing shall be new and unused, and of the type, thickness, diameter, and weight specified herein. All casing shall be free of defects in workmanship and handling.

B. The casing (34-inch) shall be new, unused steel, random length, 34-inch diameter 0.375-inch wall thickness, and shall conform to API 5L Grade B, ASTM A 53 Grade B or Spiral Weld A 139 Grade B. The casing shall be plain end and beveled for welding and shall be joined together by certified welders.

2.03 PRODUCTION CASING

A. All casing shall be new and unused, and of the type, thickness, diameter, and weight specified herein. All casing shall be free of defects in workmanship and handling.

B. The casing (24-inch) shall be new, unused steel, seamless, random length, 24-inch diameter 0.500-inch wall thickness, and shall conform to API 5L Grade B, ASTM A 53 The casing shall be plain end and beveled for welding and shall be joined together by certified welders.

C. Casing specifications, including material weight and size, rated working and resistance to hydraulic collapse pressure, tensile strength and pipe connection plans shall be provided with Shop Drawing submittals. Any substitute casing materials planned for use must be identified at that time.

PART 3 -- EXECUTION

3.01 INSTALLATION

A. The Contractor shall install casing to the approximate depths as shown in the Drawings. Final casing depth will be determined in the field by the Engineer.

B. The Contractor shall install the casing such that all joints are water tight. The method used to connect casing lengths shall be in accordance with the manufacturer's recommendations so that the resulting joint shall have the same structural integrity as the casing itself.

C. Pipe joints shall be connected following the manufactures recommended practices so that the casing string can withstand the tensile load experienced during installation. If screws are used in fastening the casing joints, they shall be installed in a manner that will prevent them from penetrating through the internal surface of the pipe.

D. The Contractor shall remove and replace all casing which fails, collapses, or separates during construction at his sole expense.

3.02 STRAIGHTNESS AND PLUMBNESS TEST

A. Priority requirements of these Technical Specifications is the drilling of straight holes and casing to the required depths. To insure that the casing and tubing can be set to the required depths and properly cemented, all of the holes shall be drilled so that they are

straight. The plumbness or straightness of the borehole, which will allow setting the casing at the required depths and provides room for proper cementing, shall not be sacrificed for drilling speed or any other reason.

B. All holes for all wells shall be round, straight, and true to line. No doglegs or departures from a straight line shall be permitted which will interfere or prevent casings from being set to their required depths.

D. To confirm compliance with the Specifications, a hole straightness test shall be performed on the production casing string of each well constructed for the project. The test shall be performed by using rigid tubing to lower a section of pipe 40 feet long or a dummy of the specified pump length into each well to a depth of 180 feet below land surface. The outer diameter of the test pipe or dummy shall not be more than 1/2-inch smaller than the inside diameter of that part of the casing or hole being tested. The lowered unit shall pass freely through the entire tested section. The Engineer may also direct the Contractor to perform a test of casing plumbness in accordance with AWWA A100. Costs for all plumbness and straightness tests shall be included in the price of the wells listed in the Proposal Bid Form.

E. The Contractor shall submit to the Engineer a remediation plan for the repair of any well that fails the plumbness or straightness standards. If the well cannot be repaired the well shall be plugged in accordance with current state requirements and a new well constructed at the Contractor's own expense.

3.03 CENTRALIZERS

A. The Contractor shall provide all fittings, drive shoes and centering guides necessary to complete the well as designed.

B. Casings for all wells shall be fitted with hinged centralizers meeting API Specification 10D and as acceptable to the Engineer. They shall be placed at 0, 90, 180 and 270 degrees around the casing at each position and shall be in a precise vertical alignment, one above the other, to allow for placement of tremie pipes in the annulus. The cost for centralizers shall be included in the unit price for casing installation.

C. Centralizers shall be fastened to the casing using clamps provided by the manufacturer and shall not penetrate the casing material.

D. Casing centralizers shall be installed at the approximate locations shown below:

<u>Surface Casing</u>

1. 5 feet from bottom of casing
2. 5 feet below land surface

<u>Production Casing Strings</u>

1. 5 feet from bottom of casing
2. 20 feet from bottom of casing

3. 40 foot intervals thereafter

4. 20 feet below land surface

3.04 WELDING

A. The Contractor shall use certified welders on all welding operations. The Contractor shall pay for all testing requirements prior to acceptance of any welder. Welder's qualifications shall be in conformance with Section IX, Article III of the ASME Boiler and Pressure Vessel Code. The Contractor shall demonstrate that welder can make groove welds in carbon steel pipe in positions 2G and 5G for each welding process used.

B. The Contractor shall provide welding certificates for all welders prior to any welding.

C. The Contractor shall correct all welding deficiencies in materials and/or workmanship at his own expense.

3.05 PRESSURE TEST

A. The Contractor shall perform a casing pressure test after completion of the final casing string. The casing shall be pressure tested between 150 psi and 175 psi for one hour, and shall have less than a five percent deviation in pressure. The Contractor shall be responsible for any and all corrective actions needed until the test is performed as required. No Contractor standby time will be considered during any portion of the pressure test.

B. The Contractor shall notify the Engineer at least 72 hours prior to performance of the casing pressure test.

C. The Contractor shall use a pressure gauge capable of readings to one-half psi, and shall have submitted a calibration certificate for the pressure gauge certifying its accuracy. The pressure gauge shall be calibrated not more than sixty (60) days prior to conductance of pressure test.

D. If the pressure changes or if there is some other indication of leakage, the Contractor shall take steps to locate the leak and make repairs in a manner satisfactory to the Engineer. Pressure testing shall be witnessed and certified in writing by the Engineer.

E. Contractor shall provide and install a pressure test gauge with a 0 to 200 psi scale for the 24-inch casing pressure test. Major graduations shall be 50 psi and minor graduations shall be 1 psi. Contractor shall provide factory certification of calibration. Gages shall be certified with sixty days of the test. Gauge accuracy shall be +/- 1/4 percent of scale range. Prior to beginning pressure test, all air shall be evacuated from the system. Contractor is required to demonstrate the adequacy of his mechanical test installation prior to beginning test.

- END OF SECTION -

SECTION 02853

GEOPHYSICAL LOGGING AND TESTING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide all work, materials, and equipment necessary to prepare the borehole/well for geophysical logging. The Contractor shall employ the services of a company acceptable to the Engineer to obtain geophysical logs of the wells. The Contractor shall prepare and condition each hole to insure it is open and can be logged with a minimum of delay. The following logs shall be run in the well at the stages listed and their cost shall be included. No payment will be made for logs which are unusable or inaccurate due to poor performance of the logging equipment or poor borehole conditioning.

B. A schedule of the proposed geophysical logs is provided in the Table "Schedule of Proposed Geophysical Logs". Other geophysical logs may be required and/or selected by the Engineer.

C. The Contractor shall assist the Engineer during geophysical logging and data collection as needed.

D. The Contractor shall be responsible for the preparation of the borehole/pilot hole for geophysical logging.

1.02 SUBMITTALS

A. The Contractor shall submit for approval by the Engineer the name of the proposed geophysical logging service company.

B. The Contractor shall furnish up to 15 field copies of the various logs to the Engineer and shall provide them within three hours of the time when logging was complete. A written field evaluation of their quality shall be submitted within two days of completion. Twenty copies of the finished logs shall be provided to the Engineer as soon as possible after the logging along with copies of the log in ASCII format on CD ROM.

PART 2 – PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

3.01 LOGGING

A. Geophysical logging shall be done as soon as possible after drilling and preparation of the pilot hole or borehole. Caliper and natural gamma ray logs shall be run over the

entire open hole and casing. Tools run for the other logs shall be run over the entire open borehole and the lower 75 feet of casing. Caliper logs shall be performed with a four-arm (x-y) tool. The Contractor shall notify the Engineer 36 hours in advance of any scheduled logging event.

B. The pilot holes and the wells shall be logged in stages as indicated in the proposed schedule of Geophysical Logging.

C. The Contractor shall be responsible for preparing the open-hole intervals for geophysical logging by removing all drill cuttings from the hole and by properly conditioning the well bore to prevent the formation from collapsing into the hole. The Contractor shall be responsible for keeping the borehole open and free from obstruction during geophysical logging and shall remove any obstruction to the logging tools at his own expense. In the event that the logging tools do not reach to within five feet of the bottom of the hole, as measured by the length of the drill pipe, the Contractor shall then clean the hole to the original drilled depth at his own expense. The logs shall then be rerun at the Contractor's expense.

D. Flow velocity, fluid resistivity, and temperature logs shall be performed under static and dynamic conditions. The Contractor shall furnish and install a pumping system capable of maintaining a constant withdrawal of at least 700 gallons per minute (gpm) form the wells. Discharge rates shall be measured using an approved metering device (calibrated flow meter of orifice plate) accepted by the Engineer, furnished by the Contractor. Calibration certificates shall be submitted to the Engineer prior to installation of the pumping system.

E. Dynamic flow logs shall be recorded down hole after static runs have been completed with the well shut in to establish rotor counts due to tool motion. Recorded static counts shall be displayed on the same track as the dynamic flow log, with counts attributed solely to well flow clearly distinguished. A separate tool run shall be performed in which flow velocity is recorded at up to 15 fixed stations in each well as selected by the Engineer. For each dynamic flow log, the Contractor shall provide a separate record that displays the percent fluid flow versus tool depth, calculated from the calibrated flow log results and the cross-sectional area of the borehole as indicated by the caliper log.

D. The Contractor shall provide access down the well for data collection and geophysical logging during pumping tests. If needed, pumps shall be capable of being removed and reinstalled to facilitate logging.

E. The Engineer may need to perform work of an experimental nature or consult with regulatory agencies which will require the Contractor to stop drilling operations. During such time it may be necessary for the drilling crew and equipment to standby during normal working hours. In such an event the representative of the Engineer shall order the Contractor to cease operations and will state the anticipated duration of the standby period. The start and stop of standby time is to be recorded on the daily logs maintained by both the Contractor's superintendent and the Engineer's representative. In the event of disagreement, payment for standby time will be based upon the records maintained by the Engineer's representative.

F. Start and stop of extra work time requested by the Engineer shall be recorded on the daily logs maintained by both the Contractor's superintendent and the Engineer's

representative. In the event of disagreement, payment for extra work time will be based upon the records maintained by the Engineer's representative.

G. The Contractor shall be responsible for performing all work as expeditiously as possible. Undue delays may result in payment by the Contractor for Engineer's time. The Owner and the Engineer must be given 36 hours written notice, exclusive of Sundays and holidays, prior to any testing, geophysical logging, or grouting. Payment to the Contractor for standby time shall commence at the end of the 36-hour notice period, as long as such time is within normal working hours. Approval for any standby time to be paid to the Contractor shall be made in writing within 48 hours of occurrence to be considered for approval by the Engineer. If the Owner and the Engineer are notified to be onsite for testing, geophysical logging, pumping tests, or cementing and the Contractor is not ready, then the Owner shall be reimbursed for the Engineer's time.

3.02 VIDEO SURVEY

A. General: Video surveys shall be conducted by a qualified service company using equipment capable of surveying and recording to the required depth. The Contractor may use his own equipment providing it is capable of surveying as required and the Contractor shall furnish proof of the capability of the equipment. The camera shall be centralized within the borehole. Color surveys shall be conducted with the camera lens in two positions, radial view and horizontal rotating. The field and final video surveys shall be provided in either DVD and/or VHS format as requested by Engineer. Four field copies of the survey shall be submitted to the Engineer following the video survey. Twenty copies of all complete surveys shall be provided by the Contractor for distribution. The Contractor shall make all arrangements and scheduling for the video survey.

B. The Contractor shall insure that the well and borehole fluid is of sufficient clarity (as determined by the Engineer) to allow a video survey to be conducted. The Contractor shall pump into (or out of) the well a quantity of clear water not less than three volumes of the entire well and borehole.

C. While pumping in the water and during the video survey, the wells may be under artesian pressure and may flow. The Contractor shall provide and use a stripper head assembly and any other equipment necessary to keep any flow under control at all times.

D. Costs for pumping clear water into the borehole to achieve the desired level of clarity for the video surveys and tapes (including time spent waiting for the video equipment) and for rig and crew labor for all activities associated with preparing for, performing and dismantling equipment related to the video survey shall be included with the testing costs for injection or monitor well.

E. Completed Injection Well Surveys: Following completion of the ASR well, the Contractor shall have a video survey performed on the entire well from land surface to total depth.

3.03 LOGGING SCHEDULES

A. A schedule of geophysical logs is presented below.

City of Naples
Geophysical Logging Schedule

Construction Phase	Approximate Depth Below Land Surface	Geophysical Logs
ASR TEST WELL (ASR-4)		
12 ¼ -inch pilot hole	0 to 450 feet	Caliper and gamma ray
42-inch reamed hole	0 to 180 feet	Caliper and gamma ray
12 ¼ -inch pilot hole	0 to 750 feet	Caliper, gamma ray, and dual-induction, sonic with VDL
34-inch reamed hole	450 to 1,250 feet	Caliper and gamma ray
24-inch casing	0 to 670 feet	Temperature log after each cement stage
24-inch final hole	0 to 670 feet	Caliper, gamma ray, dual-induction, sonic with VDL, and under static and flowing conditions – temperature, fluid resistivity, and video survey

- END OF SECTION -

SECTION 02854

GROUTING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide the work, materials, and equipment necessary for furnishing and installing the grout seal, complete.

B. The Contractor shall submit a detailed grouting plan in writing (at least 24 hours before grouting starts) prior to each grout operation for review by the Engineer. The grouting plan shall include all calculations in detail showing pre-flush volume, quantities of grout needed and pressure calculations to avoid casing collapse during grouting and chase volume. Also included shall be injection pump capacity, equipment used for mixing and grout mix, and monitoring equipment.

1.02 SUBMITTALS

A. The Contractor shall submit to the Engineer mill certificates for all dry cement delivered to the site. The Contractor shall submit all cement mixtures to the Engineer prior to placement.

B. The Contractor shall submit to the Engineer the name and qualifications of the proposed cement service company. The Engineer will review the submittal for competency.

PART 2 -- PRODUCTS

2.01 GROUT INFORMATION

A. The Contractor shall provide all grout, materials, collarless tremie pipe specifications, and equipment necessary for placement of the grout as specified.

B. All cement used for cementing of casings and plugging of boreholes shall be sulfide-resistant grout shall conform to ASTM Type II.

D. The Contractor shall provide other cementing additives formulated specifically for well cementing as provided by a service company or equal and as acceptable to the Engineer.

E. Cement emplaced at the bottom 200 feet of the casing shall be ASTM Type II (API Class B) cement mixed with no more than 5.2 gallons of water per sack of cement. Additional casing grout shall be ASTM Type II cement mixed with up to 6% bentonite (if allowed by local code) and no more than 9 gallons of water per sack of cement. No more mix water than that specified in the Halliburton Cementing Tables shall be utilized.

F. Grout can be used with additives and lost circulation materials as necessary and acceptable to the Engineer. Organic polymers, peanut shells and cotton seed hulls shall not be used as lost circulation materials. All grout mixtures shall be approved by the

Engineer in advance of placement. The unit cost for grout shall include cement and all additives and lost circulation materials.

PART 3 -- EXECUTION

3.01 GROUTING PROCEDURES

A. General: Grouting (cementing) shall be completed by a company that is expert in well cementing, such as Halliburton Services, unless the Contractor can demonstrate that he has the equipment and expertise to perform these operations. Cementing will be accomplished in stages by mean of a collarless tremie pipe with the exception of the first stage which shall be pressure grouted. After each stage of cementing and before the next stage, the Contractor shall tag the top of the cement with a collarless tremie pipe and recondition the mud to assure proper mud displacement by the cement. The method of cementing applies to all cementing procedures in all casing.

B. Cementing procedures shall be continuous for each stage after cementing begins. If loss of circulation or no return of cement is encountered, the Engineer shall be notified immediately of what remedial measures are underway to reestablish the circulation and complete the cementing program according to well design and Technical Specifications.

C. During the cementing of all strings of casing, the Contractor shall be responsible for having a sample from each cement stage collected (both dry and mixed). Mixed cement sample shall include at least three, 2-inch cubes from each cement stage.

D. If good bonding between casing, cement, and formation is not obtained, remedial work shall be done to the satisfaction of the Engineer. In addition, the Engineer may require temperature and/or cement bond logs to substantiate the effectiveness of any remedial grout work done. These operations shall be performed at the Contractor's expense.

E. During all stages of cementing, the Contractor shall use a pre-flush or spacer. The Contractor shall submit the technical specification of the pre-flush to the Engineer for review before cementing begins.

F. When the casings are being set and cemented in place, it is the Contractor's responsibility to insure that these operations are conducted in such a manner that the casing collapse and burst strengths (with safety factor) are not exceeded and the casing are not caused to fail. Cement shall be pumped or placed so that excessive pressures will not result and affect the bond.

G. During all stages of cementing the Contractor will continuously monitor the pumping rate, the total volume pumped, volume of “chase” water pumped, and the chasing pressure. This information shall be provided to the Engineer Representative.

H. The Contractor may be required to back-plug a portion of the borehole with cement. In such cases, cementing shall be done through a collarless tremie pipe positioned slightly above the bottom of the hole or top of the previous cement stage. A sufficient grout thickness shall be maintained above the discharge point to ensure that the grout mixture is not introduced directly into the water column in the well. The Contractor shall determine the volume of cement that shall be used in each grout stage and the number

of stages required to back-plug only the portion of the borehole specified by the Engineer.

I. Cementing Pilot Holes: If directed by the Engineer, the Contractor shall back-plug pilot holes with grout. Grout shall be placed in stages of with a maximum lift of 250 feet or as directed by Engineer. Each stage shall be tagged.

3.02 GROUT CURING

A. The Contractor shall allow a minimum grout curing time of at least 12 hours between each grout stage.

B. The Contractor shall not perform any work or any drilling operations until the grout has cured.

C. The Contractor shall wait a minimum of 24 hours after the completion of the last grout stage. The grouted well shall be left undisturbed for at least 24 hours for setting of the grout.

D. The Contractor shall include waiting on grout time for each grout stage in the unit price of grout pumped in the Schedule of Values.

- END OF SECTION -

SECTION 02855

GRAVEL PACK

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. This section covers the work, materials, and equipment necessary for furnishing and installing the gravel pack, complete.

PART 2 -- PRODUCTS

2.01 GRAVEL

A. Gravel: The gravel shall be thoroughly washed, sound, durable, well rounded basalt or siliceous material containing, when delivered, less than 5 percent silt and clay, no organic material, anhydrite, gypsum, mica, or calcareous material and shall be prepackaged in 100 pound or less bags. Specific gravity shall be not less than 2.5.

1. The size and gradation of the gravel packing material will be determined by the Engineer on the basis of formation samples taken by the Contractor during drilling.

2. Submit to the Engineer a 1-pound sample of proposed gravel pack material for approval prior to delivery of gravel pack to the site.

PART 3 -- EXECUTION

3.01 WORKMANSHIP

A. General: If high viscosity drilling fluid has been used in drilling, it shall be thinned with water, prior to placement of gravel.

B. Gravel Sounding Device: The Contractor shall provide a measuring device to sound the gravel level in the hole during placement to detect bridging.

C. Placing Gravel:

1. The gravel shall be introduced at a metered uniform rate in a manner that will allow even placement of the gravel. Every precaution shall be taken to ensure placement of the gravel pack continuously from the bottom of the well to a point above the well screen as determined by the Engineer, without separation or bridging of the materials as they are introduced into the well. The preferred method is by using a minimum 1-1/4-inch diameter tremie pipe with a funnel-type hopper installed at the top. A liberal amount of water (approximately 5 to 10 gallons per cubic foot of gravel) shall be introduced with the gravel pack to help prevent bridging.

2. During placement of the gravel, the top of the gravel shall be continuously sounded to measure its rate of rise and to determine if bridging is occurring. The tremie pipe or a weighted line inserted through the tremie may be used; however, other methods may be used if demonstrated to be effective and approved by the Engineer.

- END OF SECTION -

SECTION 02858

PUMPING TESTS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide the work, materials, and equipment necessary for the well pumping tests, complete. Pumping tests will be constant rate and variable rate (step drawdown) tests.

B. The length of the pumping tests is estimated to be 4 hours for variable rate pumping tests. However, the Engineer shall be the sole judge as to length of the test and therefore may increase or decrease the total pumping time.

C. The Contractor shall schedule his work so that all pumping are conducted during daylight hours. The Contractor shall notify the Engineer 72 hours prior to start of pumping test.

D. Typical pumping test will include a 24-hour background period, a 4 to 6-hour pumping period, and a 24-hour recovery period. The Contractor shall not perform any work that may affect water levels during pumping tests.

PART 2 – PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

3.01 EQUIPMENT

A. The Contractor shall provide and install a submersible pump in the pumping well capable of pumping 350 to 2,100 gpm at a constant rate, set in the well at 200 feet.

B. The Contractor shall provide a gate valve, or equal, on the discharge side of the pump, downstream of the flowmeter for adjustment of flowrate down to the required flow range.

C. The Contractor shall provide the pumping unit, controls, and appurtenances capable of continuous operation for a period of 4-6 hours. If equipment fails to operate as specified, the Contractor shall pay for all costs associated with re-running of the test in progress, including Engineer's labor and expenses.

D. Contractor shall make his own arrangements for power for the well pumping test.

E. The Contractor shall be responsible for installation and maintenance of the submersible pump, flow measuring device(s), discharge piping, access pipe and other necessary appurtenances shall be installed for the well pumping test.

F. The Contractor shall equip the wellhead with a calibrated pressure gauge (0 to 25 psi range) to monitor initial wellhead pressure.

3.02 FLOW MEASURING DEVICE

A. The Contractor shall provide a flow-meter with an indicator and a totalizer capable of measuring the pump discharge within plus or minus five percent of true flow for rates between 350 and 2,100 gpm or as required by Engineer.

B. The Contractor shall provide machined orifice plate(s) and piezometer for the pumping tests capable of measuring the pump discharge within plus or minus five percent of true flow for the above flow-rate or as required by Engineer. The Contractor shall provide a flow table for the orifice plate or flow meter, and a calibration certificate.

C. The Contractor shall provide, install, maintain, and operate discharge piping for the pump unit of sufficient size to conduct pump water to disposal area. Quantity of discharge piping needed at each location is estimated to be less than 1000 feet.

D. The Contractor shall provide and install a 1-inch diameter access pipe to permit installation of an electric measuring device. The access pipe shall be installed to a depth approximately two feet above the pump suction and be of sufficient strength to remain open for the duration of the test. The Contractor shall furnish an electronic water level indicator acceptable to the Engineer that can be used to accurately measure water levels

E. The Contractor shall provide adequate access into the well while pumping for data collection and geophysical logging tools. The Contractor shall be responsible for providing a pressure recording system capable of measuring pressure changes of 0.01 psi to measure the drawdown and recovery due to pumping at each location as directed by Engineer. The Contractor shall remove the test pump as required by the geophysical logger to install logging equipment if ample clearance is not provided.

3.03 VARIABLE RATE PUMPING TEST

A. The Contractor shall conduct a variable rate (step drawdown) pumping test prior to the constant rate pumping test. The Contractor shall operate the pumping test equipment continuously at such rates of discharge and for such period of time as determined by the Engineer. Duration of the variable rate pumping test shall be approximately four hours, for the purpose of estimating the production capacity of the well. If the same pump for the step drawdown test is also used for final well development the time between completing development and initiating the step drawdown test must be sufficient to allow the water level in the well (or shut in pressure) to return to static conditions as determined by the Engineer.

B. The Contractor shall assist the Engineer in collecting a clear water sample from each well during each step of the step drawdown test to be analyzed in the field by the Engineer for specific conductance and chloride concentrations and for laboratory analysis of chloride and TDS. The Contractor shall provide a calibrated instrument acceptable to the Engineer for conducting field measurements.

C. The Contractor shall assist the Engineer in collecting a clear water sample from each well during the step drawdown test for analysis of F.A.C. 62-550 primary and secondary drinking water standard parameters, plus alkalinity (bicarbonate and total), hardness (carbonate, magnesium, and total) total sulfide, pH, and temperature. Field measurements of specific conductance, pH, and temperature shall also be performed. The Contractor shall provide a calibrated instrument acceptable to the Engineer for conducting field measurements.

3.05 FURTHER DEVELOPMENT

A. The Contractor shall discontinue the test and resume well development if considerable quantities of fines are pumped out of the well during the test. The Engineer shall be the sole judge as to whether such additional development is necessary.

B. The Contractor shall sound the well and remove any sand or silt accumulated in the well as a result of the pumping test after completion of the pumping test.

3.06 DISPOSAL OF WATER

A. The Contractor shall be responsible for disposal of all water produced during pumping tests, including necessary permitting.

- END OF SECTION -

SECTION 02859

WELL DEVELOPMENT

PART 1-- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide all work, materials, and equipment necessary for the development of the water supply wells, complete.

B. The Contractor shall perform all well development during daylight hours.

C. The total development time is anticipated to vary per well. Cost for well development shall be on a lump sum basis. It should be noted that the Engineer shall be the sole judge as to when development is complete and may therefore increase or decrease the total development time.

1.02 SUBMITTALS

A. The Contractor shall submit to the Engineer copies of calibration certificates in advance of their use.

PART 2 – PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

3.01 MATERIALS AND EQUIPMENT

A. The Contractor shall provide all necessary compressors, piping, tools, pumps, and any other equipment to develop the wells by airlifting and high rate pumping to obtain a maximum flow.

3.02 AIR DEVELOPMENT

A. Initial development shall be by open reverse-air circulation. This shall be implemented by tripping the drill bit in the well and varying the intake depth throughout the entire open-hole section while maintaining circulation. The Contractor shall continue development until it is determined by the Engineer than all visible particulate matter has been removed from a grab sample of the developed water

B. After reverse-air development has been completed the Contractor shall initially develop the well by air surging. The Contractor shall clean the well if fines are drawn into the well excessively during air surging before continuing with air surging. Prior to removing the drill string, the Contractor shall ensure that no cuttings or debris remain in the bottom of the borehole.

3.03 DEVELOPMENT BY PUMPING

A. The Contractor shall complete well development by high rate pumping and surging. For this purpose the Contractor shall furnish and install a pump capable of withdrawing at least 2,100 gpm from each well. The wells shall be repeatedly surged during this process. A calibrated flow meter or orifice plate shall be installed on the discharge pipe to measure the pumping rate.

B. Contractor shall provide a copy of calibration certificates as part of their submittals. Certificates shall be calibrated within 90 days of use or as determined by the Engineer.

C. During pump development the Contractor shall furnish a centrifugal sand sampler, or other approved method of quantifying sand content in the parts per million range, a calibrated turbidity meter, and a silt density kit. The Contractor shall periodically sample the pump discharge for turbidity, sand content, and silt density index analysis to determine when adequate development has been achieved to the satisfaction of the Engineer. These results shall be recorded in the Contractor's daily log.

D. The Contractor shall not remove pump or appurtenant equipment until the work is complete as specified by Engineer.

E. The Contractor is solely responsible for all disposal of water during pumping tests and for obtaining all necessary permits.

3.04 WATER QUALITY ANALYSES

A. General: The Contractor, at his expense, shall perform full water quality analysis on samples from the ASR Test Well.

B. Storage Zone: The Contractor, at his expense, shall have a state certified laboratory collect a water sample from the discharge to the circulation system of each well and have it analyzed by a State certified laboratory acceptable to the Engineer. The Contractor shall have an analysis conducted on the samples for all constituents listed in Article 3.05F. The Laboratory will follow all quality assurance guidelines set forth by the State of Florida.

E. Constituents: The samples collected from the zones shall be analyzed for all constituents listed in the FAC Chapter 62-550, as primary and secondary drinking water standards, and minimum criteria constituents including analysis for microbiological, radionuclide, BOD and constituents listed under EPA Methods 608, 624, and 625 in and in the current issue (at the time of award of contract) of FAC Chapter 62-550. The laboratory will follow all quality assurance guidelines set forth by the State of Florida. The current constituents are identified in the following lists. The testing results shall also include the maximum contaminant level (MCL) of each parameter test. Test methods shall be able to detect the constituent below the MCL. Prior to testing, the list will be checked by the Engineer for changes in the regulations regarding testing. A new list of constituents will be provided if necessary.

1. Inorganic Compounds:

   Antimony
   Arsenic
   Asbestos
   Barium
   Beryllium
   Cadmium
   Chromium
   Cyanide
   Fluoride
   Lead
   Mercury
   Nickel
   Nitrate (as N)
   Nitrite (as N)
   Total Nitrate + Nitrite (as N)
   Selenium
   Sodium
   Thallium

2. Volatile Organic Compounds:

   Benzene
   Carbon tetrachloride [Tetrachloromethane]
   1,2-Dichlorobenzene [o-Dichlorobenzene]
   Volatile Organic Compounds: (Continued)

   1,4-Dichlorobenzene [p-Dichlorobenzene or para-Dichlorobenzene]
   1,2-Dichloroethane [Ethylene dichloride]
   1,1-Dichloroethylene [Vinylidene chloride]
   Cis-1,2-Dichloroethylene [1,2-Dichlorethylene]
   Trans-1,2-Dichloroethylene [1,2-Dichlorethylene]
   Dichloromethane [Methylene chloride]
   1,2-Dichloropropane
   Ethylbenzene
   Monochlorobenzene [Chlorobenzene]
   Styrene [Vinyl benzene]
   Tetrachloroethylene [Perchloroethylene]
   Toluene
   1,2,4-Trichlorobenzene
   1,1,1-Trichloroethane
   1,1,2-Trichloroethane
   Trichloroethylene [Trichloroethene, TCE]
   Vinyl chloride [Chloroethylene]

Xylenes (total)

3. Pesticides and PCBs:

Alachlor
Atrazine
Benzo(a)pyrene
Carbofuran
Chlordane
2,4-D [2,4-Dichlorophenoxyacetic acid]
Dalapon [2,2-Dichloropropionic acid]
Dibromochloropropane [DBCP]
Di(2-ethylhexyl) adipate [Bis(2-ethylhexyl) adipate]
Di(2-ethylhexyl) phthalate [Bis(2-ethylhexyl) phthalate]
Dinoseb
Dioxin [2,3,7,8TCDD]
Diquat
Endothall
Endrin
Ethylene dibromide [EDB, 1,2-Dibromethane]
Glyphosate [Roundup]
Heptachlor
Heptachlor epoxide
Hexachlorobenzene [HCB]
Hexachloracyclopentadiene
Lindane [gamma-Hexachlorocyclohexane]

Pesticides and PCBs: (Continued)

Methoxychlor
Oxamyl [vydate]
Pentachlorophenol
Picloram
Polychlorinated biphenyl [PCB, Aroclors]
Simazine
Toxaphene
2,4,5-TP[Slivex]

4. Secondary Drinking Water Standards:

Aluminum
Chloride
Color
Copper
Fluoride
Foaming Agents (Surfactants) (MBAS)

Iron
Manganese
Odor
PH
Silver
Sulfate
Total Dissolved Solids (TDS)
Zinc

5. Municipal Wastewater Minimum Criteria Ground Water Monitoring Parameters:

   a. Inorganics:

      Ammonia
      Nitrogen (organic)
      Nitrogen, Total Kjeldahl (TKN)
      Orthophosphate (soluble)
      Phosphorus

   b. Base / Neutral Organics:

      Anthracene
      Dimethylphthalate
      Naphthalene
      Phenanthrene

   c. Acid Extractables:

      2-Chlorophenol
      2,4,6-Trichlorophenol

   d. Other:

      Temperature
      Conductivity
      Biological Oxygen Demand (BOD)
      Turbidity

6. Other

   Coliform fecal
   Coliform total
   Gross Alpha
   Radium 226 and 228
   Manmade beta and photon emitters
   Trihalomethanes, total

Para-Dichlorobenzene
Specific Conductance

7. Treatment Chemicals

Acrylamide
Epichlorohydric

- END OF SECTION -

SECTION 02860

WELLHEAD CAPPING AND DISINFECTION

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide all work, materials, and equipment necessary for disinfecting each well, complete.

B. The Contractor shall be responsible for obtaining passage of bacterial tests as required by regulations.

C. The Contractor shall be responsible for complying with all the requirements specified in FAC 62-555.

D. The Contractor shall be responsible for collection and analysis of water samples for each production well. Analysis shall be for all primary and secondary drinking water parameters, and as determined by the Engineer.

1.02 SUBMITTALS

A. The Contractor shall submit to the Engineer for review detailed procedures for disinfection and testing to achieve bacteriological clearance. The procedures shall include the testing laboratory which will perform services.

B. The Contractor shall submit to the Engineer the documentation that the Laboratory used for water analysis is certified in the State of Florida.

PART 2 -- PRODUCTS

2.01 MATERIALS

A. The Contractor shall provide all chemicals and equipment necessary to perform disinfection complete. Said equipment may include pumps, hoses, fittings, etc.

B. The Contractor shall be responsible for transport and handling of all chlorine and/or disinfectants in accordance with appropriate regulations and manufacturer's recommendations.

C. The Contractor shall premix hypochlorite solutions and feed to tanks or piping. The Contractor shall not place dry mix.

PART 3 -- EXECUTION

3.01 GENERAL

A. The Contractor shall comply with AWWA C651 standards and FAC 62-555.

B. The Contractor shall dispose of any waters produced while disinfecting wells in accordance with applicable regulations.

C. The Contractor shall disinfect the well with the premixed chlorine solution as specified herein. The chlorine solution shall be prepared and applied in accordance with the manufacturer's directions. The chlorine solution shall be poured into the well and agitated throughout the full depth of the well for 5 minutes.

3.02 DISINFECTING SOLUTION

A. Following acceptance by the Engineer, the Contractor shall disinfect the wells in accordance with ANSI/AWWA A100, Standard for Water Wells and ANSI/AWWA C654, "Disinfection of Wells". The Contractor shall submit to the Engineer for review of his procedure for disinfection prior to its implementation. The Contractor shall notify the Engineer in writing at least 24 hours in advance of the implementation of the accepted disinfection procedures. The Contractor shall re-disinfect well at his own expense should the well fail to pass bacteriological clearance. The disinfected well will be tested for the presence of coli-form by the Owner in accordance with ANSI/AWWA C654. If bacterial evaluation fails, disinfection shall be repeated until the bacteriological test results indicate a pass.

B. The Contractor shall apply a disinfecting solution of such volume and strength that a concentration between 100 ppm and 200 ppm of free available chlorine shall be obtained throughout the well. Contractor shall be responsible for complying with all the requirements specified in F.A.C. 62-555.

C. The Contractor shall use a surge block as necessary for surging the well and distribution of chlorine solution.

D. The Contractor shall allow a contact period of at least 24 hours after addition of chlorine to well. The Contractor shall pump the well at the end of the 24-hour period until chlorine concentrations are less than 5 ppm.

E. Where test pumping equipment is to be used, such equipment shall be thoroughly cleaned and disinfected in accordance with AWWA A100 prior to installation.

3.03 BACTERIALOGICAL CLEARANCE

A. The Contractor shall demonstrate to the satisfaction of all applicable regulatory agencies, Owner and Engineer that the well conforms with the bacterial limits for public drinking water. If required, the Contractor shall de-chlorinate to neutralize chlorine prior to discharge (submit plan to appropriate regulatory agencies and Engineer).

B. The Contractor shall obtain the necessary bacterial samples to demonstrate bacteriologic clearance. It is assumed that approximately fourteen consecutive samples shall be needed; however, more samples may be required by the local health department. At a minimum, up to two samples collected at least six hours apart, for seven consecutive days shall be obtained and analyzed using standard procedures.

- END OF SECTION -

SECTION 03305

CONCRETE AND GROUT

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all materials for concrete in accordance with the provisions of this Section and shall form, mix, place, cure, repair, finish, and do all other work as required to produce finished concrete, all in accordance with the requirements of the Contract Documents.

B. The following types of concrete shall be covered in this Section:

1. Structural Concrete: To be used in all cases.

C. The following types of grout are covered in this Section:

1. Non-Shrink Grout: This type of grout shall be used wherever grout or cementitious grout is called for in the Contract Documents, unless another type is specifically referenced.

2. Epoxy Grout: This type of grout shall be used for grouting reinforcement steel into existing concrete and for grouting beneath equipment base and sole plates.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Codes: Without limiting the generality of other requirements of these specifications, all Work specified herein shall conform to or exceed the requirements of the Florida Building Code and the applicable requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of this Section.

ACI 315	Manual of Standard Practice for Detailing Reinforced Concrete Structures
ACI 318	Building Code Requirements of Reinforced Concrete
ACI 347	Recommended Practice for Concrete Formwork
ASTM A185	Specifications for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement
ASTM A615	Standard Specifications for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33	Standard Specifications for Concrete Aggregates

ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C94	Specification for Ready-Mixed Concrete
ASTM C143	Standard Test Method for Slump of Hydraulic Cement Concrete
ASTM C150	Standard Specification for Portland Cement
ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C579	Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars and Monolithic Surfacings
ASTM D1751	Specification for Preformed Expansion Joint Fillers for Paving and Structural Construction (Non-Extruding and Resilient Bituminous Types)
ACI	Manual of Standard Practice.

1.03 SUBMITTALS

A. Mix Designs: Prior to beginning the Work, the Contractor shall submit to the Engineer, for review, proposed concrete mix designs which shall show the proportions and gradations of all materials proposed for each class and type of concrete specified herein in accordance with Section entitled "Submittals". Mix designs shall include manufacturer's data on all admixtures. The mix designs shall be tested by an independent testing laboratory selected by the Owner. All costs related to such mix design shall be borne by the Contractor.

B. Certified Delivery Tickets: Where ready-mix concrete is used, the Contractor shall provide certified weighmaster delivery tickets at the time of delivery of each load of concrete. Each certificate shall show the public weighmaster's signature, and the total quantities, by weight of cement, sand, each class of aggregate, admixtures, and the amounts of water in the aggregate and added at the batching plant as well as the amount of water allowed to be added at the site for the specific design mix. Each certificate shall, in addition, state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to when the batch was dispatched, when it left the plant, when it arrived at the job, the time that unloading began, and the time that unloading was finished.

C. Reinforcing Steel: The Contractor shall furnish shop bending diagrams, placing lists, and Drawings of all reinforcing steel prior to fabrication in accordance with the requirements of Section entitled "Submittals."

D. Grout: The Contractor shall submit shop drawings for all types of grout to be used.

1.04 QUALITY ASSURANCE

A. Tests on component materials and for compressive strength and shrinkage of concrete will be performed as specified herein. Test for determining slump will be in accordance with the requirements of ASTM C 143.

B. The cost of all laboratory tests on cement, aggregates, and concrete, will be borne by the Contractor.

C. Concrete for testing shall be supplied by the Contractor at no cost to the Owner. The Contractor shall dispose of and clean up all excess material.

D. Field Compression Tests: Compression test specimens shall be taken during construction from the first placement of each class of concrete specified herein and at intervals thereafter as selected by the Engineer to insure continued compliance with these specifications. At least one set of test specimens shall be made for each 50 yards of concrete placed. Each set of test specimens shall be a minimum of 4 cylinders.

E. Compression test specimens for concrete shall be made in accordance with ASTM C 31. Specimens shall be 6-inch diameter by 12-inch high cylinders.

F. Compression tests shall be performed in accordance with ASTM C 39. One test cylinder will be tested at 7 days and 2 at 28 days. The remaining cylinder will be held to verify test results, if needed.

PART 2 -- PRODUCTS

2.01 CONCRETE MATERIALS

A. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Only one brand of cement shall be used. Cement reclaimed from cleaning bags or leaking containers shall not be used. All cement shall be used in the sequence of receipt of shipments.

B. All materials furnished for the Work shall comply with the requirements of ACI 301, as applicable.

C. Storage of materials shall conform to the requirements of ACI 301.

D. Materials for concrete shall conform to the following requirements:

1. Cement shall be standard brand portland cement conforming to ASTM C 150 Type II.

2. Water shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts and other impurities.

3. Aggregates shall be obtained from pits acceptable to the Engineer, shall be non-reactive, and shall conform to the FBC and ASTM C33. Maximum size of coarse aggregate shall be as specified in Paragraph 2.05B.

4. Ready-mix concrete shall conform to the requirements of ASTM C 94.

5. Air-entraining agent meeting the requirements of ASTM C 260, shall be used. Sufficient air-entraining agent shall be used to provide a total air content of 3 to 5 percent. The Owner reserves the right, at any time, to sample and test the air-entraining agent received on the job by the Contractor. The air-entraining agent shall be added to the batch in a portion of the mixing water. The solution shall be batched by means of a mechanical batcher capable of accurate measurement.

6. Admixtures: Water reducing and retarding admixture shall be added and measured as recommended by the manufacturer. The addition of the admixture shall be separate from the air entraining admixture. The addition of the admixture shall be completed within one minute after addition of water to the cement has been completed, or prior to the beginning of the last three-quarters of the required mixing, whichever occurs first. Water reducing and set retarding admixtures shall be in conformance with ASTM C 494, Type D.

2.02 CURING MATERIALS

A. Materials for curing concrete as specified herein shall be MB 429 as manufactured by Masterbuilders, Cleveland, Ohio; or equal. The curing compound shall contain a fugitive dye so that areas of application will be readily distinguishable.

B. Polyethylene sheet for use as a concrete curing blanket shall be white and have a nominal thickness of six mils.

2.03 NONWATERSTOP JOINT MATERIALS

A. Materials for nonwaterstop joints in concrete shall conform to the following requirements:

1. Preformed joint filler shall be a non-extruding, resilient, bituminous type conforming to the requirements of ASTM D 1751.

2. Elastomeric joint sealer shall be 2-part polyurethane polymer designed for bonding to concrete which is continuously submerged in water, conforming to ASTM C920.

3. Mastic joint sealer shall be a material that does not contain evaporating solvents; that will tenaciously adhere to concrete surfaces; that will remain permanently resilient and pliable; that will not be affected by continuous presence of water and will not in any way contaminate potable water; and that will effectively seal the joints against moisture infiltration even when the joints are subject to movement due to expansion and contraction. The sealer shall be composed of special asphalts or similar materials blended with lubricating and plasticizing agents to form a tough, durable mastic substance containing no volatile oils or lubricants and shall be capable of meeting the test requirements set forth hereinafter, if testing is required by the Engineer.

2.04 REINFORCING STEEL

A. All reinforcing steel for all reinforced concrete construction shall conform to the following requirements:

1. Bar reinforcement shall conform to the requirements of ASTM A 615 for Grade 60 Billet Steel Reinforcement with supplementary requirement S-1, and shall be manufactured in the United States.

2. Welded wire fabric reinforcement shall conform to the requirements of ASTM A 185. All welded wire fabric reinforcement shall be galvanized.

B. Accessories: Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers, and other devices to position reinforcement during concrete placement.

C. Concrete blocks (dobies) used to support and position reinforcement steel, shall have the same or higher comprehensive strength as specified for the concrete in which it is located. Wire ties shall be embedded in concrete block bar supports.

2.05 CONCRETE DESIGN REQUIREMENTS

A. General: Concrete shall be composed of cement, admixtures, aggregates and water. These materials shall be of the quantities specified. The exact proportions in which these materials are to be used for different parts of the Work will be determined during the trial batch. In general, the mix shall be designed to produce a concrete capable of being deposited so as to obtain maximum density and minimum shrinkage and, where deposited in forms, to have good consolidation properties and maximum smoothness of surface. The aggregate gradations shall be formulated to provide fresh concrete that will not promote rock pockets around reinforcing steel or embedded items. The proportions shall be changed whenever necessary or desirable to meet the required results at no additional cost to the Owner. All changes shall be subject to review by the Engineer.

B. Water-Cement Ratio and Compressive Strength: The minimum compressive strength and cement content of concrete shall be not less than specified in the following tabulation.

Type of Work	Minimum 28-Day Compressive Strength (psi)	Maximum Size Aggregate (in.)	Minimum Cement per cu yd (sacks)	Maximum W/C Ratio (by wt.)
Structural Concrete				
All Reinforced Concrete	4,000 (Class A)	1	6	0.45

Note: One sack of cement equals 94 lbs.

C. Adjustments to Mix Design: The mixes used shall be changed whenever such change is necessary or desirable to secure the required strength, density, workability, and surface finish and the Contractor shall be entitled to no additional compensation because of such changes.

2.06 READY-MIXED CONCRETE

A. Ready-mixed concrete shall conform to meeting the requirements as to materials, batching,

mixing, transporting, and placing as specified herein and in accordance with ASTM C 94.

B. Ready-mixed concrete shall be delivered to the site of the Work, and discharge shall be completed within one and one half hour after the addition of the cement to the aggregates or before the drum has been revolved 250 revolutions, whichever is first. In hot weather, or under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 85 degrees F or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed 60 minutes.

2.07 NONSHRINK GROUT

A. Non-shrink grout shall be a prepackaged, inorganic, non-gas liberating, nonmetallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of non-shrink grout specified herein shall be that recommended by the manufacturer for the particular application. Non-shrink grout shall be Thorite as manufactured by Thoro, or equal.

B. Non-shrink grouts shall have a minimum 28 day compressive strength of 5000 psi and shall meet the requirements of CRD C 621.

C. A bonding admixture shall be added to the non-shrink grout to improve adhesion and curing. The bonding admixture shall be Acryl 60 as manufactured by Thoro, or equal.

2.08 EPOXY GROUT

A. Epoxy grout shall be a pourable, non-shrink, 100 percent solids system. The epoxy grout system shall have three components: resin, hardener, and specially blended aggregate, all premeasured and prepackaged. The resin component shall not contain any nonreactive diluents. Resins contained butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are not acceptable. Variation of component ratios is not permitted unless specifically recommended by the manufacturer. Manufacturer's instructions shall be printed on each container in which the materials are packaged.

B. The chemical formulation of the epoxy grout shall be that recommended by the manufacturer for the particular application.

C. The mixed epoxy grout system shall have a minimum working life of 45 minutes at 75 degrees Fahrenheit.

D. The epoxy grout shall develop a compressive strength of 5000 psi in 24 hours and 10,000 psi in seven days when tested in accordance with ASTM C 579, Method B. There shall be no shrinkage (0.0 percent) and a maximum 4.0 percent expansion when tested in accordance with ASTM C 827.

2.09 EPOXY BONDING COMPOUND

A. The epoxy bonding shall be a high-modulus, high-strength, moisture-insensitive, epoxy adhesive. The epoxy bonding system shall be a two-component, 100 percent solids, epoxy-resin. The epoxy bonding compound shall be used to bond new concrete to sound hardened concrete. The epoxy bond shall be E-bond 580 or equal.

PART 3 -- EXECUTION

3.01 PROPORTIONING AND MIXING

A. Proportioning: Proportioning of the concrete mix shall conform to the requirements of Chapter 3 "Proportioning" of ACI 301.

B. Mixing: Mixing of concrete shall conform to the requirements of Chapter 7 of said ACI 301 Specifications.

C. Slump: Maximum slumps shall be 3 inches, plus or minus 1 inch.

D. Re-tempering: Re-tempering of concrete or mortar which has partially hardened will not be permitted.

3.02 PREPARATION OF SURFACES FOR CONCRETING

A. General: Earth surfaces shall be thoroughly wetted by sprinkling, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing cement.

B. No concrete shall be placed until the reinforcement steel and formwork have been erected in a manner acceptable to the Engineer. The Contractor shall notify the Engineer not less than 2 working days prior to concrete placement, allowing for review and any corrective measures which are required.

C. Existing concrete surfaces upon or against which concrete is to be placed shall be given a roughened surface for good bond. Joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material. Such cleaning shall be accomplished by sandblasting followed by thorough washing. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.

D. All anchor bolts called for on the drawings shall be cast-in-place in the concrete. Drilled, impact, adhesive or other types of anchors shall not be substituted for anchor bolts.

E. Corrosion Protection: Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there will be a minimum of two inches clearance between said items and any part of the concrete reinforcement will not be permitted. Securing such items in position by wiring or welding them to the reinforcement will not be permitted.

F. Anchor bolts shall be accurately set, and shall be maintained in position by templates while being embedded in concrete.

G. Cleaning: The surfaces of all metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

3.03 HANDLING, TRANSPORTATION, AND PLACING

A. General: Placing of concrete shall conform to the applicable requirements of Chapter 8 of ACI 301 and the requirements of this Section.

B. Nonconforming Work or Materials: Concrete which upon or before placing is found not to conform to the requirements specified herein shall be rejected and immediately removed from the Work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality, shall be removed and replaced by, and at the expense of, the Contractor.

C. Unauthorized Placement: No concrete shall be placed except in the presence of duly authorized representative of the Engineer. The Contractor shall notify the Engineer in writing at least 24 hours in advance of placement of any concrete.

D. Placement in Slabs: Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the pour. As the Work progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screeded in an up-slope direction.

3.04 FINISHING CONCRETE SURFACES

A. General: Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface. Allowable deviations from plumb or level and from the alignment, profiles, and dimensions shown on the Drawings are defined as tolerances and are specified herein. These tolerances are to be distinguished from irregularities in finish as described herein. Aluminum finishing tools shall not be used.

B. Unformed Surfaces: After proper and adequate vibration and tamping, all unformed top surfaces of slabs, floors, walls, and curbs shall be brought to a uniform surface with suitable tools. The classes of finish specified for unformed concrete surfaces are designated and defined as follows:

1. Slabs: The surface shall be given a light hair-broom finish with brooming perpendicular to drainage unless otherwise shown. The resulting surface shall be rough enough to provide a nonskid finish.

3.05 CURING AND DAMPPROOFING

A. All concrete shall be cured for not less than 14 days after placing, in accordance with the methods specified herein for the different parts of the Work, and described in detail in the following paragraphs.

B. The surface shall be sprayed with a liquid curing compound. It shall be applied in accordance with the manufacturer's printed instructions at a maximum coverage rate of 200 square feet per gallon and in such a manner as to cover the surface with a uniform film which will seal thoroughly.

C. Care shall be exercised to avoid damage to the seal during the curing period. Should the seal be damaged or broken before the expiration of the curing period, the break shall be

repaired immediately by the application of additional curing compound over the damaged portion.

D. Wherever curing compound may have been applied by mistake to faces against which concrete subsequently is to be placed and to which it is to adhere, said compound shall be entirely removed by wet sandblasting just prior to the placing of new concrete.

E. Curing compound shall be applied as soon as the concrete has hardened enough to prevent marring on uniformed surfaces, and within 2 hours after removal of forms from contact with formed surfaces. Repairs required to be made to formed surfaces shall be made within the said 2-hour period; provided, however, that any such repairs which cannot be made within the said 2-hour period shall be delayed until after the curing compound has been applied. When repairs are to be made to an area on which curing compound has been applied, the area involved shall first be wet-sandblasted to remove the curing compound, following which repairs shall be made as provided herein.

3.06 PROTECTION

A. The Contractor shall protect all concrete against injury until final acceptance by the Owner. Fresh concrete shall be protected from damage due to rain. The Contractor shall provide such protection while the concrete is still plastic and whenever such precipitation is imminent or occurring.

3.07 TREATMENT OF SURFACE DEFECTS

A. As soon as forms are removed, all exposed surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted. No repairs shall be made until after inspection by the Engineer. In no case will extensive patching of honeycombed concrete be permitted. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall have them repaired as specified herein. Concrete containing extensive voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced. All repairs and replacements herein specified shall be promptly executed by the Contractor at its own expense.

3.08 CARE AND REPAIR OF CONCRETE

A. The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed Work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with the acceptable concrete at the Contractor's expense.

3.09 FABRICATION OF REINFORCING STEEL

A. Reinforcing steel shall be accurately formed to the dimensions and shapes shown on the

Drawings, and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318, except as modified by the Drawings.

3.10 PLACING REINFORCING STEEL

A. Reinforcing steel shall be accurately positioned as shown on the Drawings, and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcing steel shall be supported by concrete, plastic or metal supports, spacers or metal hangers which are strong and rigid enough to prevent any displacement of the reinforcing steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used, in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. All concrete blocks used to support reinforcing steel shall be tied to the steel with wire ties which are embedded in the blocks. For concrete over formwork, the Contractor shall furnish concrete, metal, plastic, or other acceptable bar chairs and spacers.

3.11 CLEANING AND PROTECTION OR REINFORCING STEEL

A. Reinforcing steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.

B. The surfaces of all reinforcing steel and other metalwork to be contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed. Where there is a delay in depositing concrete, reinforcing shall be re-inspected and, if necessary re-cleaned.

3.12 GROUT INSTALLATION

A. All surface preparation, curing, and protection of cement grout shall be as specified herein. The finish of the grout surface shall match that of the adjacent concrete.

B. The Contractor through the manufacturer of non-shrink grout and epoxy grout shall provide on-site technical assistance to the Engineer upon request, at no additional cost to the Owner.

C. All mixing, surface preparation, handling, placing, consolidation, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.

D. Grout shall be placed in such a manner, for the consistency necessary for each application, so as to assure that the space to be grouted is completely filled.

- END OF SECTION -

SECTION 15100

VALVES AND APPURTENANCES

PART 1 -- GENERAL

1.01 SCOPE

A. Furnish and install, all valves complete with accessories, and special equipment as shown on the Drawings and specified herein.

1.02 GENERAL INFORMATION AND DESCRIPTION

A. The equipment covered by these specifications is intended to be standard equipment of proven performance as manufacturer by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practice of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

1.03 SUBMITTALS

A. Each submittal shall be complete in all aspects incorporating all information and data listed herein and all additional information required to evaluate the proposed valve's or hydrant's compliance with the Documents. Partial or incomplete submissions shall be returned to the Contractor disapproved without review.

B. Data to be submitted shall include but not be limited to:

1. Catalog Data consisting of specifications, illustrations and a parts schedule that identifies the materials to be used for the various parts and accessories. The illustrations shall be in sufficient detail to serve as a guide for assembly and disassembly.

2. Complete assembly and installation drawings with clearly marked dimensions. This information shall be in sufficient detail to serve as a guide for assembly and disassembly and for ordering parts.

3. Weight of all component parts and assembled weight.

4. Design calculations.

5. Listing of all lubricants required for the equipment with a minimum of two equivalent and compatible natural and/or synthetic lubricants produced by different manufacturers. The listing shall include the estimated quality of lubricant required for one year of operation.

6. Sample data sheet of equipment nameplate(s) including information contained thereon.

7. Spare parts list.

8. Special tools list.

C. The Contractor shall obtain from the manufacturer and submit to the Engineer copies of the results of all certified shop tests.

D. The Contractor shall obtain from the manufacturer and submit to the Engineer copies of certified letters of compliance in accordance with the General Conditions and Division 1.

1.04 TOOLS, SUPPLIES AND SPARE PARTS

A. The Contractor shall obtain from the equipment manufacturer and submit to the Engineer the following spare parts lists in accordance with the procedures and requirements set forth in the General Conditions and Division 1.

1. A complete list of parts and supplies with current unit prices and source of supply.

2. A list of parts and supplies that are either normally furnished at no extra cost with the purchase of the valve or hydrant as specified herein to be furnished as part of the Contract. (This list shall be submitted as part of the shop drawing submission).

B. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same parts number.

C. The Contractor shall also compile from the shop drawing submittals and furnish a comprehensive list of all special tools required for the equipment.

D. For each solenoid valve, provide a spare solenoid coil, suitably boxed and labeled, as elsewhere specified.

PART 2 -- PRODUCTS

2.01 GENERAL

A. The valves and accessories shall be in the quantity, quality, types and sizes as indicated on the Drawings and specified herein.

B. Operation of valves and gates shall be designed so that the effort required to operate the handwheel, lever or chain shall not exceed 40 pounds applied at the extremity of the wheel or lever. The handwheels on valves 14 inches and smaller shall not be less than 8 inches in diameter, and on valves larger than 14 inches the handwheel shall not be less than 12 inches in diameter.

C. Except where noted otherwise, all interior and exposed valves shall be handwheel or lever operated if the centerline of the valve operator is within 6 feet of the floor or platform from which it is to be operated, and chain wheel operated if the distance is greater than 6 feet unless otherwise shown on the Drawings. Chains shall extend to within three (3) feet from the operating floor. Rotated operators shall be supported independent of the valve to prevent torsional loads induced on the piping system.

D. All operators, unless otherwise specified, shall turn counter-clockwise to open. Operators shall have the open direction clearly and permanently marked. All valve operators, manual,

motor and pneumatic, shall be provided with the valve by the valve manufacturer. The valve manufacturer shall be solely responsible for the selection of the proper operator to meet the operating conditions specified herein. Field calibration and testing of the operators and valves to ensure a proper installation and an operating system shall be the responsibility of the valve manufacturer.

E. All valves shall have a minimum design pressure rating of 150 psi and capable of a test pressure of 300 psi. For service applications with pressures in excess of 150 psi, valves shall have a minimum pressure rating in excess of the service application working pressure. All above grade, interior valves with a nominal pipe size of three inches and larger shall have flanged ends unless otherwise noted. All above grade, interior valves less than 3-inch size shall be threaded ends. Buried service valves shall have mechanical joint pipe ends. Buried service valves shall be provided with AWWA operating nuts, extension stems and cast iron valve boxes. Extended valve stems, stem guides and operating nuts shall be provided as indicated or required.

F. All valves of one type shall be the product of one manufacturer.

G. Levers shall be provided at each lever operated valve.

H. Cast iron parts of valves shall meet the requirements of ASTM A 126, "Standard Specifications for Gray Iron Castings for Valves, Flanges and Pipe Fittings, Class 'B'". Flanged ends shall be flat-faced and have bolt circle and bolt patterns conforming to ANSI B16.1 Class 125 unless otherwise specified hereinafter. All castings shall be clean and sound, without defects of any kind and no plugging, welding or repairing of defects will be permitted. All bolt heads and nuts shall be hexagonal conforming to ANSI B18.2. Gaskets shall be full face and made of natural or synthetic elastomers in conformance with ANSI B16.21 suitable for the service characteristics especially chemical compatibility and temperature. Nonferrous alloys of various types shall be used for parts of valves as specified. Where no definite specification is given, the material shall be the recognized acceptable standard for that particular application.

I. All valves shall have applied to them the same coatings as the adjacent piping.

J. All valves which are dead ends for active pipelines shall be provided with blind flanges or plugs to prevent leakage.

K. Raised face flanges in conformance with ANSI B16.5 Class 150 will not be acceptable. All raised faces shall be milled flat.

2.02 COMBINATION VACUUM AND RELEASE AIR VALVE

A. The six-inch combination air release and air and vacuum valves on the injection well heads shall be of the float-operated type, comprised of an air and vacuum valve and an air release valve completely piped and assembled together. Both valves shall be designed for a working pressure of 150 psi and service on a 24-inch diameter pipe carrying a flow of up to 18 mgd. The air release valve shall be two-inch NPT inlet size with a 3/8-inch diameter orifice. The combination shall include the two-inch diameter Schedule 40 316SS connecting piping and a two-inch diameter 316SS ball valve. The combination air release valve shall be Valve and Primer Corporation, APCO Model 153/200, Crispin Model C262/P20, or equal.

B. Stainless steel ball valves shall be Type 316 stainless steel body and trim, Teflon seats and seals and flanged or threaded connections as indicated on the Drawings or as required by the piping. Valve body shall be either two or three piece design; no internal ring for the ball shall be acceptable. Valves shall be class 150. Valves shall be supplied with stainless steel manual lever and shall be manufactured by Jamesbury Corporation, Jenkins Bros., Wm. Powell Company or equal.

2.03 AWWA C507 BALL VALVES

A. Ball valves shall be of the full port, dual seated, resilient seated type conforming to the latest revision of AWWA C507 Specifications.

B. Ball valves shall be AWWA Class 150, unless otherwise indicated in the valve schedules, designed with flanged ends.

C. Resilient seats shall be located in the valve body. Dual seats of Buna-N rubber shall be furnished.

D. Valves otherwise indicated, all ball valves shall have manual, right angle actuators with handwheels. Actuators shall conform to the requirements of Section entitled "Valves and Appurtenances".

E. Manufacturers:

1. Apco Willamette
2. Golden-Anderson
3. Henry Pratt Company
4. or Equal

2.04 PVC AND CPVC

A. Ball valves shall be manufactured from PVC or CPVC compounds and shall have Viton or Teflon seals and O-ring seals to suit the intended chemical service requirements. PVC valves shall be provided on PVC and fiberglass piping. CPVC valves shall be provided on CPVC piping. Ball valves shall be full port type with flanged or threaded union ends, G.F. Plastics Type 346 (union), Type 370 (flanged), Asahi / America Duo Bloc, or equal.

2.05 GATE VALVES

A. <u>For Nominal Pipe Sizes Less Than Three Inches</u>: Gate valves for above ground service for less than 3 inches in diameter shall conform to the requirements of Federal Specification WW-V-54 for Class B, Type II, and shall be bronze, double disc, solid wedge, rising stem, inside screw, screwed bonnet, 150 pound S.P., 300 W.O.G. with stuffing box re-packable under pressure and all renewable parts. Ends shall be as shown or indicated on the Contract Drawings.

B. Small gate valves shall be as manufactured by Crane Company No. 431 or 435-UB to match application, or equal.

C. For Nominal Pipe Sizes Three Inches and Larger: Valves for nominal pipe sizes 4 to 12 inches shall have resilient seats and non-rising stems with double O-ring stem seals conforming to AWWA C509. Valves ends shall be flanged, mechanical joint, or "ring-tite" joint as required for the type of pipe used. Valves shall be provided with 2-inch square operating nuts. Valves for buried service larger than 12 inches shall be double disc type with non-rising stems equipped with double O-ring seals conforming to AWWA C500.

2.06 GAUGE COCKS

A. Gauge cocks shall be screwed, all bronze, tee handle, as manufactured by Crane Co. Model No. 712 or 744.

PART 3 -- EXECUTION

3.01 INSTALLATION

A. The procedures regarding unloading, inspection, storage and where applicable installation, described in the Appendix of AWWA C500 entitled "Installation, Operation and Maintenance of Gate Valves" shall be used for all valves.

B. All valves shall be manually opened and closed before installation to check their operation, and the interior of the valves shall be cleaned. Valves shall be placed in the positions shown on the Drawings. Joints shall be made as directed under the piping specifications.

C. All circular butterfly valves shall be installed with the shaft in a horizontal position. Operators shall be provided with the necessary gearing to be positioned as shown on the Drawings.

3.02 TESTING

A. All valves shall be hydrostatically field tested at the pipeline test pressures specified in the piping sections. Any leakage or "sweating" of joints shall be stopped and all joints shall be tight. All motor operated and cylinder operated valves shall be tested for control operation as directed by the Engineer. All valves shall be tested for control operation as directed by the Engineer. All valves shall be operated at the pressures specified in the piping schedules for the connected pipe.

B. Testing shall be performed in accordance with the specifications and the ANSI and/or AAWA standards contained herein including leakage tests. Copies of the certified test results shall be provided by the manufacturer to the Contractor and submitted in accordance with the Section entitled "Submittals" to the Engineer.

C. The Owner may at its discretion visit and inspect the manufacturer's facilities. During the inspection visit, a witness shop test shall be performed for all standard tests listed in applicable standards.

D. The Contractor shall obtain and submit certified statements that the valves and hydrants comply with the requirements of the standards specified herein.

3.03 PAINTING

A. Valves and hydrants shall be shop primed and field coated for interior and exposed piping in accordance with Division 9 "Finishes" or as requested by Owner.

- END OF SECTION -

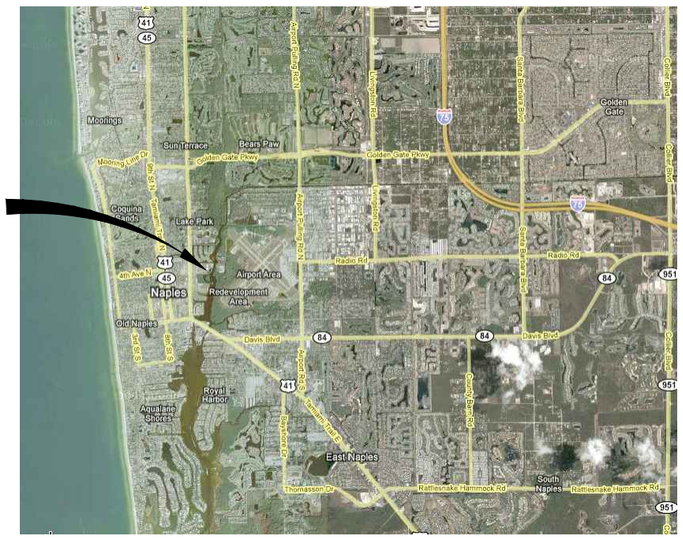
CITY OF NAPLES

AQUIFER STORAGE AND RECOVERY TEST WELL

CITY OF NAPLES, FLORIDA
ON THE GULF

LIST OF DRAWINGS

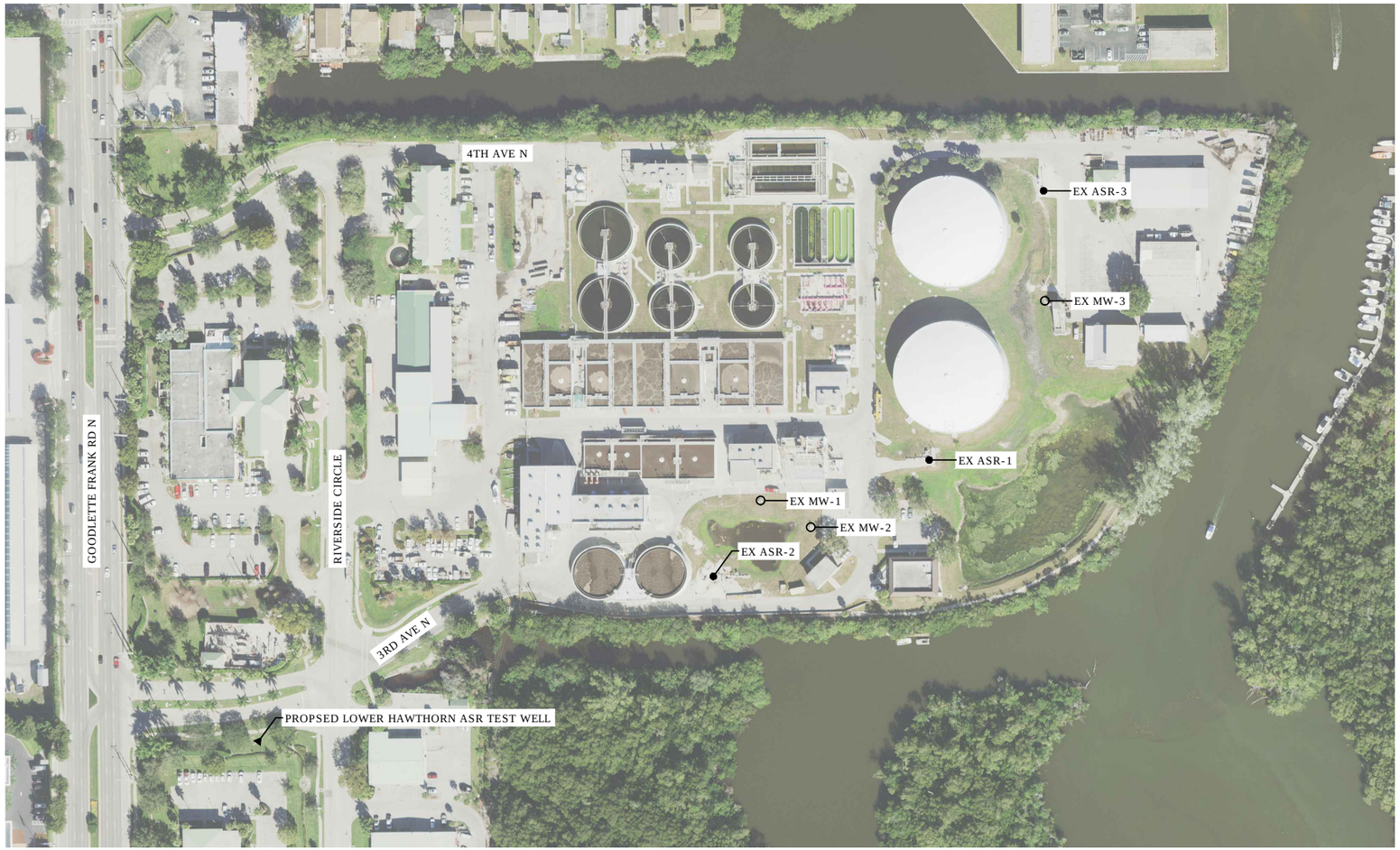
SHEET NUMBER	SHEET TITLE
G01	COVER SHEET, LOCATION MAP AND DRAWING INDEX
C01	ASR TEST WELL SITE MAP
M01	ASR TEST WELL DETAILS
M02	TEST WELL DETAILS



LOCATION MAP
N.T.S.

JANUARY 2016

HAZEN AND SAWYER
Environmental Engineers & Scientists
2101 Corporate Boulevard, Suite 301
Boca Raton, Florida 33431
Certificate of Authorization Number: 2771



CITY OF NAPLES WATER RECLAMATION FACILITY

1"= 100'-0"

N

GENERAL NOTES:

1. THE CONTRACTOR WILL BE PROVIDED WITH A STAGING AREA BY THE OWNER. IF ADDITIONAL STAGING AREA IS REQUIRED THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR OBTAINING OFFSITE STAGING.
2. CONTRACTOR SHALL MAINTAIN ACCESS TO PRIVATE PROPERTY AT ALL TIMES.
3. CONTRACTOR SHALL MAINTAIN HIS WORK WITHIN THE AREA DESIGNATED BY THE OWNER.
3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES TO PROTECT EXISTING PIPELINES OR UTILITIES WHETHER SHOWN OR NOT.
4. THE CONTRACTOR SHALL ENSURE THAT ALL NECESSARY PERMITS ARE IN HAND BEFORE COMMENCEMENT OF CONSTRUCTION.
5. ALL PRACTICAL AND NECESSARY EFFORTS SHALL BE TAKEN DURING CONSTRUCTION TO PREVENT UNNECESSARY TREE REMOVAL AND OR DAMAGE.
6. CONTRACTOR SHALL COORDINATE DISCHARGE OF DRILLING FLUIDS WITH OWNER AND ENGINEER, AND SHALL BE RESPONSIBLE FOR TURBIDITY CONTROL DURING ALL ACTIVITIES. CONTRACTOR SHALL ALSO COMPLY WITH ANY AND ALL APPLICABLE STANDARDS AND REGULATIONS FOR DISCHARGE AND DISPOSAL OF FLUIDS AND CUTTINGS.

1"=100'-0" 100 50 0 100'

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER: A.M.
DESIGNED BY: A.M.
DRAWN BY: F.C.B.
CHECKED BY:
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

ALBERT MUNIZ, P.E. NO. 35587

Hazen
HAZEN AND SAWYER
2101 CORPORATE BOULEVARD, SUITE 301
BOCA RATON, FLORIDA 33431
CERTIFICATE OF AUTHORIZATION NO. : 2771

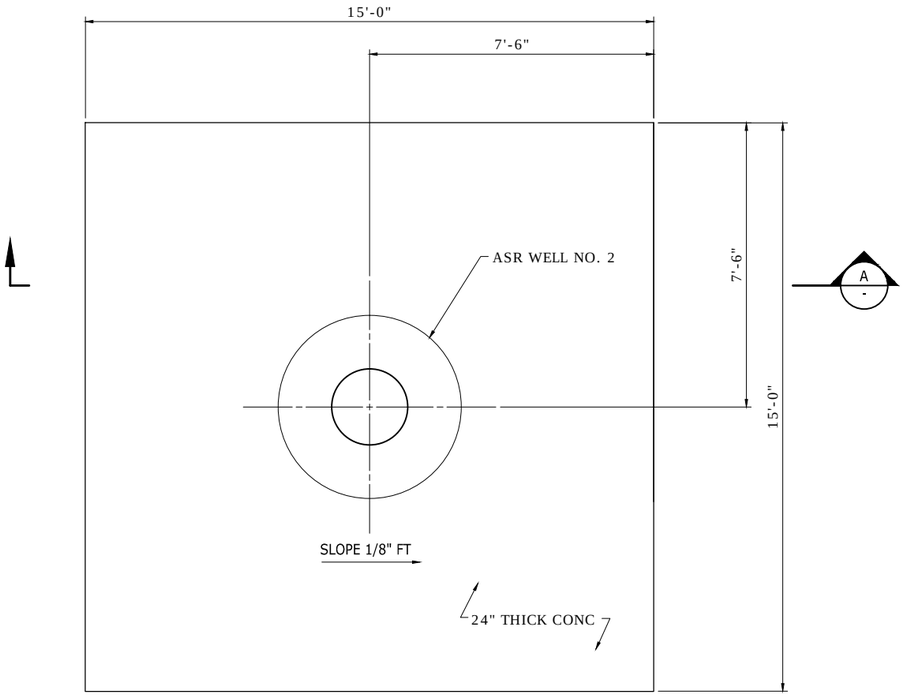
CITY OF NAPLES

AQUIFER STORAGE AND RECOVERY TEST WELL

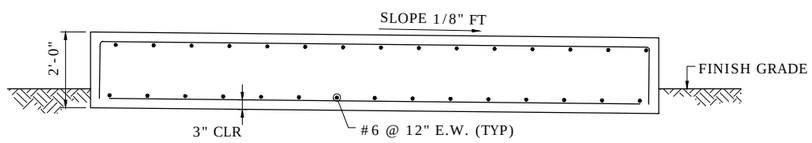
ASR TEST WELL SITE MAP

DATE: JANUARY 2016
HAZEN NO.: 43201-002
CONTRACT NO.:
DRAWING NUMBER: C01

File: C:_PROJECTS\43201-002\C01_43201-002 Saved By: FBENNETT Save Date: 2016/01/19 8:26 AM
PLOT DATE: 2016/01/29 10:08:48 AM BY: FBENNETT

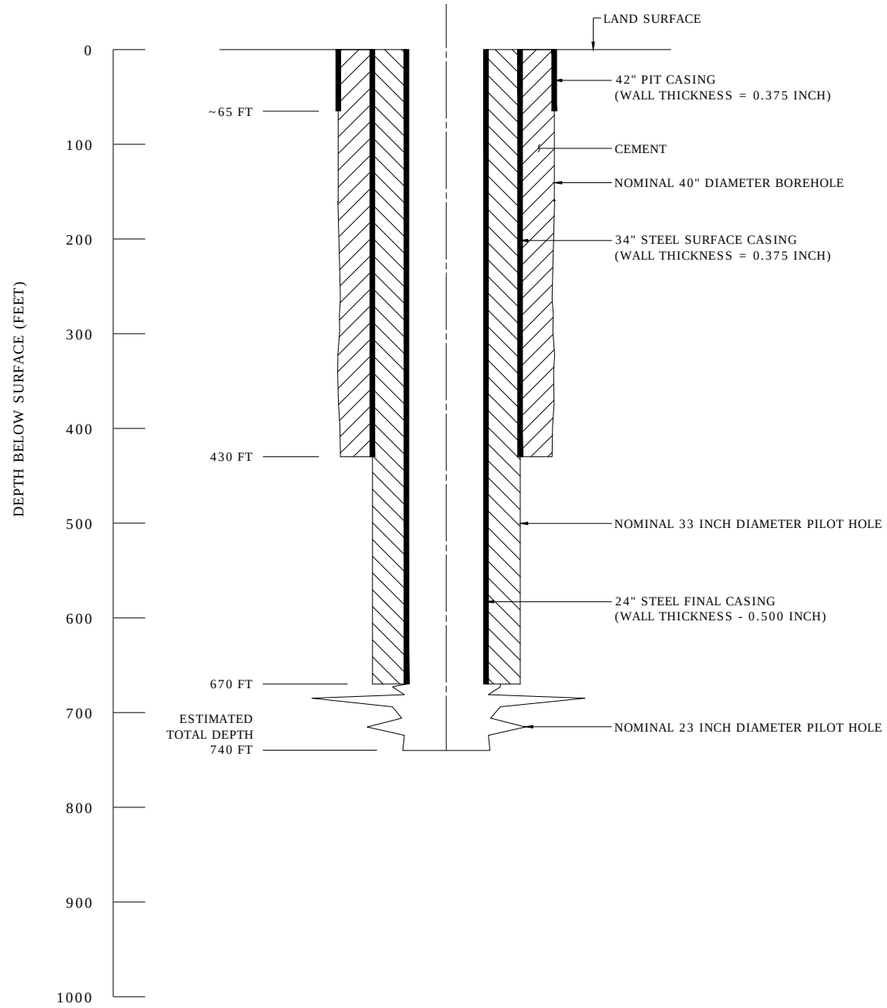


PLAN
1/2"= 1'-0"



SECTION A
1/2"= 1'-0"

ASR TEST WELL PAD DETAIL
1/2"= 1'-0"



ASR TEST WELL
1/2"= 1'-0"

1/32"=1'-0" 32 16 0 32'

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	A.M.
DESIGNED BY:	A.M.
DRAWN BY:	F.C.B.
CHECKED BY:	

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

ALBERT MUNIZ, P.E. NO. 35587

Hazen
HAZEN AND SAWYER
2101 CORPORATE BOULEVARD, SUITE 301
BOCA RATON, FLORIDA 33431
CERTIFICATE OF AUTHORIZATION NO. : 2771

CITY OF NAPLES

AQUIFER STORAGE AND RECOVERY
TEST WELL

ASR TEST WELL DETAILS

DATE:	JANUARY 2016
HAZEN NO.:	43201-002
CONTRACT NO.:	
DRAWING NUMBER:	M01

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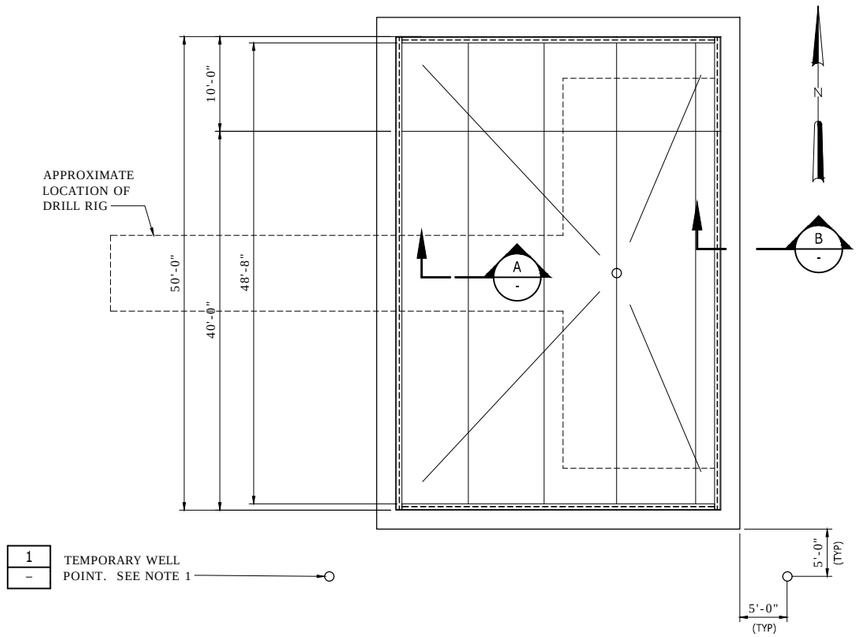
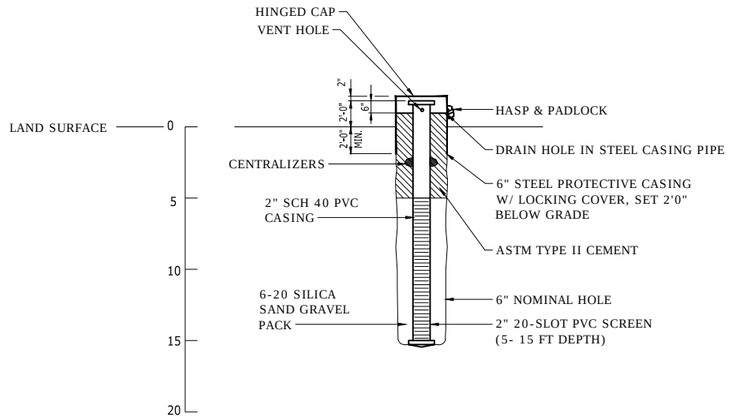


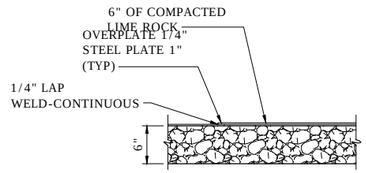
PROPOSED TEMPORARY STEEL DRILLING PAD

1/8" = 1'-0"



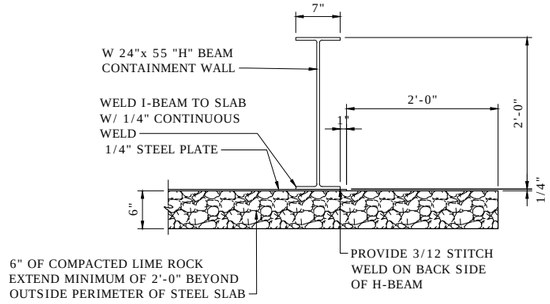
TEMPORARY WELL POINT

DETAIL 1 / NTS -



TYPICAL LAP JOINT

SECTION A / 1"= 1'-0" -



TYPICAL WALL SECTION

SECTION B / 1"= 1'-0" -

NOTES:

1. TEMPORARY WELL POINTS SHALL BE INSTALLED PRIOR TO START OF DRILLING OPERATIONS AND SHALL BE REMOVED AFTER COMPLETION OF DRILLING AND TESTING.
2. THE DRILLING PAD SHALL BE CONSTRUCTED OF CONTINUOUS 1/4" THICK ASTM A36 STEEL PLATE. ALL WELDING FOR THE STEEL DRILLING PAD AND CONTAINMENT WALL TO BE 1/4" CONTINUOUS IN ACCORDANCE WITH THE AMERICAN WELDING SOCIETY STRUCTURAL WELDING CODE WHICH SHALL BE WATERTIGHT.
3. SITE EXCAVATION AND BACKFILL FOR THE COMPACTED LIMEROCK BASE SHALL BE IN ACCORDANCE WITH FDOT STANDARD SPECIFICATION SECTION 120 TO A DENSITY OF 98%. ANY REQUIRED STABILIZATION SHALL BE IN ACCORDANCE WITH FDOT STANDARD SPECIFICATION SECTION 160.
4. THE STEEL DRILLING PAD SHALL PITCH TO THE SUMP ON A 6" COMPACTED LIMEROCK BASE CONSTRUCTED IN ACCORDANCE WITH FDOT STANDARD SPECIFICATION SECTION 200 COMPACTED TO 98% DENSITY.
5. EXACT DEPTH OF WELL AND SCREEN SETTING WILL BE DETERMINED IN THE FIELD. TOP OF SCREEN WILL BE A MINIMUM OF 5 FEET BELOW WATER TABLE.
6. CONTRACTOR IS RESPONSIBLE FOR PROVIDING DRILLING PAD DETAILS TO ACCOMMODATE HIS OPERATIONS.

1"=1'-0" 12" 6 0 1'

1/8"=1'-0" 8 6 4 2 0 8'

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	A.M.
DESIGNED BY:	A.M.
DRAWN BY:	F.C.B.
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CITY OF NAPLES

AQUIFER STORAGE AND RECOVERY TEST WELL

TEST WELL DETAILS

DATE:	JANUARY 2016
HAZEN NO.:	43201-002
CONTRACT NO.:	
DRAWING NUMBER:	M02

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